Submitted To:

GOVERNMENT OF NEPAL

MINISTRY OF ENERGY

Through

Department of Electricity Development

Submitted By:

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कार्यकारी सारांश

१.० प्रस्तावक

पस्तावित **" कावेली कोरीडर१३२ के.भि. प्रशारण लाइन"** आयोजनाको प्रस्तावक निम्न अनुसार रहेको छ ।

वातावरण तथा सामाजिक अध्ययन विभाग
नेपाल विद्युत प्राधिकरण
जमल, काठमाण्डौं
पोष्ट वक्स नं.: १००२०
फोन: ००९७७ १ ४२२६८८९
फ्याक्स नं.: ००९७७ १ ४२४३७४६

२. प्रस्ताव

हाल नेपालको पूर्वान्चल विकास क्षेत्रमा इलाममा १७ (६७ मे.वा), पाँचथरमा ४ (३२ मे.वा.) र ताप्लेजुङ्गमा १४ (३१२ मे.वा.) जलविद्युत आयोजनाहरु लाई उत्पादनकौ लागी स्विकृती प्रदान गरि्एको छ । यसका अतिरिक्त उक्त क्षेत्रमा सर्वेक्षण अनुमतिका लागि आवेदनको प्रक्रियामा रहेका विभिन्न ३३ (९५० मे.वा.) जलविद्युत आयोजनाहरु रहेका छन् । त्यस क्षेत्रमा प्रशारण लाईनकौ अभावका कारण जलविद्युत आयोजनाहरु बन्न नसकैकौ सिथिती छ । प्रस्तावित कावेली कोरीडर १३२ के.भि. प्रशारण लाइन आयोजनाले प्रथम चरणमा उत्पादनका लागी स्विकृती प्रदान गरिएका केहि आयोजनाको विद्युत प्रशारण लाई सहयौग पुर्‍याउने छ । प्रस्तावित कावेली कोरीडर १३२ के.भि. प्रशारण लाइन आयोजना चार वटा जिल्लाका विभिन्न २५ गा.वि.स. हुदै जाने छ । आयोजनाले छुने गा.वि.स. हरुमा तह्रथुमको छातेढुङ्गा, पाँचथरको अमरपुर, सुभाङ्ग, भारप्पा, फिदिम, चोकमागु, सिवा, नवमिडाँडा, इम्बुङ्ग, पौवासारताप, र चिलिङ्गदेन, इलामको फाकफोक, चमैता, एकातप्पा, मंगलवारे, साङ्गरुम्वा, सिद्धिथुम्का, सोयाक, गोदक, चिसापानी, दानावारी, महमाइ, वाँझो र चुलागुली तथा झापा जिल्लाको लखनपुर गा.वि.स. रहेका छन् ।

रहने प्रस्तावित कावेली कोरीडर १३२ के.भि. प्रशारण लाइन आयोजनाले

झापाको सावित्रा चोकमा रहने १३२ के.मि. सवस्टेशनवाट शुरु हुने यस आयोजना उत्तर पूर्व दिशामा चाजु खोला, चुरे पहाड, माइ खोला, तथा महाभारत पर्वत श्रृंखला र उपत्यका का भू-भागहरु हुँदै जाने छ । इलामको सोयाक गा.वि.स. वाट भने प्रशारण लाइन दुइ भागमा विभक्त भइ एउटा इलामकै गोदक गा.वि.स. को सेतुवा वेशीमा रहने १३२ के.भि. सवस्टेशनमा जाने छ भने अर्को लाइनले पाँचथरको अमरपुर गा.वि.स. पिनासीघाटमा रहने अर्को १३२ के.भी. सवस्टेशनलाई जोड्ने छ । आयोजना आरम्भ हुने स्थान (सावित्रा चोक, झापा) काठमाण्डौंवाट पूर्व करिव ६०० कि.मि. को दुरीमा रहेको छ ।

३. कार्यविधि

प्रस्तुत प्रारम्भिक वातावरणीय परिक्षण अध्ययन विभिन्न प्राथमिक तथा अन्य अध्ययनका आधारमा तयार गरिएको हो । प्राथमिक अध्ययनका निम्ति अध्ययन टोलीले विभिन्न नक्साको अध्ययन तथा स्थलगत रुपमा भौतिक, जैविक, तथा सामाजिक आर्थिक अवस्थाको अध्ययन गरेको थियो । उक्त अध्ययनमा रुख तथा बोट विरुवाको नमूना विश्लेषण, सर्वेक्षण तथा प्रभावित जनसमुदायसँग गरिएका छलफल समावेश थिए । प्राप्त आँकडाहरुलाई जी. आई. एस., विज्ञहरुको व्यक्तिगत अनुभव र विगतमा भएका समान किसिमका अध्ययनका आधारमा विश्लेषण गरिएको थियो ।

४. वातावरणीय निती तथा कानूनहरुको विवेचना

वातावरण सरक्षण ऐन (१९९७) तथा वातावरण सरक्षण नियमावली (१९९७) र यसका संसोधनहरुले निर्दिष्ट गरे बमोजिम प्रस्तावित आयोजना कार्यान्वयन गर्नु पूर्व यसको प्रारम्भिक वातावरणीय परीक्षण अध्ययन गराई उर्जा मन्त्रालयबाट स्वीकृत गराउनु पर्ने प्रावधान रहेको छ । यसका अलावा अन्य नियम कानूनहरुको अधिनमा रहि प्रारम्भिक वातावरणीय परीक्षण अध्ययन गर्नु पर्ने प्रावधान रहेको छ । यस खण्डमा ति सबै नियम कानूनहरुको विवेचना गरिएको छ ।

५. अध्ययनका आवश्यकताहरु

यस खण्डमा अध्ययनको समय, अनुमानित बजेट तथा विशेषज्ञता समावेश गरिएको छ ।

६. आयोजनाको वातावरणीय अवस्थिति

६.१ भौतिक वातावरण

प्रस्तावित आयोजना दक्षिणको तराई भेग (१३० देखि ५००मी. र कुल प्रशारण लाइनको ८%), देखि उत्तर पूर्व सिवालिक (१८० देखि ५००मी. र कुल प्रशारण लाइनको १२ %), महाभारत (५०० देखि २०७३मी. र कुल प्रशारण लाइनको ५१%) र मध्य पहाडी भेग (५०० देखि १४४७मी. र कुल प्रशारण लाइनको २९%) सम्म बिस्तारित छ ।

भौगर्भिक दृष्टिकोणवाट प्रस्तावित आयोजना गैर-हिमाली र हिमाली भौगर्भिक क्षेत्रमा विस्तार भएको छ । तराइ क्षेत्रमा बहने खोलाहरुका कारण यहाँ माटोको राम्रो विकास भएको देखिन्छ भने सिवालिक क्षेत्रमा माटोको विकास कम भएको देखिन्छ । गर्मीयाम प्रायः तातो सुख्खा र आर्द्रता युक्त रहने गरेको छ भने जाडो याममा चिसोको प्रभाव उचाई अनुसार फरक छ । समग्र आयोजना क्षेत्रमा वार्षिक वर्षा १८०० मि.मि. देखि २८०० मि.मि. सम्म रहेको छ । आयोजना क्षेत्रको वायु, ध्वनि र पानीको गुणस्तर सापेक्षरुपमा स्वच्छ रहेको छ । भु-उपयोगको हकमा प्रस्तावित आयोजना क्षेत्रको कुल भू-भाग मध्ये ५०.५ प्रतिशत कृषि, ३९.३१ प्रतिशत वन जंगल, ५.४५ प्रतिशत खोलानाला, ३.९८ प्रतिशत वन्जर जमिन तथा वाँकि क्षेत्र वाटोघाटोले ओगटेको छ ।

६.२ जैविक वातावरण

प्रस्तावित आयोजनाले नेपाल सरकारवाट संरक्षित कुनै पनि संरक्षण क्षेत्रलाई छुदैन । आयोजना विस्तार हुने क्षेत्र वरपर पाइएका प्रमुख प्रकारका वन जंगलहरुमा साल, मिश्रित साल, साल चिलाउने, चिलाउने, कटुस-सल्ला, मिश्रित लालिगुराँस, सल्ला, उत्तिस र मिश्रित उत्तिस आदि पर्दछन् ।

आयोजना क्षेत्रमा विभिन्न १०५ प्रजातीका अन्नवाली, दाल, तथा फलफुल पाइने गरेको छ । मुख्यतया: वन्यजन्तु उत्पादनमा आश्रित जनसमुदायले २६ प्रकारका घाँसेवाली तथा ४ प्रजातीका गैरकाष्ठ वन पैदावार प्रयोग गर्ने गरेको पाइएको छ । स्थानिय रुपमा प्रयोग हुने करिव २८९ जंगली प्रजातीका वनस्पती मध्ये १६४ प्रजाती औसधि, १५ प्रजाती सजावट, १८ प्रजाती घाँसेवाली, ३० प्रजाती काठ, २ प्रजाती दाउरा, ६० प्रजाती गैरकाष्ठ वन पैदावार, ७ प्रजाती फलफुल आदिका रुपमा प्रयोग हुदै आएका छन् । सूचिकृत गरिएको कुल वनस्पती मध्ये २१ विभिन्न प्रजातीका वनस्पती नेपाल सरकार, साइटिस र आइ.यू.सि.एन. का विभिन्न संरक्षण सूचिमा रहेको पाइएको छ ।

६.३ सामाजिक-आर्थिक वातावरण

आयोजनाद्धारा प्रभावित गा.वि.स. हरुको कुल जनसंख्या १६८७४७ रहेको छ । र यो संख्या आयोजना प्रभावित जिल्लाहरुको जनसंख्याको १३ प्रतिशत हुन आउछ । उक्त गा.वि.स. हरुको औषत परिवार संख्या ५.३४ रहेको छ भने पुरुष महिला अनुपात १:१.०२ रहेको छ । ७० भन्दा वढि जातजातिको वसोवास भएपनि लिम्वु (२४ प्रतिशत) र राई (१७ प्रतिशत) को वाहुल्यता रहेको छ । त्यसपछि भने वाहुन (१५ प्रतिशत), क्षेत्री (११ प्रतिशत), तामाङ्ग (६ प्रतिशत), कामी (६ प्रतिशत) र मगर (३ प्रतिशत) को वासोवास रहेको छ । आयोजना संचालन हुने गा.वि.स हरुमा ५७ प्रतिशतजनसंख्या नेपाली भाषी र २६ प्रतिशत जनसंख्या लिम्वु भाषी छन् । आयोजना प्रभावित गा.वि.स. हरुमा ६ वर्ष उमेर समूह माथिका जनसंख्याको साक्षरता प्रतिशत ६३ रहेको छ भने २२५ शैक्षिक संस्था दर्ता गरिएका छन् । जसमध्ये ६७ प्रतिशत प्राथमिक विद्यालय छन् । त्यसैगरी२१ वटा उप-स्वास्थ्य चौकी, २ वटा स्वास्थ्इ चौकी, २ वटा स्वास्थ्य केन्द्र र एउटा अस्पताल छन् । उक्त गा.वि.स. हरुमा प्रमुख रुपमा विद्यमान रोगहरुमा श्वासप्रस्वास प्रणालीमा हुने संक्रमण, झाडा पखला, रगत मासी, चर्मरोग र ग्याष्ट्रिक रहेका छन् । आर्थिक रुपमा सक्रिय १० वर्ष माथिको जनसंख्या ८१ प्रतिशत रहेको छभने ९१ प्रतिशत घरधुरी संग जमिन, र पशु पंक्षिको स्वामित्व रहेको छ ।
अध्ययनको क्रममा प्रसारण लाइनको लागि पहिचान गरिएको ठाउँ आसपासका २०५ घरधुरीमा सामाजिक-आर्थिक सर्वेक्षण गरिएको थियो । सर्वेक्षित घरधुरीको कूल जनसंख्या १२४४ रहेको छ, औषत परिवार संख्या ५.०८ रहेको छ भने पुरुष महिला अनुपात १:०.९२ रहेको छ । सर्वेक्षित घरधुरीमध्ये ६३.१८ प्रतिशत ले जनजातिको प्रतिनिधित्व गरेका छन्, भने २७.८९ प्रतिशत ले उच्च जातीय वर्गको प्रतिनिधित्व गरेका छन्, त्यसपछि दलित (८.९२ प्रतिशत) रहेका छन् । धार्मिक दृष्टिकोणबाट सर्वेक्षित घरधुरीहरु चार विभिन्न धर्म मान्दै आएका छन् जसमा हिन्दु (४७.३२ प्रतिशत), किराँत (३३.६६ प्रतिशत), बौद्ध (१६.५९ प्रतिशत) र इसाई (२.४४ प्रतिशत) रहेका छन् ।

सर्वेक्षित घरधुरीको ६ वर्ष माथिको जनसंख्या मध्ये ८३.८४ प्रतिशत साक्षर छन् । उक्त घरधुरीमध्ये ३०.२४ प्रतिशत घरहरुमा विद्युतीकरण भएको छ भने बाँकी घरधुरीले बत्ती बाल्नका निम्ति अन्य स्रोतहरुको प्रयोग गर्ने गरेका छन् । खाना बनाउने उर्जाको हकमा लगभग सबै घरधुरीले दाउराको प्रयोग गरेको पाइयो । अधिकांक सर्वेक्षित घरधुरीमा (७०.४२ प्रतिशत) खानेपानीका निम्ति धाराको सुविधा राहेको छ भने ६४.३९ प्रतिशत घरधुरीमा चर्पी बनाइएको छ । स्वास्थ्य परामर्शका लागि अधिकांश सर्वेक्षित घरधुरीले स्वास्थ्यकर्मीको सल्लाह लिने गरेको पाइयो भने अन्यले परम्परागत उपचारको विधि अपनाउने गरेको पाइयो । सर्वेक्षित घरधुरीहरुमा पाइएका प्रमुख स्वास्थ्य समस्यामा सामान्य रुघाखोकी ज्वरो, नशा सम्बन्धि रोग, श्वासप्रश्वास र मुटु तथा उच्चरक्तचाप रहेको छ । संस्थागत रुपमा लगभग ५०.२ प्रतिशत घरधुरीका सदस्यहरु विभिन्न समूह (सामुदायिक वन उपभोक्ता समिति, जल उपभोक्ता समिति) मा संलग्न रहेको पाइयो ।

सर्वेक्षित घरधुरीका जनसंख्याको प्रभुख हिस्सा (३७.५४५) कृषिमा संलग्न रहेको छ, त्यसपछि क्रमश: वैदेशिक रोजगार (५.७१ प्रतिशत), व्यापार (५.२३ प्रतिशत), नोकरी (३.३ प्रतिशत) र दैनिक ज्यालादारी (१.७१ प्रतिशत) मा संलग्न रहेका छन् । सर्वेक्षित घरधुरी मध्ये ९६ प्रतिशत घरधुरीसँग कुनै न कुनै रुपमा आयोजना क्षेत्रमा घर-जग्गा रहेको छ भने करिब ४ प्रतिशत सँग जग्गा छैन ।

औषतमा प्रत्येक घरधुरी संग १.२२ हे. भूस्वामित्व रहेको छ । जसमा अधिकांस वारी रहेको छ । उक्त क्षेत्रमा खेती हुने प्रमुख वालीहरुमा धान, गहुँ, मकै, कोदो, दाल, तोरी, फापर र आलु रहेका छन् । भने प्रमुख नगदेवालीमा चिया, अदुवा, अलैची, अम्रीसो, र अकवरे रहेका छन् । करिव ८० प्रतिशत सर्वेक्षीत घरधुरीलाई आफ्नै जमिनको उत्पादनले खान पुगेका छैन ।
आय आर्जनको हकमा सर्वेक्षित घरधुरीको औषत वार्षिक आम्दानी रु ३०७००६ रहेको छ । आम्दानीको प्रमुख श्रोतको रुपमा वैदेशिक मुद्रा (२३.९७ प्रतिशत), ऋण (२४.९४ प्रतिशत), पशुपालन (१०.३६ प्रतिशत), व्यापार तथा उद्योग (१०.२१ प्रतिशत), कृषि -९.४६ प्रतिशत) र नगदे वाली (६.७७ प्रतिशत) रहेको छ भने स्वास्थ्य तथा शिक्षा (१८.३६ प्रतिशत) रहेको छन् । सर्वेक्षित घरधुरीको औषत वार्षिक खर्च रु २५०४२८ रहेको छ ।

७. वातावरणीय प्रभावहरु

७.१. भौतिक वातावरण

भौतिक वातावरणमा पर्नसक्ने प्रमुख नकारात्मक असरहरु निम्न छन् ।

- भु-उपयोगमा आउने परिवर्तन
- विद्युतीय र चुम्बकीय प्रभावबाट पर्नेसक्ने असर

भौतिक वातारणमा पर्नसक्ने प्रभावहरु निम्न छन् ।

- भु-क्षयबाट हुनसक्ने जोखिमको न्यूनिकरण
- भिरालो जमिनको स्थीरता

७.२. जैविक वातावरण

जैविक वातावरणमा पर्नसक्ने प्रमुख नकारात्मक असरहरु निम्न छन् ।

- १९.४७२ हे. सरकारी वन, २३.८०१ हे. सामुदायिक वन र १५.९८१ हे. निजी वनमा पर्ने प्रभाव

- विभिन्न तहमा हुर्किरहेका विभिन्न प्रजातिका रुखहरुको नोक्सानबाट हुनजाने करिब रु. १०३५८२५० बराबरको क्षति
- पंक्षीहरुको आवतजावतमा पर्नसक्ने असर
- जैविक विविधतामा हुनसक्ने अतिक्रमण

सकारात्मक प्रभावहरु

- प्रसारण लाइनको निर्माण पश्चात बन्न जाने डढेलो नियन्त्रण रेखा
- जीवहरुको निम्ति उत्पन्न हुने नयाँ पर्यावरणीय इकाई

७.३ सामाजिक-आर्थिक तथा सांस्कृतिक वातावरण

सामाजिक -आर्थिक तथा सांस्कृतिक वातावरणमा पर्ने प्रमुख असरहरु निम्न रहेका छन् ।

- ९१४ घरधुरीको स्वामित्व रहेको ९६.४१५ हे. जमिनको स्थायी रुपमा हुने क्षति
- ५५ घरधुरीको स्वामित्व रहेको ६.९८ हे. जमिनको अस्थायी रुपमा हुने क्षति
- १८ स्थायी र ५ अस्थायी गरि कुल २३ संरचनाको क्षतिवाट हुने करिव रु ८०५०००० वरावरको क्षति
- स्थायी रुपमा हुने जग्गाअधिकरणवाट अन्नवाली घाँसेवाली र फलफुल उत्पादनमा आउने ह्रासवाट हुन जाने करिव रु ८६३२३८७ वरावरको क्षति
- १९.४८ हे. सरकारी वन २३.८ हे. सा.वन. १५.९८ ह. निजी वन गरी कुल ५९.२५ हे. वनमा पर्ने क्षती
- पेशागत स्वास्थ्यमा पर्ने जोखिम
- सामुदायिक स्वास्थ्य र सरसफाइमा पर्नसक्ने जोखिम

सामाजिक-आर्थिक र सांस्कृतिक वातावरणमा पर्नसक्ने प्रमुख सकारात्मक प्रभावहरु निम्न छन् ।

- आयोजनास्थल वरपर वृद्धि हुने आर्थिक क्रियाकलाप
- स्थानीयवासीलाई प्राप्त हुने रोजगारीको अवसर
- आयोजना निर्माणको क्रममा विकास हुने नयाँ सीप

८. विकल्पहरुको विश्लेषण

आयोजनाको विषयमा निर्णय लिनु अघि यसको संरचना, आयोजना निर्माणस्थल, प्रविधि, कार्यविधि, समय तालिका, प्रयोग हुने निमार्ण सामग्री, वातावरण व्यवस्थापन संयन्त्र तथा यसको निर्माणबाट हुनसक्ने जोखिमको विषयमा विभिन्न विकल्पहरुको विश्लेषण गरिएको थियो । उक्त विश्लेषणका आधारमा आयोजनाको प्रस्तुत प्रारुप नै सबैभन्दा उत्तम हुने देखिन्छ ।

९.० न्यूनिकरण तथा अभिवृद्धिका उपायहरु

९.१ न्यूनिकरण

९.१.१ भौतिक वातावरण

भौतिक वातावरणमा पर्ने नकारात्मक असरहरु न्यूनिकरण गर्न र सकारात्मक असरहरुको वृद्धि गर्न परियोजनाले विभिन्न उपायहरु अवलम्बन गरेको छ । टावर राख्ने स्थानहरुको भूस्थिरताका बारेमा पुनः जाँच गरिने छ र त्यस क्षेत्रमा उपयुक्त गहिराईसम्म मात्र खन्ने कार्य गरिने छ । टावर रहेको स्थान नजिकका भूस्खलन हुन सक्ने स्थान र खोल्साखोल्सीहरु बायोइन्जिनियरिङ्गको मद्दतले नियन्त्रण गरिने छ र पहिले देखि नै चलनमा रहेका गोरेटो-घोडेटोद्वारा टावर रहेको ठाउँ र तार जाने स्थानमा चाहिने बस्तुहरु पुऱ्याउन कालागि प्रयोग गरिनेछ । तार जाने बाटोमा पर्ने ठूला रुख काट्दाको क्षति, क्षतिपूर्ति वृक्षारोपणको मद्दतले पूर्ति गरिने छ । अत्यावश्यक नपर्दासम्म ROW मा रहेका रुख-विरुवा विशेष गरि भिरालो जमिनमा काटिने छैनन् र वन मासिएको भूमिमा सानो उचाईका गैरकाष्ठ वन पैदावार रोपिने छ । कृषियोग्य जमिन, सो कार्यका लागि नै प्रयोग गर्न स्वीकृति दिइने छ । ठूला मेशिनहरु सव-स्टेशन बाहेकका क्षेत्रमा प्रयोग गरिने छैनन् । ध्वनि प्रदुषण हुने कार्यहरु दिनको समयमा मात्र गरिने छ । तरल तथा ठोस फोहरहरु सुरक्षित ठाउँमा जम्मा गरिने छ र सुरक्षित स्थानमा नै विसर्जन गरिने छ । प्रयोग भएका तेल, मोबिल र अन्य रासायनिक फोहरहरुलाई पनि सुरक्षित स्थानमा जम्मा गरिने छ र इन्जिनियरको सल्लाह अनुसार नष्ट गरिने छ । आवश्यकता अनुसार अनियन्त्रितरुपमा हुने शौचकार्य नियन्त्रणका लागि क्याम्प र कार्यक्षेत्रमा आवश्यकता अनुसार शौचालयको व्यवस्था गरिने छ । काम गर्दा जथाभावी उड्ने धुलो कम गर्न नियमित रुपमा पानी छर्किने छ । दाउराको प्रयोग कम गर्नका लागि क्याम्प क्षेत्रमा सहुलियत दरको मट्टितेल वा ग्यासको प्रयोग गरिने छ । ट्रान्समिसन लाइन जाने स्थानका वासिन्दाहरुलाई सुरक्षाका निम्ति विशेष सचेतनाका अभियानहरु चलाइने छ । निर्माण लागत र वातावरण सुधार लागतमा नै भौतिक असरहरुको क्षतिपूर्ति व्यवस्था गरिएको हुँदा यसका लागि थप लागत छुट्याउनु पर्ने देखिदैन ।

९.१.२ जैविक वातावरण

जैविक वातावरणमा पर्न जाने नकारात्मक असरहरु कम गर्न र सकारात्मक असरहरुको वृद्धि गर्न परियोजनाले निर्माण तथा सञ्चालनको अवस्थामा विभिन्न उपायहरु सिर्जना गरेको छ । नकारात्मक असरहरु न्यून गर्न डेढ मिटर सम्मका घाँस तथा झाडीहरु फडानी गरिने छैन । धेरै अग्ला हुने खालका रुखरु काट्नुको सट्टा छटानी गरिने व्यवस्था पनि मिलाईएको छ । कामदारहरुलाई खाना बनाउन दाउराको प्रयोगमा नियन्त्रण गरिने छ । बोट विरुवाहरुलाई नचाहिएको अवस्थामा मास्न खोज्ने कामदारलाई सजायँ दिइने छ । साथै क्षतिपूर्ति वापत १ रुख बराबर २५ रुख वृक्षारोपण कार्य गरिने छ ।

जैविक वातावरणमा पर्नजाने जोखिम न्यूनिकरण गर्न र सकारात्मक प्रभावहरुको अभिवृद्धिकरण गर्न निर्माण लागतमा थप रु २०८८५८५६.२५ को व्यवस्था गरिएको छ ।

९.१.३ सामाजिक आर्थिक तथा सांस्कृतिक वातावरण

सामाजिक तथा आर्थिक वातावरणमा पर्ने नकारात्मक असरहरु न्यून गर्ने र सकारात्मक असरहरुको वृद्धि गर्न परियोजनाले निर्माण तथा सञ्चालनको अवस्थामा विभिन्न उपायहरुको अवलम्बन गरेको छ । आयोजना सञ्चालन गर्दा हुने जग्गा जमिन, खेतबारीमा लगाइएका बाली, घाँसे रुख र फलफुल खेती नष्ट हुने देखिएमा बजारभाउ अनुसार क्षतिपूर्ति प्रदान गर्ने छ । प्रत्येक घरधुरीलाई भत्काइएका संरचनाहरु अन्यत्र सार्न वा ओसारपसार गर्नुपर्ने अवस्थामा यातायात खर्च आयोजनाले व्यवस्था गर्ने छ । साथै घर सार्दा आईपर्ने अप्ठ्यारो तथा दैनिक

जीविकोपार्जनमा हुने कष्टलाई ध्यानमा राख्दै योजनाले भत्काइएका घरधुरीलाई ६ महिनासम्म भर्पाई गर्ने छ । व्यक्तिगत, सामुदायिक तथा कबुलियती वनका रुख काट्न परेमा वन निर्देशिका २००६ बमोजिम क्षतिपूर्ति दिईने छ । गैरकाष्ठ वनपैदावार बढाउने विभिन्न उपायहरुका बारेमा सामुदायिक वन उपभोक्ता समूहलाई तालिम दिइने छ । साथै यस्ता पैदावार योजनाको तार जाने क्षेत्रको जमिनमा रोप्न प्रोत्साहन गरिने छ । साथै सामुदायिक वन तथा कबुलियती वनका इच्छुक उपभोक्तालाई क्षतिपूर्तिको रुपमा गर्ने वृक्षारोपण कार्यक्रममा जागिरको व्यवस्था गरिने छ । आयोजना निर्माणका क्रममा टेलिफोन तथा बिजुलीको रोकावट हुने देखिएमा पूर्वजानकारी गराईने छ र आयोजनाको काम सम्पन्न भएपछि पुनः सञ्चालन गरिने छ । प्रत्यक्ष असर पर्ने घरधुरीलाई आयोजनामा प्राथमिकता साथ जागिरको व्यवस्था गरिने छ । जागिर दिने क्रममा लिङ्गभेदको वेवास्ता गरिने छ । महिला, रैथाने, जनजाति तथा लोपोन्मुख समुदायलाई प्राथमिकताका साथ जागिर तथा तालिममा स्थान दिइने छ । समुदायका महिला, स्थानीय बासिन्दा र उनीहरुको रीतिरिवाज तथा संस्कृतिलाई सम्मान गर्न कामदारहरुलाई नियमित रुपमा सुझाव गरिने छ । परियोजनाको कार्य गर्दा, कामदारहरुलाई, क्याम्पमा नै रहन सुझाव दिइने छ र व्यक्तिगत क्षेत्रमा प्रवेश गर्नुपरेमा अनुमति लिएर मात्र अगाडि बढ्न प्रोत्साहन गरिने छ । कार्य योजना र कार्यस्थलका बारेमा स्थानीय प्रशासनका अंगलाई नियमित रुपमा जानकारी गराइने छ । परियोजनाको काम अगाडि बढाउँदा कामदारहरुद्वारा पर्नसक्ने असर न्यून गर्न प्रभावित गा.वि.स.का विद्यालयलाई सहयोग गरिने छ । यसका साथै क्याम्पलाई आवश्यकता पर्ने वस्तुहरुको व्यवस्था गर्न क्याम्प भित्रै व्यवस्थित पसल, स्वास्थ्य संस्था र खानेपानीको उचित व्यवस्था गर्ने छ । कामदारहरुको स्वास्थ्य प्रति सचेत रहि परियोजनाले निर्माणको अवस्थामा उनीहरुको स्वास्थ्य र सुरक्षाको योजना बनाएर कार्यान्वयन गर्ने छ । कामदारहरुलाई काम गर्दा हुनसक्ने खतराका बारेमा नियमित रुपमा जानकारी गराइने छ साथै सुरक्षाका साधनहरु वितरण गरिने छ । प्राथमिक उपचार सामग्री प्रत्येक कार्यस्थलमा राखिने छ । कामदारहरुलाई निःशुल्क कण्डोमको व्यवस्था गरिने छ । यसका साथै क्याम्पको सरसफाईका लागि, जस्तै खानेपानी, चर्पी तथा तरल तथा ठोस फोहरहरु विशेष कार्यक्रम ल्याएर व्यवस्था गरिने छ । प्राकृतिक स्रोत खन खोरस गर्दा सकेसम्म चाहिने र थोरै मात्रामा गरिने छ साथै काटिएका वन पैदावार नजिकै र वातावरणीय मैत्री रुपमा राखिने छ । आर्थिक-सामाजिक र सांस्कृतिक वातावरणमा पर्नजाने नकारात्मक असर न्यूनिकरण गर्न परियोजनाको लागतमा ने.रु. ९,०९,४३,५९१।०० थप गरि छुट्याइएको छ ।

९.२. अभिवृद्धिकरण उपायहरु

आयोजना क्षेत्रमा पर्न जाने विभिन्न क्षतिको मध्यनजर गर्दै, आयोजनाले वातावरण अभिवृद्धिका विभिन्न कार्यक्रम तार जाने क्षेत्रमा लागु गर्नेछ । यस्ता कार्यक्रमको मुख्य उद्देश्य वातावरणमा सकारात्मक असरहरुको अभिवृद्धि गर्ने र नकारात्मक असरहरु न्यून गर्ने रहने छन्। समुदायको संसाधन तथा वनजंगलमा नकारात्मक असरहरु कम गरिने छन् । वातावरण अभिवृद्धिका लागि क) दक्षताका लागि तालिम ख) जैविक विविधताका लागि तालिम ग) गैर काष्ठ वन पैदावारका लागि सहयोग घ) सामुदायिक वन गठनका लागि सहयोग रहेका छन् । वातावरण अभिवृद्धिका लागि कुल आगतमा ने.रु. ९५,००,०००।०० थप व्यवस्था गरिएको छ ।

१०.० वातावरणीय व्यवस्थापन योजना

वातावरणीय व्यवस्थापन आवश्यकताको लागि काबेली कोरिडोर परियोजनाले वातावरणीय व्यवस्थापन योजना तयार गरेको छ । सो योजना अनुरुप आयोजनाले न्यूनिकरणका उपाय र अनुगमनका आवश्यकता आयोजनाको क्रमिक चरणमा अवलम्बन गर्ने छ । आयोजनाको वातावरणीय व्यवस्थापन योजना लागु गर्ने प्रमुख दायित्व रहने छ र यो कार्य आयोजनाका अन्य सरोकारवालाहरुसँग संयोजन गरि अगाडि बढाइने छ । यसरी संयोजना गर्दा मुलःत वातावरण मन्त्रालय, उर्जा मन्त्रालय, वन तथा भु-संरक्षण मन्त्रालय, राष्ट्रिय निकुञ्ज तथा वन्यजन्तु संरक्षण विभाग, विद्युत विकास विभाग, वन विभाग, जिल्ला वन कार्यालय, गा.वि.स., निरीक्षण गर्ने इन्जिनियर र परियोजनाका ठेकेदार पर्दछन् । यस योजनाले परियोजना व्यवस्थापन कार्यालय अन्तर्गत वातावरण व्यवस्थापन कार्यालयका विभिन्न संरचना खडा गर्ने छ र साथमा सम्बन्धित सरोकारवालाहरुको परियोजनाको विभिन्न चरणमा रहने भूमिका र दायित्वको उल्लेख गर्दछ । परियोजनाको विभिन्न चरण अन्तर्गत निर्माण पूर्व, निर्माण, निर्माण पश्चात र सञ्चालन रहने छन् ।

११. आयोजनाका लागत र फाइदा

प्रशारण लाइन आफैले प्रत्यक्ष आम्दानी नगर्ने भएपनि, यसले आवश्यक परेको ठाउमा उत्पादित विद्युतलाई पुऱ्याइ अन्यक्षेत्रको आम्दानीमा सहयोग पुऱ्याउछ । यसकारण, आयोजनावाट संभावित प्रत्यक्ष आम्दानी पहिल्यै अनुमान गर्न कठिन छ । यसका अतिरिक्त, आयोजनाले आयोजना क्षेत्रको उद्योग विकासमा टेवा पुर्याउने, रोजगारीका नयाँ संभावनाको सिर्जना, स्थानियको कार्यक्षमताको अभिवृद्धि, प्रशारण लाइनका टावरहरु निर्माणको तालिम, निर्माण क्रममा हुने अन्य आर्थिक गतिविधिको अभिवृद्धि, गैरकाष्ठ वन पैदावारको उत्पादनमा हुने उन्नति लगायत स्थानीय स्तरमा रु ९५ लाख वरावरको वातावरणीय अभिवृद्धिकरणका कार्यक्रम आदि भने आयोजनावाट हुन सक्ने अन्य फाइदाहरु हुन् । उल्लेखित फाइदाहरुका कारण राष्ट्रिय विकास लक्ष्यहरु जस्तै गरिवी निवारण, आर्थिक क्रियाकलापको विविधिकरण र महत्वपूर्ण रुपमा नेपाली नागरिकको सामाजिक सेवा र जीवन स्तरको स्तरोन्नतिमा टेवा पुऱ्याउने छ ।

आयोजना अन्तर्गत प्रशारण लाइन र सवस्टेशन निर्माणका लागि कुल लागत करिव रु २ अर्व रहेको छ । भने आयोजनाका कारण हुने क्षति जस्तै कृषि योग्य जमिन र स्थानिय प्राकृतिक श्रोतको क्षति (रु ३.२३ करोड), उत्पादन क्षति (रु २४.८ लाख), वनस्पति क्षति (रु ३.४७ करोड) गर्दा हुने कुल क्षति (रु ७.०१ करोड) कुल आयोजना लागत को ३.४९ प्रतिशत हुन आउँछ । यस वाहेक वातावरणीय प्रभाव न्यूनिकरण, अनुगमन, वातावरणीय लेखा परिक्षण र वातावरणीय अभिवृद्धिकरणको निम्ति रु १२.०४ करोड, खर्च हुने देखिन्छ, जुन आयोजना निर्माण लागतको ५.९९ प्रतिशत हुन आउँछ ।

१२. निष्कर्ष

अध्ययनको क्रममा पहिचान गरिएका सम्पूर्ण नकारात्मक प्रभावहरुलाई व्यवहारिक न्यूनिकरणका उपायहरुको अवलम्वन वाट स्वीकार योग्य तहसम्म ल्याउन सकिने देखिन्छ । वातावरण अभिवृद्धिकरण कार्यक्रम मार्फत प्रभावित हुनसक्ने समुदायको जीवनस्तर पनि माथि उठाउन सकिन्छ । यी कुराहरुलाई मध्यनजर गर्दा, अध्ययन प्रतिवेदनमा उल्लेख गरिएको प्रभाव न्यूनिकरण र वातावरणीय अभिवृद्धिकरणका उपायहरुलाई वातावरण व्यवस्थापन योजना अनुरुप अवलम्वन गर्दै आयोजना निर्माणका निम्ति इजाजत दिन सुझाव दिइन्छ ।

Executive Summary

1.0 Proposal Proponent

The proponent of the Kabeli Corridor 132 kV Transmission Line Project (KCTLP) is as under:

Environmental and Social Study Department (ESSD)
Nepal Electricity Authority
Jamal, Katmandú
P.O.Box : 10020
Tel: 00977-1-4226889
Fax: 00977-1-4243746

2.0 The Proposal

As of the date there are 17 hydropower projects in the Ilam district (67MW), 4 projects in Panchthar (32MW), and 14 projects in Taplejung (312MW). All of the above projects from Ilam, Panchthar, and Taplejung have been licensed for development. It is to be emphasized that additional 33 hydropower projects of above 950 MW have applied for survey license to DoED for the hydropower development in the same region. These projects are delayed for a simple reason that the area lacks an adequate capacity high voltage transmission line to evacuate the power from the area to the consumption centers. The proposed Kabeli Corridor transmission line project is envisaged to provide transmission line facility to the licensed hydropower projects to be developed in the immediate future. The KCTLP passes through 25 VDCs of 4 districts namely Terhathum (*Chattedhunga),* Panchthar (*Amarpur, Shuvang, Bharapa, Phidim, Chokmagu, Siwa, Nawamidanda, Imbung, Pauwasartap & Chilingden),* Ilam *(Phakphok, Chamaita, Ektappa, Mangalbare, Sangarumba, Siddhithumka, Soyak, Godak, Chisapani, Danabari, Mahamai, Bajho & Chulachuli) and* & Jhapa (Lakhanpur).

The proposed KCTLP starts from 132/33 kV sub-station at Sabitra Chowk of Lakhanpur VDC in the Terai and extend north east through Chaju Khola at the foot hills of Chure and across Chure mountains into the valley of Mai Khola in the Mahabharat and Midlands. From Soyak, it bifurcates into two branches: the short one extending north east from Soyak up to Godak 132/33 kV substation (Setuwabesi, Godak VDC-3) and the longer one extending north-north-west from Soyak up to Amarpur 132/33 kV substation (Pinasighat, Amarpur VDC-9) in the northern part of midland zone. Sabitra Chowk is accessed through the all weather Mahendra Highway about 600 km east of Kathmandu

3.0 Data Requirement and Study Methodology

The IEE report is prepared based on the secondary and primary level studies. The primary level data was collected on the physical, biological, and socio-economic environmental sectors using various methods such as geological and geo-morphological mapping in the physical environment; quadrant sampling and total enumeration and measurements of the trees and vegetations, transect survey and focus group discussions with the local communities on the mammals, birds, and herpeto-fauna Structured and unstructured questionnaire survey of the project affected households and focus group discussions with the project affected VDCs in the social, socio-economic and cultural environment. The data were analyzed using various tools such as GIS, personnel experience, and projects of similar nature in similar geographic locations.

4.0 Review of Plan/Policies, Legislations, Guidelines, Standards and Conventions

This sections reviews all the plan/policies, legislations, guidelines, standards and conventions that are envisaged to attract the project actions, and activities during construction and operation of the project including Environment Protection Act (EPA) 1997, and Environment Protection Rules (EPR), 1997 as amended 2010,

5.0 Study Requirements

This section of the report includes time schedule, estimated budget and specialists/experts required for the preparation of this IEE report.

6.0 Project Environmental Baseline

6.1 Physical Environment

The proposed KCTLP route extends from the Terai (elevation of 130m to 180m and about 8% of the alignment) via Siwalik Zone (elevation of 180 m to 500 m and about 12% of the alignment), Mahabharat Zone (elevation of 500 m to 2073 m and about 51% of the alignment) to Midland Zone (500 m to 1447 m and about 29% of the alignment). Geologically, the KCTLP alignment traverse through the Non-himalayan component – Gangatic alluvium to Himalayan component comprising of sedimentary, meta-sedimentary and high grade metamorphic rocks involved in a complex tectonism of faults, thrusts and folding. Soils in the Terai are alluvial deposited by the streams and rivers whereas in the Siwalik hills are colluvial and thin. In the Mahabharat and Midland, the major portion of the soil is colluvial formed from the phyllites and schists. The climate ranges from tropical climate to sub-tropical, warm temperate climate and cool temperate climate. The summer is hot, dry and humid; while winter is cool to chilly as per altitude. The annual average precipitation of the area ranges from 1800 mm to 2800 mm. The quality of air, water and noise along the KCTLP corridor is not polluted. The land use across KCTP corridor is 50.50% agricultural land followed by 39.31% forestland, 5.45% water body and flood plain, 3.98% barren land and rest roads and foot trails

6.2 Biological Environment

The project area lies outside any of the biodiversity conservation sites (National Parks, Strict Nature Reserve, Wildlife Reserve, Hunting Reserve, Conservation Area, and Buffer Zone) officially declared by the Government of Nepal. The forest of the project area is recognized as *Shorea forest*:, Mixed Sal Forest, Mixed Broadleaved Forest, *Adina* Mixed Forest, Sal-Chilaune Forest, *Schima wallichii forest*, *Castanopsis-Pinus* Forest, Mixed-Rhododendron Forest , *Pinus roxburghii* Forest, *Alnus* Forest and Mixed-*Alnus* forest

Agro-biodiversity of the area comprises a total of 105 varieties of cereal crops, legumes, fruits and spieces. Local people uses more than 26 types of plants as fodder, 4 as timber and fodder showing their dependency on forest and forest based non timber forest products (NTFP). Local people use 289 plant species for ethnobotanical purpose of which 164 plant species are used as medicine, 15 as wild ornamental purpose, 18 species as fodder, 30 species for timber, 2 as fuelwood, 60 species as non timber forest products, 7 species as furits, 7 species as wild edibles and 9 species as ornamental Among the total recorded vegetation plants, 21 vegetation species are listed as rare/Endangered/Threatened or Protected species under various conservation lists of GoN, CITEs and IUCN

A total of 45 mammalian species, 55 species of reptiles and amphibians, 201 species of birds, are reported from the project area. Among the total reported species, 11 species of mammal, 9 species of reptiles and amphibians, and 5 species of birds have been identified as rare/Endangered/Threatened or Protected species under various conservation lists of GoN, CITEs and IUCN.

6.3 Socio-economic Environment

The project VDCs have a total population of 168747constituting 13% percent of the total population of the project districts. Average household size is 5.34 with male to female ratio of 1:1.02. There are more than 70 caste/ethnic groups in the project VDCs of which Limbu (24%) and Rai (17%) are the major caste reported in the project VDCs and is followed by Brahman (15%), Chettri (11%), Tamang (6%), Kami (6%), and Magar (3%). Majority of the population speak Nepali (47%) and Limbu (26%) language. Literate population above 6 years of age is about 63%.There are 225 registered schools with higher share of the primary school (67%).The project VDCs comprise of 21 sub-health post, 2 Primary Health Post, 2 health centers and 1 hospital. Acute Respiratory Track Infection (ARTI), Diarrhea, Dysentery, Skin Disease and Gastritis are the most common disease in the project VDCs. Ecomoicall active population above 10 years of age is about 81% and 91% of the households have land, livestock and poultry

A total of 205 households living close to the transmission line were surveyed. The population constitutes 1244 persons with an average family size of 5.08. The average male: female ratio is 1: 0.92

(6.3.37).Majority (63.18 %) of the households represent *Janajatis* while 27.89 percent are higher caste groups followed by Dalits (8.92 percent). The surveyed families practice four religions namely Hindu (47.32%), Kirat (33.66%), Buddhist (16.59%) and Christian (2.44%).

The majority of surveyed Population above 6 years of age (83.84%) is reported to be literate.Only 30.24 % of the surveyed households have access to electricity while the remaining households use other sources for lightening. Nearly 100% households are dependent on firewood with occasional use of LPG for cooking. Majority of the Surveyed households (70.24%) have access to pipe or tap water supply. 64.39 % households are using toilets for defecation. Majority of them (85.59%) are found to consult with the medicinal practitioner in case of sickness followed by Dahami/Jhankri - the local traditional healers (8.11%). The most common sickness case is the general cough and cold followed by digestive disorder, neuro-and spinal, respiratory and heart and blood pressure. About 50.2 % of the household reported to be participating in the local organization such as VDC, community forestry, water users committees etc.

Among the household population, only 37.54% are involved in agriculture while others are involved in foreign employment (5.71%) or Business (5.23%) or Jobs & services (3.30%),wage earning (1.61%) and student (34.97%). About 96% households own certain portion of land within the project area while few households (3.9%) mainly belonging Limbu, Tamang, Dalit, Magar and Newars do not own any land. Average land holding size of the households is 1.22 ha and the majority of the land owned by the household is Bari. The principle agricultural crops grown are paddy, wheat, maize, millet, legume, mustard, fapar, and potato. The principle cash crop of the area is tea, ginger, cardamom, amriso, akabare. Nearly 80% of the households reported food deficiency from their own agricultural production which is noticed highest among Dalit, Gurung and others.

The average annual household income of the household is estimated to be NRs 3,07,006. A large majority of the households are deriving income from remittance (23.97%) followed by loan (24.94%), Livestock (10.36%), Business and industry (10.21%), agriculture (9.64%), cash crop (6.77%), and other incomes. The average annual expenditure is estimated to be NRs. 2,50,428. he highest share of the expenditure is occupied by food items (39.38%) followed by investment (21.41%) and health and education (18.36%).

7.0 Environmental Impacts

7.1 Physical Environment

The key adverse impacts of the project are

- land use changes
- Electro-magnetic fields effect

The key beneficial impacts of the project are

- Erosion protection
- Enhancement of slope stability

7.2 Biological Environment

The key adverse impacts of the project are

- Loss of 59.26 ha of forest area including 19.472 government forest, 23.801 ha community forest and 15.981 ha private forest
- Loss of 18877 seedlings, 7191 saplings, 10494 poles and 3317 trees worth NRs. 1,03,58,250.00 @ NRs. 30 / plant for 3,45,275 trees
- Bird Hits particularly across the Waterways
- Weeds encroachment on biodiversity

The key beneficial impacts are

- Creation of forest fire line Zone
- Creation of ecological niche Zone

7.1 Socio-economic and Cultural Environment

The key adverse impacts of the project are

- Loss of 96.415 ha of private land permanently belonging to 914 households
- Loss of 6.98 ha of private land temporarily during construction belonging to 55 households
- Loss of 23 built structures worth NRs. 80,50,000.00/- including 18 permanent structures and 5 temporary structures
- loss of standing crops in the permanently occupied areas and in the land use worth NRs.86,32,387
- Loss of 59.25 ha Forest land comprising community land including 19.48 ha of government forest, 23.80 ha of community forest and 15.98 of private forest
- Occupational health
- Community health and hygiene

The key beneficial impacts of the project are

- Increase in the economic activity within the project sites
- Employment Oopportunities to the local area people
- Development of new skills on the TL and sub-station construction

8.0 Alternative Analysis

Prior to the decision, the project alternatives has been analysis on the design, project sites, Technology, procedures of operation, time schedule and raw material to be used, environment management system and whether or not the risk resulting from the implementation of the proposal can be accepted. These analysis results reveal that the proposed project is a better alternative from every aspect.

9.0 Mitigation and Enhancement Measures

9.1 Mitigation

9.1.1 Physical Environment

To minimize the envisaged impacts on the physical environment and to maximize the beneficial impacts, the project has originated a various mitigation measures. Cleared area will be replanted and ground clearance activities will be limited to trimmings of the tall standing trees prarticularly in the steep slopes. The spoil materail generated will be managed properly and sidecasting on the side slopes will be controlled. Tower foundations sites will be further re-examined from the stability point and excavations along tower foundations will be minimized to the required depth only. The tower foundation sites and the progressing gullies close to the tower foundation will be protected by the application of bio-engineering measues and existing trails will be used for transportation of materials to ROW and Tower foundation site. The loss of forest land use due to clearance of tall trees along ROW wil be compensated by the compensatory afforestation programs. Standing trees and vegetation along ROW particularly in the hilly terrian will not be cleared untill and unless the clearance is necessary and the clearance area will be planted by NTFP species of lower heights. Agricultural land use will be allowed for agricultural purpose. Except in the sub-station heavy machinery will not be used for construction and noise producing construction activities will be carried out in the day time zone only. Liquid and solid waste will be collected in safe area and disposed safely . Spent oils, mobils, and other chemicals generated will also be safely collected in drums and disposed as per the advice of the engineers. Toilets in the camps and active construction sites will be constructed as per the requirement to prohibit Haphazard defecation. Regular sprinkling of water will be done to minimise the Fugitive dust emissions. Fuel wood will be replaced by the subsidised kerosine or LPG at the camp sites. Good earthing in all the pylon structures, regular trimming of the trees will be provisioned to reduce the impact and effects of electromagnetic fields. Additionally, an awareness program will be also be launched to further avoid and minimize the impacts on the safety issues to the communities along the ROI of transmission corridor also. No addition cost will be located for minimizing the adverse impacts on physical environment as almost all cost are already included in the construction cost or environmental enhancement cost.

9.1.2 Biological Environment

To minimize the envisaged impacts on the biological environment and to maximize the beneficial impacts, the project has originated a various mitigation measures during the construction and operation phase. The mitigation measures include no ground clearing of herbs and shrubs up to a height of one and half meter, restricting the felling to only lopping and topping of the high growing or potentially high growing trees and poles, restriction of fuel wood use, control the workforce on the damage on the vegetation structure and punish those who indulge on such activities, compensatory afforestation program, use of bird flight diverters across to increase the visibility of the conductors to avoid the bird hits particularly across the waterways, erection of barricade around the tower foundations and substation sites and uses of thorny protuberances around pylon to divert wild animals and to restrict climbing along the pylon. A total of additional NRs. 2,08,85,856.25/- is allocated for minimizing the adverse impacts on biological environment.

The estimated costs additional to construction cost for mitigation of biological Environment is NRs. 2,08,85,856.25/-

9.1.3 Socio-economic and Cultural Environment

To minimize the envisaged impacts on the socio-economic environment and to maximize the beneficial impacts, the project has originated a various mitigation measures during the construction and operation phase. The loss of land and property, price of the standing crops, fodder tress, fruits trees will be compensated at the market price. The household will be provided with salvation of the demolished material and transportation cost will be provided to transport salvaged material. Extra Discomfort allowances for 6 month rental and livelihood subsistence will also also be provided to those whose house is demolished The loss of standing tress of the private, community and lease hold forest will be compensated as per forest guideline. NTFP enhancement training will be given to the forest community user groups and NTFP plantation will be encouraged in RoW of transmission line. Besides the interested community forest user group memebers and leasehold forest memebers will be given job oppertunities in the compensatory afforestation programs. The lost community resources due to project will also be compensated as per the forest guideline 2006. Telephone and electricity user will be given prior information regarding the disruption of the services and services will be re-established once the cable stringing is completed. The affected households will be given priority in the project job. While providing Job gender discrimination will be avoided. Priority will also be given to female members and members of the indiginous, tribal and vulnerable groups in job, enhancement and training program. The construction workforce will be regularly instructed to respect female member of the community, local people and their traditions and culture.They will be instructed to remain within the camps and not to enter into the private premises without informing or without the permission.The local law and order authorities will be regularly informed about the construction planning and sites of construction works and ativities In case of construction related work force impacts, the project will support the schools of the project affected VDCs, will establish good shops and health service facility within the camps, will establish a self standing water supply system for camps etc. Health and safety plans will be prepared and operationalised for the entire period of construction to safeguard the health and safety of the construction workforce. The construciton workforce will be instructed about the risk of the constrction works regualrly and will be provided with protective equipments. First aid kits will be provisioned in all working sites. The construction workforce will be provisioned for the free condomes and Sanitary conditions of the camps, such as toilets, water supply, solid and liquid wastes will be managed by launching special sanitary programs. To minimize the impacts on the aesthetics material excavation works will be limited to the required amount and excavation material and cleared vegetation will be placed in closed areas and in an environmentally friendly manner. A total of additional NRs. 9,09,43,561.00/- is allocated for minimizing the adverse impacts on socio-economic and cultural environment.

9.2 Enhancement Measures

To address the various losses of the development area communities and also to meet the development aspiration of the local area communities, proponent will implement various environmental enhancement programs in the Project ROI areas with an objective to maximize the environmental benefits and to minimize the envisaged impacts on the community resources and in the forestry, in addition to the

mitigation measures. These program include i)Training Program for Skill Development, ii) Training Programs for Biodiversity Awareness, iii) Support for NTFP Enhancement Programs and iv) Support to Community Forest Establishment. In order to implement the enhancement program, a total of NRs. 95,00,000.00 is estimated additional to the construction cost.

10.0 Environmental Management Plan

Environmental Management Plan (EMP) has been prepared for the KCTLP to set out environmental management requirements and to develop procedures to ensure that all mitigation measures and monitoring requirements will be carried out in subsequent stages of project development. The project has the prime responsibility for the implementation of the environmental management plan in co-ordination with the other project stakeholders, which includes MoEnv, MoEn, MoFSC, DNPWC, DoED, DoF, DFO, VDCs, DDCs, Environmental Engineers, supervising engineers, construction contractors,. NGOs and CBOs. The plan also covers structures of the Project's Environmental Management Office (EMO) of the Project Management Office (PMO) and main roles and responsibilities of the parties involved in all phases of project viz., pre construction, construction, post construction or operation.

To ensure that the recommended mitigation and monitoring actions are duly implemented, monitored, assessed, evaluated and disseminated to the stakeholders for feedback and improvement, the KCTLP, PMO should establish a separate Environmental and Social Unit (ESU) of its own The ESU will comprise of two sub-units, namely Environmental and Social Implementation Sub-unit (ESISU) and Environmental and Social Monitoring Sub-unit (ESMSU)

11.0 Project Cost and Benefit

Although the Transmission line itself does not generate direct revenue on its own, it help for the revenue generation by distributing generated energy in powerhouse to the needed power consumption centers. Therefore, it is very difficult to predict the potential of such direct revenues at the moment. In addition to that, other benefits of the project include promotion of industrial growth in corridor in the operation phase, new job opportunities to the local people, enhancement of the working skills, opportunities for Transmission Tower construction related training, Promotion of the subsidiary economic activities in the project area during construction phase, promotion community development through NTFP promotion and above all environmental enhancement programs in the local community worth NRs. 9.5 million. The above benefits from the project are expected to enhance the national development objectives of poverty alleviation, diversification of economic activities, and above all in improving the social services and quality of life of the Nepalese nationals.

The total investment cost for the transmission line and the Sub-station is estimated to be NRs. 2,01,19,95,844.00 while the total estimated project losses i.e Agriculture Land Resource Loss (NRs. 32.39 million) , Production Loss (NRs 2.48 million), Loss of Standing Vegetation (34.75 million), is Nrs. 70.17 million, about 3.49 percent of the total project cost. The total additional environmental costs including mitigation, monitoring, auditing and environmental enhancement is estimated to be NRs. 12,04,29,417.3, 5.99% of the actual construction costs.

12. Conclusion

All of the identified and perceived impacts could be minimize to acceptable level by the employment of the prescribed cost effective and practical mitigation measures. The environmental enhancement measures proposed for implementation by the project targeting the affected communities will help to upgrade the quality of life of the affected communities. In view of the above considerations, it is recommended that the project is given development licensing in conditions that the proposed mitigation and enhancement measures will be implemented as per the Environmental Management Plan prescribed in this IEE report.

ABBREVIATION / ACRONYMS

BOD	Biochemical Oxygen Demand
CBO	Community Based Organizations
CC	Construction Contractor
CFUG	Community Forest Users' Group
CITES	Convention on International Trade of Endangered Species
CO	Carbon Monoxide
DBH	Diameter at Breast Height
DDC	District Development Committee
DFO	District Forest Office
DoED	Department if Electricity Development
ECC	Environmental Enhancement Committees
EE	Environmental Engineers
EIA	Environmental Impact Assessment
EMO	Environmental Management Office
EMP	Environmental Management Plan
EPA	Environment Protection Act
EPR	Environment Protection Rules
ESISU	Environmental and Social Implementation Sub-unit
ESMSU	Environmental and Social Monitoring Sub-unit
ESSD	Environmental and Social Study Department
ESU	Environmental and Social Unit
GDP	Gross Domestic Product
GIS	Geographical Information System
GON	Government of Nepal
Ha	Hectare
HC	Hydro Carbon
HEP	Hydroelectric Projects
HSU	Hertridge Smoke Unit
IEE	Initial Environmental Examination
INPS	Integrated Nepal Power System
IUCN	International Conservation Union
KCTLP	Kabeli Corridor Transmission Line Project
Km	Kilometer
kV	Kilo Volt
LPG	Liquid Petroleum Gas
mg/L	Milligram per Liter
MoE	Ministry of Energy
MoEnv	Ministry of Environment
MoEST	Ministry of Environment Science and Technology
MoFSC	Ministry of Forest and Soil Conservation
MW	Mega Watt
NEA	Nepal Electricity Authority
NEPAP	Nepal Environmental Policy and Action Plan
NGO	Non-Government Organization
NPWCA	National Parks and Wildlife Conservation Act
NTFP	Non-Timber Forestry Product
NWP	National Water Plan
^{o}C	Degree Centigrade
OPGW	Optical fiber based communication system
PAF	Project Affected Families

PIC	Public Information Center
PMO	Project Management Office
ppm	Parts per Million
ROI	Region of Influence
ROW	Right of Way
S/S	Sub-Station
SE	Supervising Engineers
TL	Transmission Line
ToR	Terms of Reference
TSP	Total Suspended Particulates
UG	Users' Group
UN	United Nations
VDC	Village Development Committee
WUG	Water Users' Group

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

1.1 Proponent

The proponent of the **Kabeli Corridor 132 kV Transmission Line Project (KCTLP)** is the **Nepal Electricity Authority (NEA).** It has obtained survey license (***Annex 1)*** valid up to 2067/3/21 for the development of KCTLP from Department of Electricity Development (DoED).

The NEA is the Government of Nepal undertaking responsible for generation, transmission and distribution of electrical energy in Nepal. As 2009, NEA has a total of 9,280 staffs working under the Corporate Office and Business Group - the technical wing of NEA. The section responsible for IEE/EIA study within the NEA Business Group is **Environmental and Social Study Department (ESSD) under the Engineering Services Directorate**. The official address of the proponent for the purpose of the IEE study is as under:

Address of the Proponent
Environmental and Social Study Department (ESSD),
Nepal Electricity Authority
Jamal, Katmandú, NEPAL
P.O.Box : 10020
Tel: 00977-1-4226889
Fax: 00977-1-4243746

1.2 Institution Responsible for Preparing the Document

Joint Venture of Nepal Environmental and Scientific Services [NESS] Private Limited and TAEC Consult (P) Ltd. pioneer consulting firms in the country in the field of environmental studies is assigned as a consultant by NEA/ESSD to carryout the IEE study as per the provision of EPA 1997 and EPR 1997. The address of the lead consulting firm is as mentioned hereunder.

GPO Box 7301, Jitjung Marga-26,
Thapathali, Kathmandu, Nepal
Tel.:977 1 4244989 / 4241001; Fax: 977 1 4226028
E-mail: ness@mos.com.np; **Website:** www.ness.com.np

Chapter 2: GENERAL INTRODUCTION OF THE PROJECT

2.1 Background

Development of power projects is always correlated with the power evacuation network available in the proposed power development area. As NEA is the solely responsible utility for expansion and reinforcement of networks of Integrated Nepal Power System (INPS), NEA had conducted several evacuation studies considering the candidate hydroelectric projects.

At present, INPS had 132 kV transmission network from Anarmani in the east to Mahendranagar on the far-west region running through the Terai Physiographic Zone of the country. As most of the hydroelectric projects are located in the northern hilly region, the limiting factor for the hydropower development is pointed out to be the lack of north south extending high voltage transmission lines in the existing INPS. In the context of the ever increasing electricity demand and annually spiraling load shedding, there is a need of the development of critically important north south high voltage transmission line to facilitate the development of candidate hydropower projects vis a vis meet the energy demand and abolish ongoing load shedding.

As of the date there are 17 hydropower projects in the Ilam district (67MW), 4 projects in Panchthar (32MW), and 14 projects in Taplejung (312MW). All of the above projects from Ilam, Panchthar, and Taplejung have been licensed for development. It is to be emphasized that additional 33 hydropower projects of above 950 MW have applied for survey license to DoED for the hydropower development in the same region. These projects are delayed for a simple reason that the area lacks an adequate capacity high voltage transmission line to evacuate the power from the area to the consumption centers. It is for this reason, feasibility study conducted in 2003 recognizing the need of development of the proposed Kabeli Corridor as priority high voltage transmission line project in the Eastern Development Region to provide transmission line facility to the licensed hydropower projects to be developed in the immediate future.

The environmental study of the KCTLP was initiated from the middle of 2009. At that period the transmission line projects falling within the National Parks, Wildlife Reserves, Conservation Area, or Buffer Zone declared by the Government of Nepal or incurring loss of above 5 ha of forest land were mandated for EIA as per the then Environment Protection Rule Schedules. Though KCTLP alignment lies outside ***the National Parks, Wildlife Reserves, Conservation Area, or Buffer Zone declared by the Government of Nepal,*** as it passes through the Forested areas incurring loss of more than 5 ha of forest areas, required EIA study and approval for construction licensing. Accordingly, Scoping Documents and Terms of Reference for EIA study were prepared and submitted to the Department of Electricity Development in October 2009 for approval process in compliance to the provision stipulated by Environment Protection Rule.

The amendments of EPR schedules on January 27, 2010 (refer EPR, Schedule 1, Uu.Uu.1), the KCTLP now requires only IEE study and its approval from the Ministry of Energy (MOEn). However, it will have to comply with the provisions of ***Guidelines to Permit Forest Land for Other Purpose (2006)*** of the Ministry of Forest and Soil Conservation.

Then with the instruction of the Ministry of Energy dated 2066/11/06 (23rd February 2010) refer letter Cha, No. 191, Pa. Sa 066/067 Niti (Batabaran), the IEE process was initiated (***Annex 2.1***). Later EIA terms of Reference prepared was amended as per the instruction of the Ministry of Energy and the IEE Terms of Reference was approved by the Ministry of Energy on 2066/11/27 (11th March 2010) (***Annex 2.2***). This IEE report is prepared as per the approved TOR (***Annex 2.3***), while the IEE Chapter Plans were based on the instruction of Ministry of Energy to the consultants. The final IEE notice was published on 2067/01/31 on Rajdhani Rastriya Dainik ***(Annex 2.4).***

2.2 Objective of IEE

The primary objective of IEE study is to ensure sustainable development by avoiding or minimizing impacts of the proposal development and operation on the physical, biological and socio-economic and cultural environments. The IEE study, as per EPA (1997) will at least undertake following activities to prepare a comprehensive IEE report for the decision making of the proposal development:

- Identify all important physical, chemical, biological and socio-economic and cultural baseline conditions in the project affected areas;
- Identify and adequately document potential adverse and positive environmental impacts due to project implementation and operation for different project alternatives selected and select best alternative in terms of environmental impacts;
- Propose appropriate, practical and const effective mitigation measures to avoid or minimize or compensate adverse impacts and capitalize maximum positive impacts of the selected alternative; and
- Prepare basic environmental mitigation including a monitoring and auditing plans associated with project construction and operation of the selected alternative.

2.3 Project Description

2.3.1 Project Location

The 132 kV KCTLP is located in the Eastern Development Region of Nepal (***Figure 2.1***). The project lies within Mechi and Koshi Zone and passes through 4 districts i.e. 3 districts namely Jhapa, Ilam & Panchthar of Mechi Zone and 1 district namely Terhathum of Koshi Zone. The KCTLP alignment pass across 10 VDCs of Pachthar district (*Amarpur, Shuvang, Bharapa, Phidim, Chokmagu, Siwa, Nawamidanda, Imbung, Pauwasartap & Chilingden*), 1 VDC of Terhatum district (*Chattedhunga*), 13 VDCs of Ilam district (*Phakphok, Chamaita, Ektappa, Mangalbare, Sangarumba, Siddhithumka, Soyak, Godak, Chisapani, Danabari, Mahamai, Bajho & Chulachuli)* and 1 VDC of Jhapa district (Lakhanpur). ***Figure 2.2*** depicts the districts and VDCs crossed by the tansmission Line.

2.3.2 Accessibility

The starting point of the KCTLP at Sabitrachowk of Lakhanpur VDC in Jhapa District is accessed through the all weather Mahendra Highway about 600 km east of Kathmandu, the capital city of Nepal. The Bhadrapur air stall at Jhapa, with daily flight services from Kathmandu is located about 40 km southeast of Sabitrachowk. The KCTLP alignment is also assessed at various points of Mechi highway, extending from Charali (Jhapa), Ilam (Ilam), Phidim (Panchthar) up to Taplejung (Taplejung). The Mechi Rajmarga is an all weather road up to Phidim. From Phidim to Taplejung it is a fair weather road with jeep & bus services regularly operating for most of the time. Besides, there are a number of fair-weather roads linking various project VDCs from the Mechi Rajmarga. The major settlements near TL route accessed by fair-weather road linking Mechi Rajmarga are Ekchepa of Subhan VDC; Chokmagu, Maidane & Bhadaure of Chokmagu VDC; Patle Bhanjyang of Nawamidanda VDC; Kolbun, Hanyok & Imbung of Imbung VDC; Sartap of Pauwasartap VDC, Deurali of Phakpok VDC, Phalate Bazaar , Simsara , Chaulagaigau & Thapagau of Chamaita VDC.

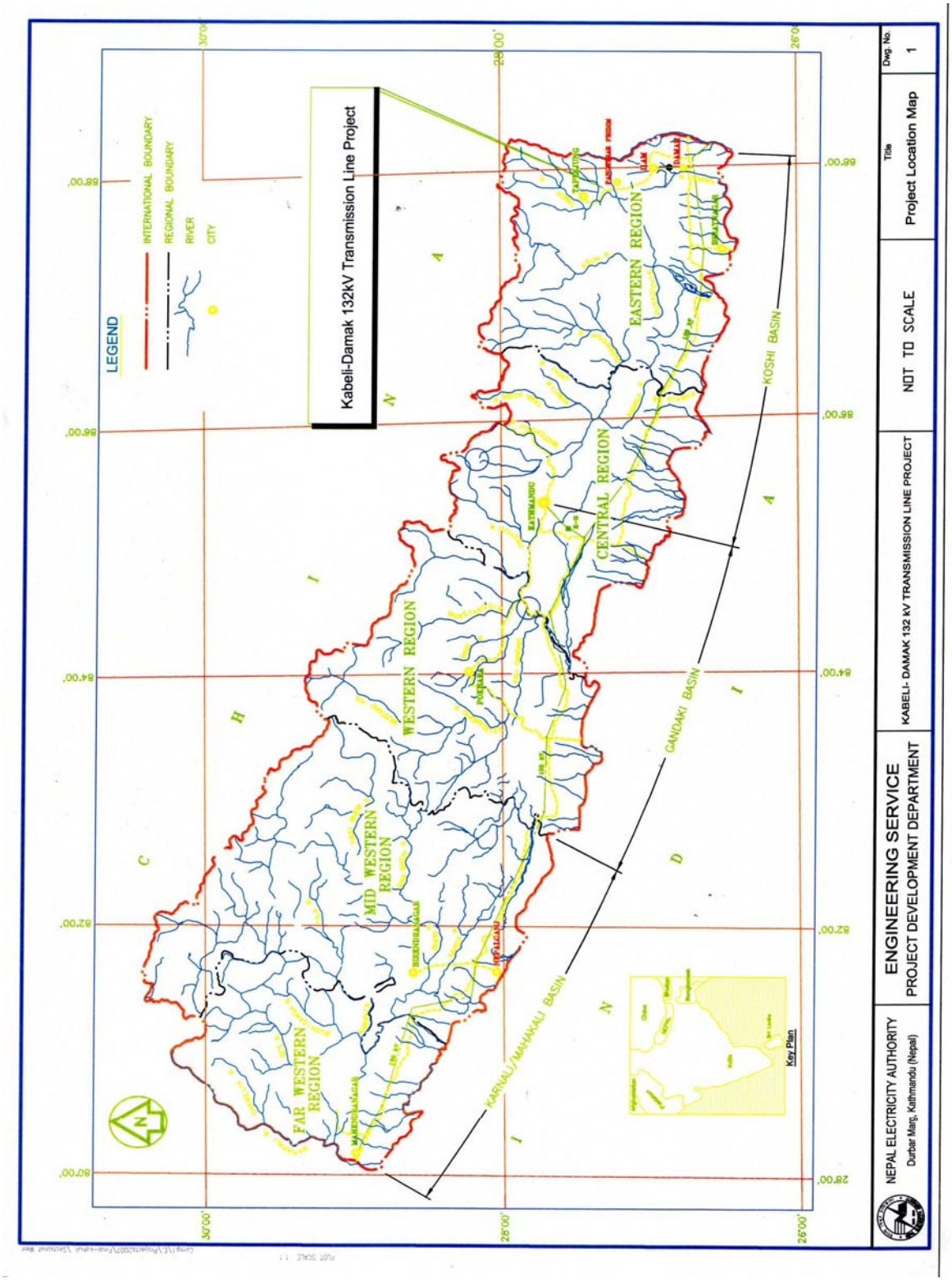
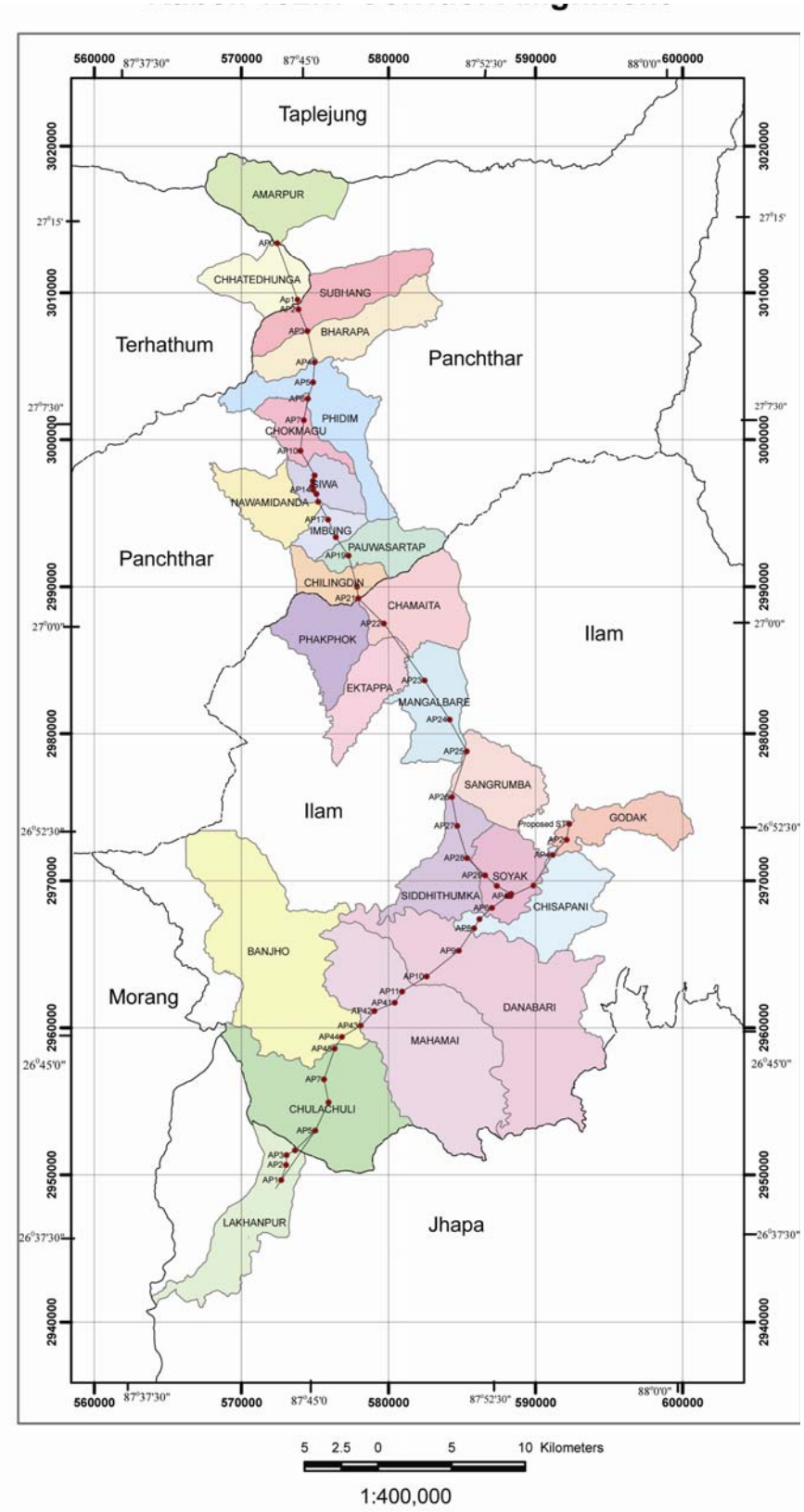


Figure 2.1: Project Location Map, KCTLP

Figure 2.2: Districts and VDCs across KCTLP



Metalun of Ektappa VDC; Tapewa, Sabjun, Sunwargau, Majhuwa, Mangalbare & Gagrebhanjyang of Mangalbare VDC; Talkharka of Sangarumba VDC, Choke Bazaar, Khandrun, Panchami Bhanjyang & Aiselukharka of Siddhithumka VDC; Soyak, Sirkot, Belase, Bahana & Tapa of Soyak VDC; Satare & Aapdanda of Chisapani VDC, Bhandarigau & Setuwabesi of Godak VDC, Hangraya, Chewali, Chaurase ,Sadhuwadada & Dhondre of Danabari VDC, Tamakhe of Mahamai VDC, Manetar & Sukuna

of Chulachuli VDC. Thus, most of the TL alignment is near road head. However, there is not any settlement near TL alignment in Bajho VDC.

2.3.3 Project Silent Features

The proposed KCTLP starts from 132/33 kV sub-station at Sabitra Chowk of Lakhanpur VDC in the Terai and extend north east through Chaju Khola at the foot hills of Chure and across Chure mountains into the valley of Mai Khola in the Mahabharat and Midlands. From Soyak, it bifurcates into two branches. The one extending north east is a short 6 km long arm terminating at Godak 132/33 kV substation (Setuwabesi, Godak VDC-3). The longer arm proceeds north-north-west from Soyak up to Amarpur 132/33 kV substation (Pinasighat, Amarpur VDC-9) in the northern part of midland zone (***Figure 2.3 sheet 1 to 15***). Table 2.1 summarizes the VDCs and wards of different districts traversed by KCTLP.

Salient features of the proposed Transmission Line and Substation hubs is presented in ***Table 2.1,*** and ***Figure 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10 and 2.11.***

Table 2.1: Salient Features of KCTLP

SN	Feature	Description	Remarks
1.	Project District	Jhapa, Ilam, Panchthar and Terhathum	
2.	System Data		
	System nominal voltage kV	*132*	
	System maximum voltage kV	*145*	
	System nominal frequency kV	*50*	
3.	Line Data		
3.1.	*Total Line Length*	*83.74 Km*	
3.1.1	*Phidim Kabeli*	*8.76 km*	
3.1.2	*Phidim-Sirkot*	*41.33 km*	
3.1.3	*Sirkot –Damak*	*26.88 km*	
3.1.4	*Sirkot – Ilam*	*6.77 km*	
3.2	*Circuit*	*Double circuit*	
3.3	*Conductor*		
3.3.1	*Conductor size (mm^2)*	*326.1*	
3.3.2	*Conductor type (ACSR)*	*Bear*	
3.3.3	*Conductor diameter (mm)*	*23.45*	
3.3.4	*Ultimate strength (kg)*	*11,340*	
3.3.5	*Modulus of elasticity final (kg/ $mm^{2)}$*	*8,200*	
3.3.6	*Coefficient of linear expansion (per ^oC)*	*$17.8 X 10^{-6}$*	
3.3.6	*Standard mass of conductor (kg/km)*	*1,214*	
3.3.7	*Electrical D.C. resistance at 20 degree C (ohm/km)*	*0.1093*	
3.3.8	*Standard unjointed length on reel (m)*	*2,000*	
3.3.9	*Every day stress (N/ mm^2)*	*60*	

SN	Feature	Description	Remarks	
4.	Design Data			
4.1	*Temperature*			
4.1.1	*Maximum ambient temperature ^oC*	45		
4.1.2	*Minimum ambient temperature ^oC*	0		
4.1.3	*Maximum temperature of conductor ^oC*	80		
4.1.4	*Everyday temperature of conductor ^oC*	32		
4.2	*Wind Loads*			
4.2.1	*Wind pressure on the whole projected area of conductors kg/m^2*	75		
4.2.2	*Wind pressure on the whole projected area of steel angle members kg/m^2*	121		
4.2.3	*Wind pressure on 1.71 times projected area of steel angle face of structure kg/m^2*	207		
5.	Number of Highway crossing	4		
6.	Number of 33kV Crossing	1		
7.	Number of 11kV Crossing	5		
8.	Number of Angle Points	55		
9.	Total Number of towers	287		
10.	Type of Towers	Self supporting Lattice steel structures		
10.1	*Suspension*	*- deviation angle* *- No. of this type of tower*	*-Up to 2^o* *-231*	*Approximate area required for this type of tower 12x12 meter*
10.2	*Angle/Tension*	*- deviation angle* *-No. of this type of tower*	*Below 60^o* *-53*	*approximate area required for this type of tower 14x14 meter*
10.3	*Dead end*	*- deviation angle* *-No. of this type of tower*	*- Up to 90^o (45^o as terminal)* *-3*	*approximate area required for this type of tower 16x16 meter*
11.	Clearance (minimum)	7.0 meter at + 65^oC conductor temperature		
11.1	*Normal ground for pedestrians only*	*7 meter*		
11.2	*Residential area*	*7 meter*		
11.3	*Road and streets*	*8 meter*		
11.4	*Highways*	*8 meter*		
11,5	*To metal clad or roofed buildings or building or structures upon which a man may stand*	*5 meter*		
11.6	*Power lines (above or below)*	*3.5 meter*		
11.7	*Telecommunication lines*	*3.5 meter*		
12.	Phase spacing	- Between phase on same side of tower 3.75 meter (minimum)		

SN	Feature		Description	Remarks
			- Between phase on opposite side of tower 6.0 meter (minimum)	
13.	Nominal Span		330 meter	
14.	Right of way		9 meter on each side	
15.	Shielding		With OPGW -Optical fiber based communication system	
16.	Substations /Hubs			
16.1	*Damak Substation*			
	16.1.1	*Purpose*	*-to connect Hydro Electric Projects (HEPs) in the Kabeli Corridor to the Integrated Nepal Power System (INPS)* *-to improve distribution networks in Jhapa district (Pachgachi and Damak area) and Urlabari of Morang District*	
	16.1.2	*Line Bays*	*-four number of 132kV* *-two number of 33kV* *-four number of 11kV*	
	16.1.3	*Transformer*	*-30 MVA, 132/33 kV* *-8 MVA, 33/11 kV*	
16.2	*Ilam Hub*			
	16.2.1	Purpose	- to facilitate power evacuation from HEPs to be developed in Ilam District	
	16.2.2	Line Bays	-two number of 132kV -two number of 33kV	
	16.2.3	Transformer	-30 MVA, 132/33 kV	
16.3	*Phidim Hub*			
	16.3.1	Purpose	- to facilitate power evacuation from HEPs to be developed in Panchthar District	
	16.3.2	Line Bays	-Four number of 132kV -two number of 33kV	
	16.3.3	Transformer	-20MVA, 132/33 kV	
	Kabeli Hub			
	16.4.1	Purpose	Panchthar, Taplejung District	
	16.4.2	Line Bays	Two 132 kV Two 33 kV	
	16.4.3	Transformer	30 MVA, 132/33kV	

Source: Kabeli Corridor Transmission Line Survey Report, Engineering Services, NEA, 2010

Figure 2.4: Kabeli Corridor 132 kV Transmission Line

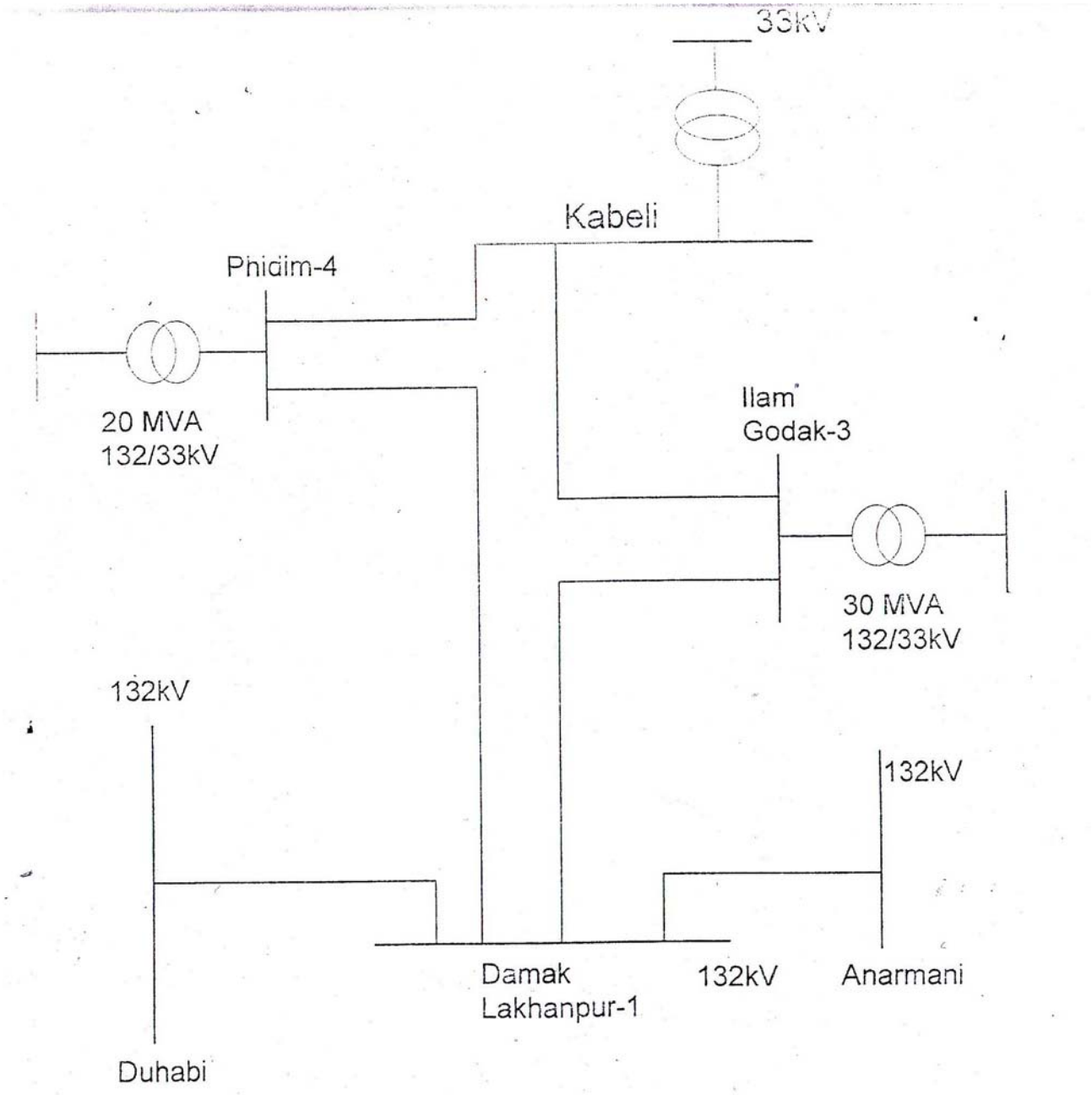


Figure 2.5: Tower Outline Configuration

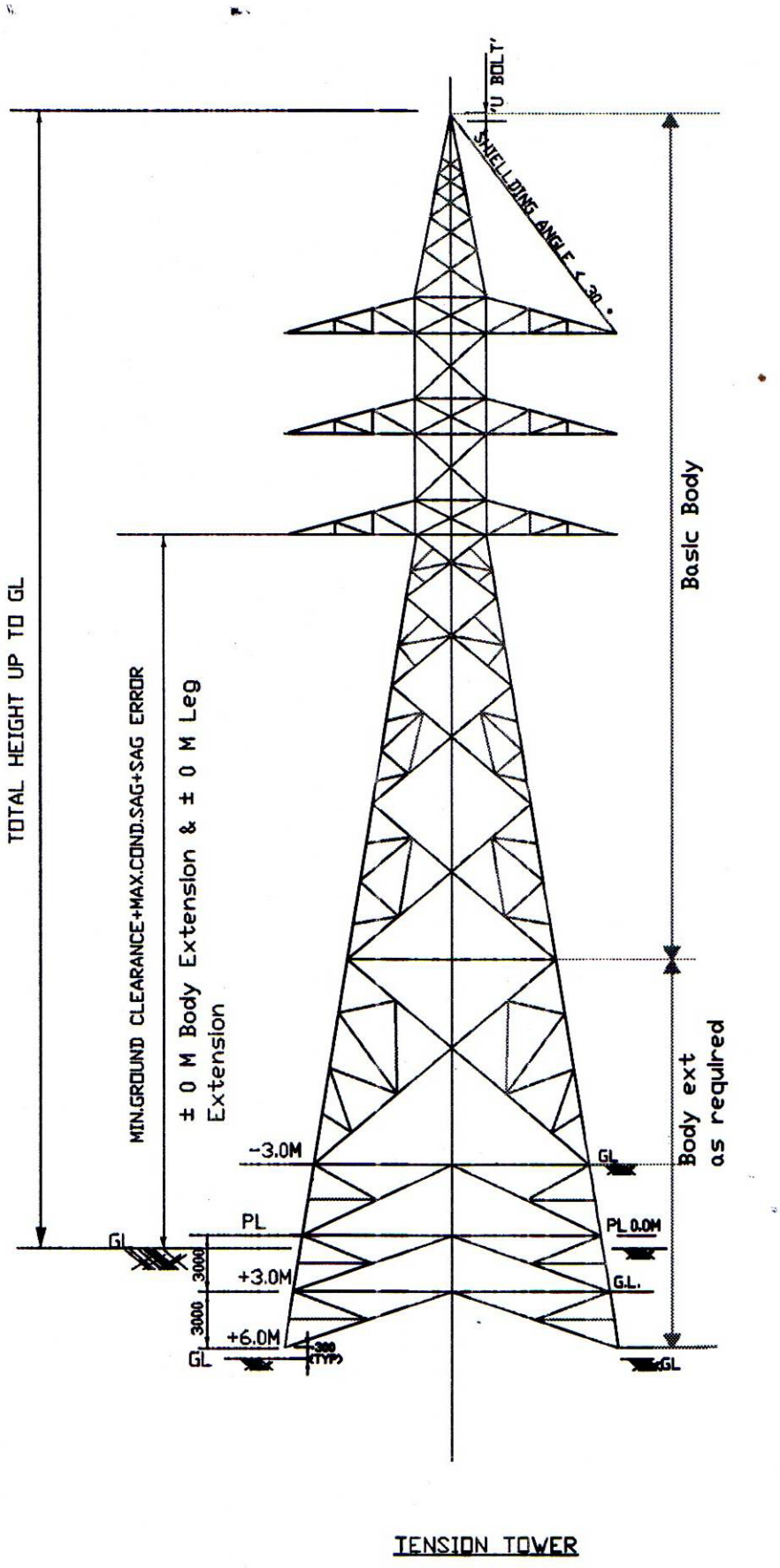


Figure 2.6: Tower Grounding

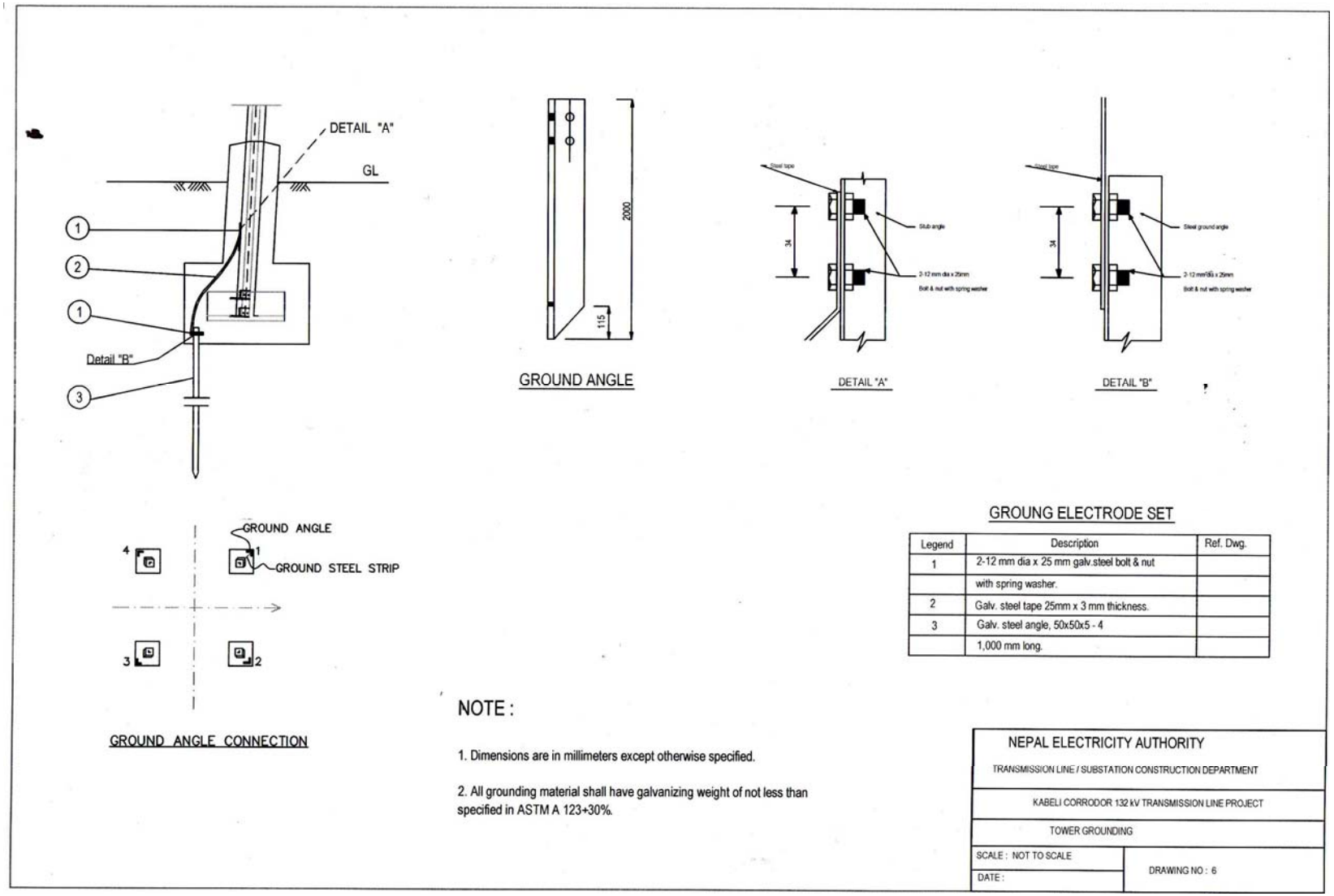


Figure 2.7: Conceptual Foundation Drawings

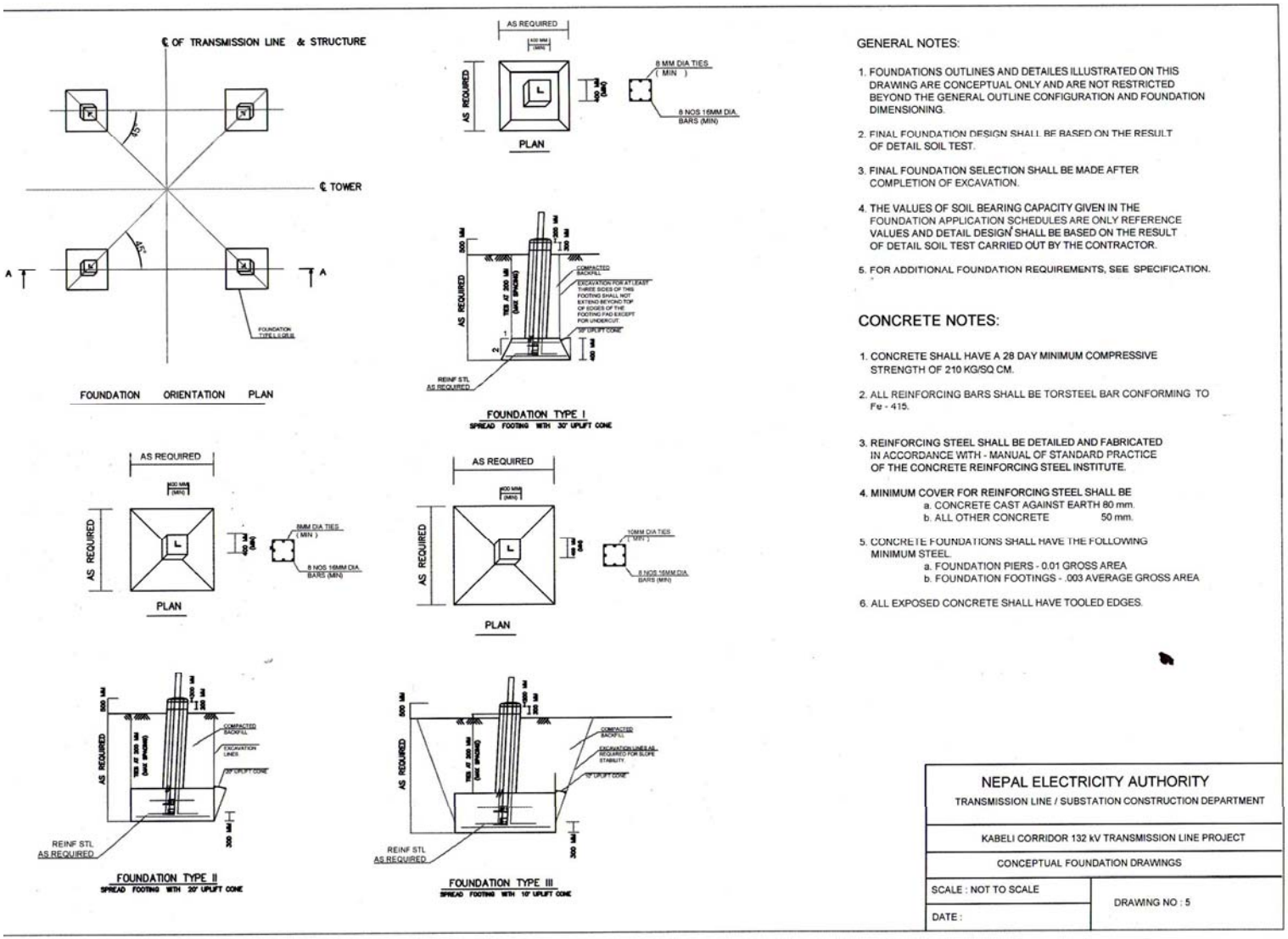


Figure 2.8: Tower Counterpoise Connections

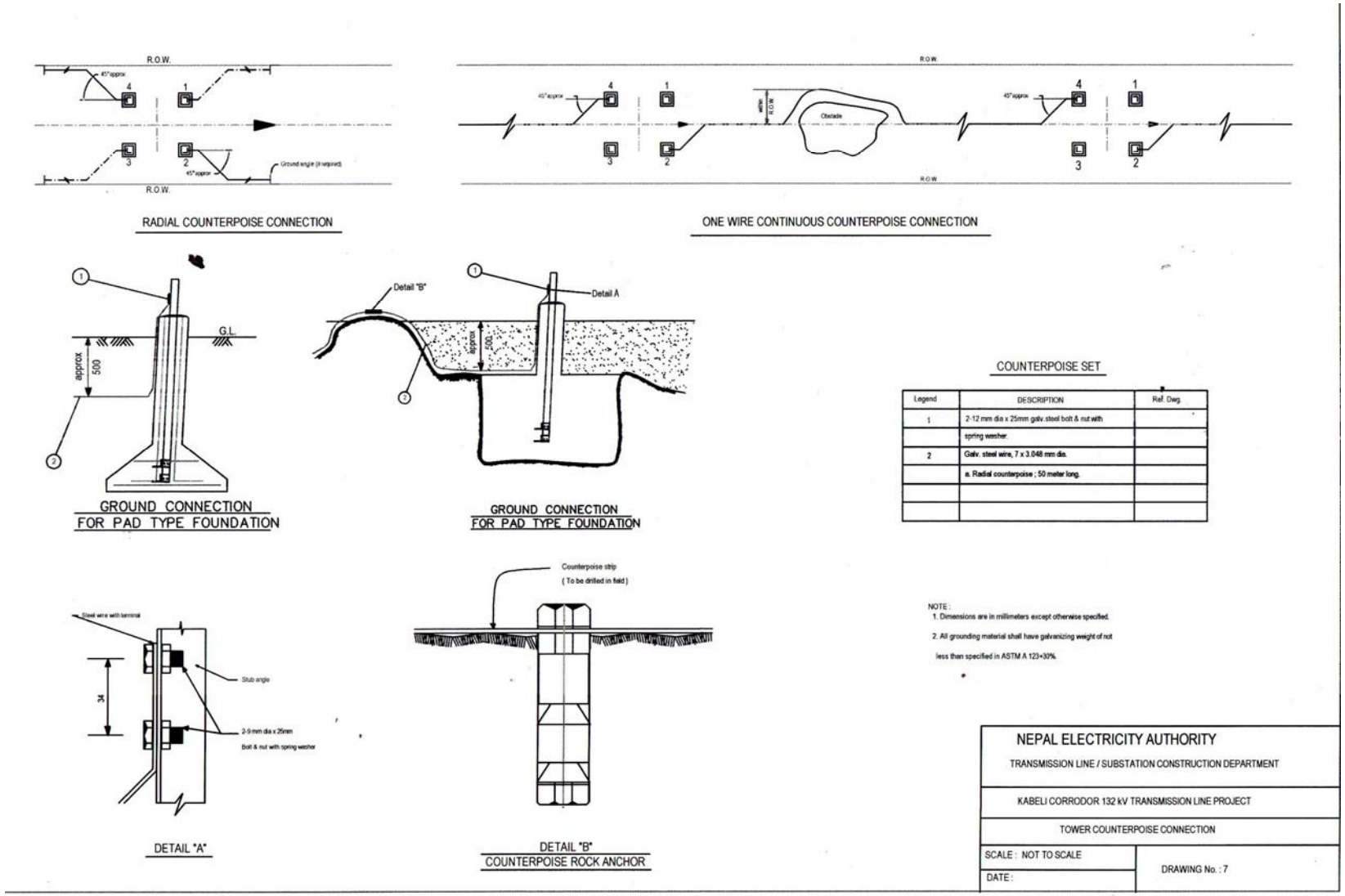


Figure 2.9: Damak Sub-Station

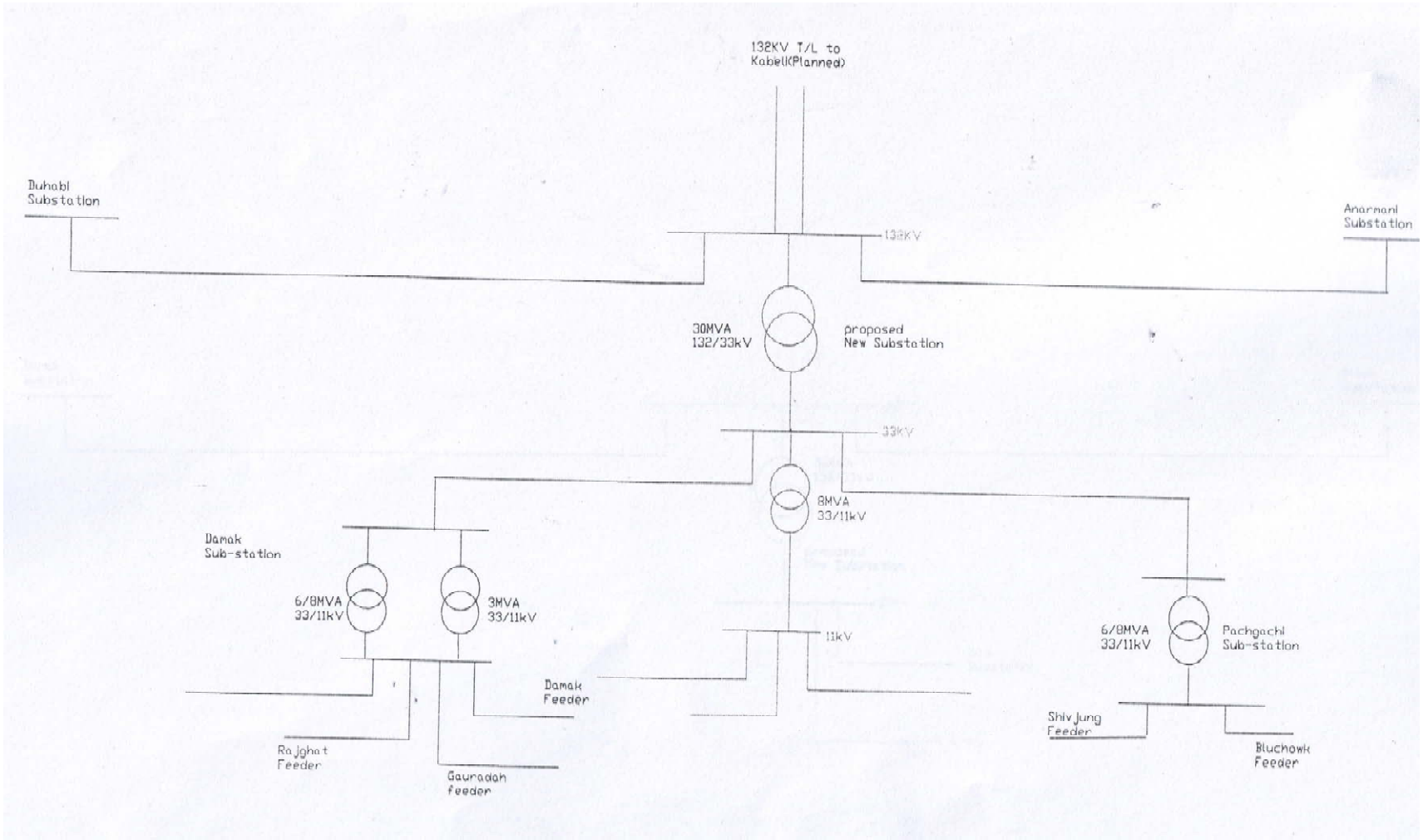


Figure 2.10: Ilam Sub-Station

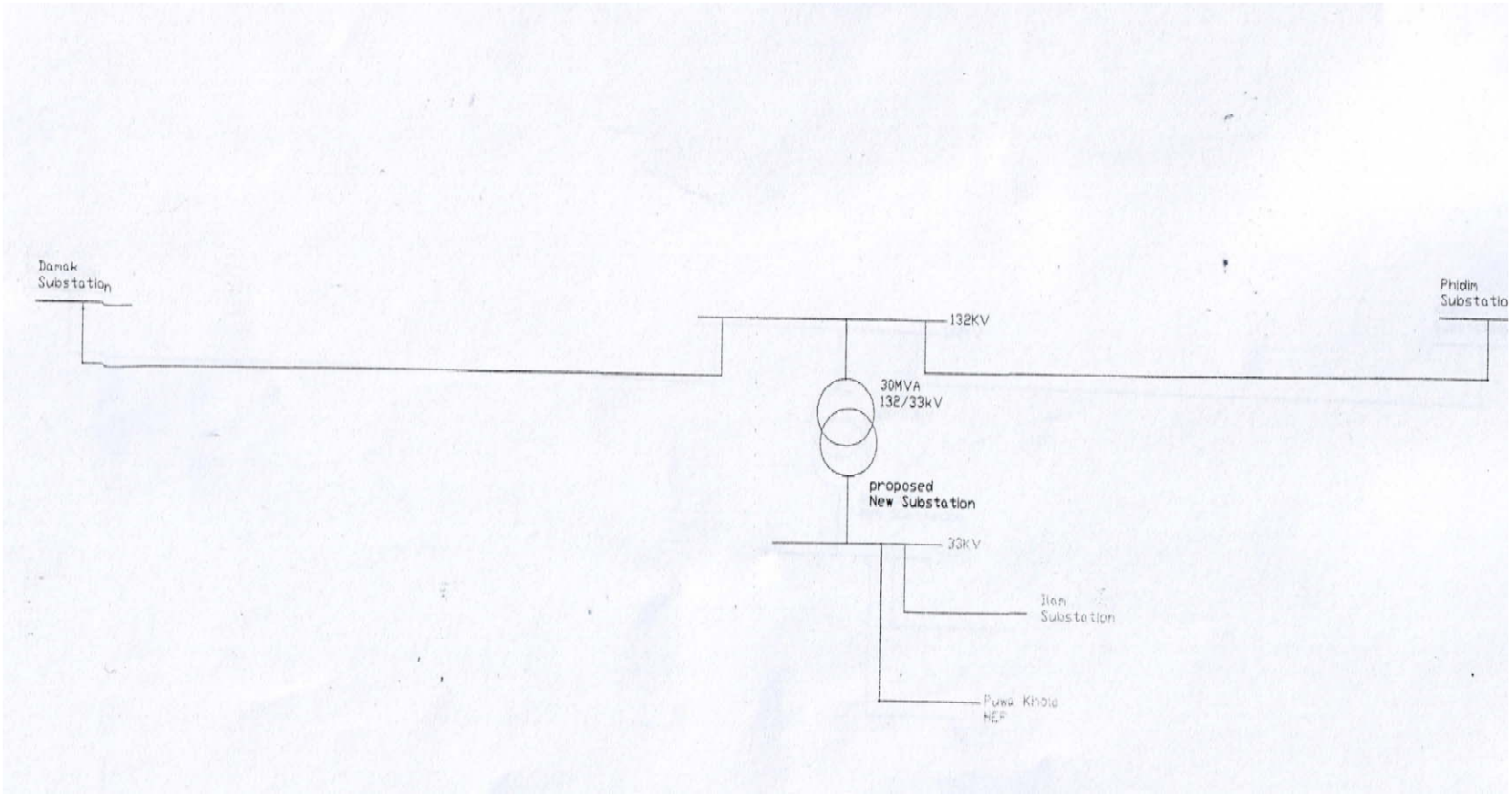
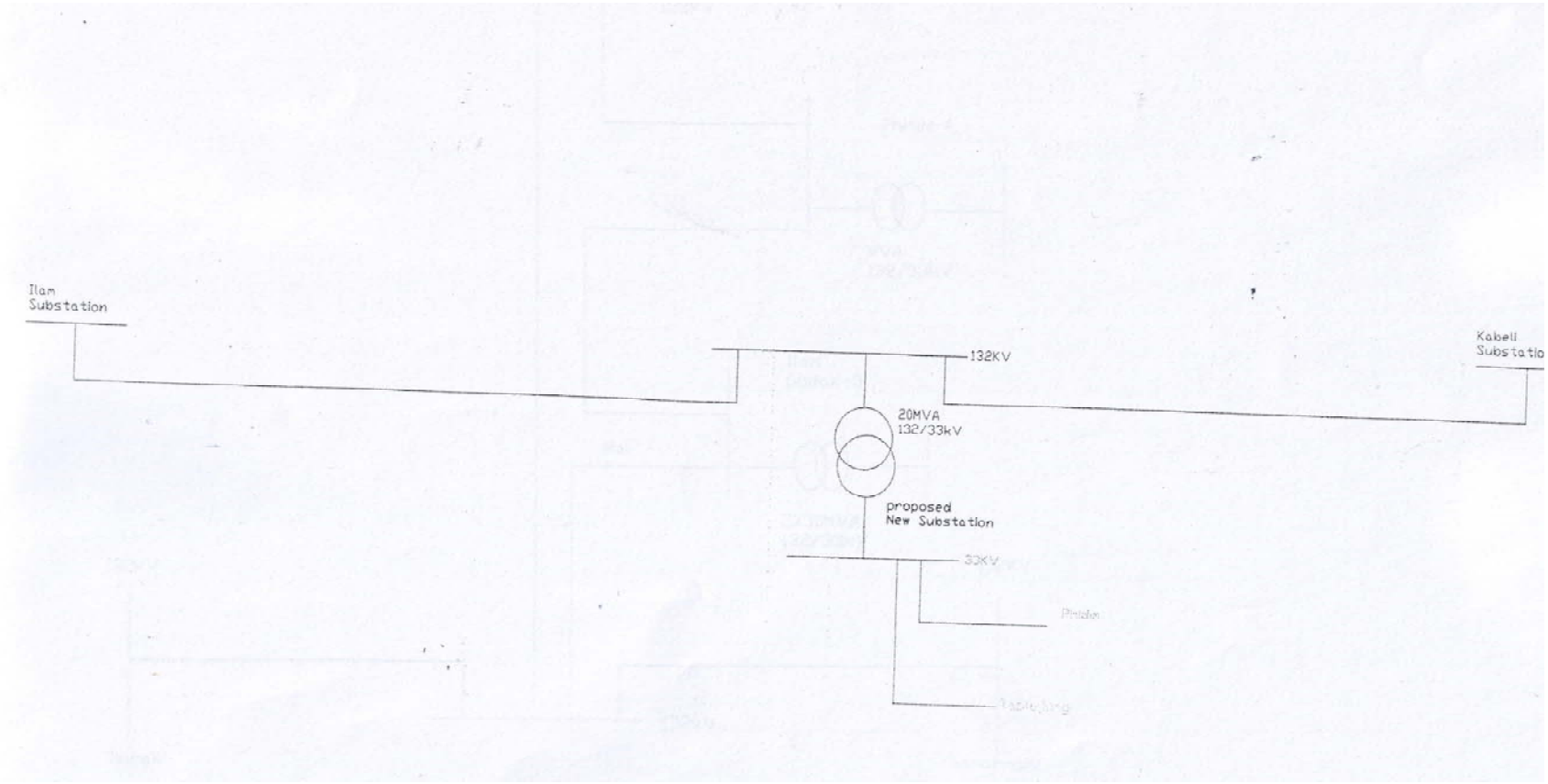


Figure 2.11: Phidim Sub-Station



2.3.4 Land Requirement

The land required for the KCTLP relates to the permanent land acquisition for tower pad foundation and sub-stations, permanent restriction for tree and structure development under ROW and the temporary land areas for construction camping and material storages for tower frames, cables, and other construction aggregates. Table 2.2 presents the details of the land requirements for the KCTLP.

Table 2.2: Land Requirements for KCTLP

Particulars	Permanent Acquisition (ha)	Permanent Restriction (ha)	Temporary (ha)
Tower Foundation			
Suspension Tower	3.326		
Angle Tower	1.019		
Dead End Towers	0.07		
Substation Patchthar (Phidim)	0.755		
Substation Ilam (Godak)	1.521		
Sub-station Jhapa (Lakhanpur)	2.048		
ROW		**146.310**	
Construction camps and storage*			6.98
Total	**8.747**	**146.310**	**6.98**
Percentage of Total Land Required	**5.40**	**90.29**	**4.31**

*Note * Construction camps at every 6 km of the TL alignment, land required at each camp 0.5 ha. The land area for the Kabeli hub will be provided by the proponent of the Kabeli hydropower project and hence are not shown here.*

2.3.5 Project Activity Overview

The key project activities during construction and operation periods are summarized as under:

- Construction phase
  - Land acquisition for Tower pad for tower foundation and tower erection
  - Establishments of camps for construction material stockpiling and material transportation at appropriate locations
  - Construction of tower foundation and substation structures
  - Tower erection
  - Land Clearance along ROW and restriction on land use utilization
  - Stringing of cables on the Tower
- Operation Phase
  - Regular maintenance works and clearance of vegetation along the T/L ROW

2.3.6 Construction Planning

2.3.6.1 Construction schedule

The KCTLP construction implementation is planned to be completed within 4 years (Table 2.3). Preliminarily works in the sub-station locations and preparation of Tender documents are under progress.

Table 2.3: Construction Schedules KCTLP

SN	Description of works	1 Year				2 Year				3 Year				4 Year			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	Tender TL/Lakahnpur S/S																
2.	Tender Damak S/S																
3.	Tender Phidim S/S																
4.	Tender Godak S/S																
5.	Construction Installation																
6.	Damak S/S																
7.	Ilam S/S																
8.	Phidim S/S																
9.	Transmission Line including Lakhanpur S/S																

2.3.6.2 Construction Materials

A part of the construction materials like boulders, aggregates and sands will be sourced from the river bed of the surrounding areas. Other construction materials like cement, reinforcement bars, steel, will be transported from the market in Nepal or in some cases in Indian market. The steel framework for the tower pylon and knot bolts will be sourced either from Nepal or from third country. The conductors and cable, transformers etc will be sourced from the third country as per the specifications.

2.3.6.3 Construction Material Stockpiling and Muck Disposal

For stockpiling purpose of the construction materials and equipments for the sub-station areas, the land area taken for the Sub-station purpose is sufficient. For the stockpiling of the construction materials for transmission line construction small storage yards (ca. 0.5ha) will be acquired temporarily at 14 places at every 6 kilometers of the transmission line corridor.

The spoil volume of the sub-station area will be managed as backfilling of the land after the completion of the construction. The spoil of the tower foundation will also be used for backfilling or filling the depression areas near by the foundation site.

2.3.6.4 Foot Trail Development

To reach the foundation sites of the tower foundations, existing foot trails will be used as far as possible. Where such foot trial does not exist, trails will be developed from the existing trails of the nearest point for material hauling purpose. Such trails will be rehabilitated soon after the completion of the construction works.

2.3.6.5 Construction Camps

The permanently occupied areas of the sub-station will also be used for the construction of sub-station for the camping of the construction workforce, whereas, material storage areas of the TL will be used for the camping of the construction workforce for TL foundation and cable stringing.

2.3.6.6 Construction Workforce

A maximum of 50 construction workforce will be involved in the civil construction of a Sub-station at any given time. Nearly 10% of the workforce will be skilled, while another 25% will be semi-skilled and rest will be unskilled workers. During erection of the transformers, bus bars etc. about 20 workforces are expected in the sub-station. Nearly 30% of the staff will be skilled and other 40% semi-skilled and the rest will be unskilled.

For the construction of tower foundation, about 10 persons (skilled, semi-skilled and unskilled) at the maximum will be required at any point of the tower foundation works and in the assembly of the tower frame above the foundation. The stringing of the cable with the use of wrench machine will require about 25 persons between the towers at any time. Clearing of forest areas under the ROW will require some additional manpower depending upon the vegetation density in a given stretch along the ROW.

2.3.6.7 Construction Method

Manual civil construction methods will be employed with limited input of the machine to provide maximum job opportunities to the local area people. Tower foundation will be totally manual work. The assembly and erection of tower will also be dominantly manual. Cable stringing will use both man and machine. In the sub-station civil construction will be pre-dominantly manual. The erection of the sub-station will however use machines for the lifting of heavy transformers and other equipments.

2.3.7 Project Cost

The total cost of the project estimated is NRs. 2,01,19,95,844.00.

2.3.8 Definition of KCTLP Impact Area

The four district namely Jhapa, Ilam, Panchthar districts of Mechi zone and Terhathum districts of Koshi Zone in the Eastern Development Region of Nepal where the development and operation of the this transmission line takes place are defined as Project Districts while those VDCs through which this transmission line passes i.e. Lakhanpur VDC of Jhapa district, Bajho VDC, Chulachuli VDC; Mahamai VDC; Danabari VDC; Chisapani VDC; Sopak VDC, Godak VDC; Sidhithumka VDC; Sangrumba VDC; Mangalbare VDC; Ektappa VDC; Chameta VDC; and Phakphok VDC of Ilam district, Chilindin VDC; Pauwasartap VDC; Imbung VDC; Nawamidanda VDC; Siwa VDC; Chokmagu VDC; Phidim VDC; Bharapa VDC; Subhan VDC; and Amarpur VDC of Panchthar District and Chhatedunga VDC of Terhathum districts are defined as project VDCs. The Right of the Way (ROW) of the Transmission Line is the high Impact area; 250 m from the ROW on either side are the moderate impact area, The zone outside 250m from ROW within the project affected VDCs are the low impact areas.

Chapter 3: DATA REQUIREMENT AND STUDY METHODOLOGY

3.1 Desk Study and Literature Review

Feasibility studies of the KCTLP, the key document on the project planning, was collected and reviewed to determine the nature and scope of activities of the project that influences the environmental conditions of the proposal development area. Existing secondary information (published and unpublished) available in the libraries/documentation sections of government organizations, academia, and non-governmental organization ,etc were collected and reviewed to get information on the existing baseline conditions on physical, biological, social, economic, cultural and archeological aspects of the proposal development area. Similarly, published and unpublished reports pertaining to Environmental Standards, Acts, and Regulations etc. were also collected and reviewed to streamline the EIA study in compliance with the prevailing legislations and sectoral guidelines.

The above review of secondary information, legislations and scrutiny of maps and other information were instrumental in shaping the study planning as well as to fill in the data gaps required by the EIA study in the field study phase.

3.2 Data Requirement, Collection Methods, and Analysis

3.2.1 Physical Environment

3.2.1.1 Data Requirement and Collection Methods

The data required for the evaluation of the physical environment were Topography and Geomorphology, Climate and Hydrology, Geology, Soil Erosion and Land Instability, Air Quality, Water Quality, Noise Level, Watershed conditions and Natural hazards. Of the above data required, information on topography and geomorphology were derived from the topographic maps. Important topographic and geomorphic features were mapped and located in the topographic maps during field survey for the key project facility sites.

Geological investigations were conducted during the field investigation to verify the data obtained from literature review for the key project sites. Information on soil, erosion, and land stability were obtained by direct field observations and mapping. The soil types, features of erosion, and areas of land instability were mapped in the field.

Air quality, water quality and noise levels of the proposal development areas were derived from the indirect inferences in the field. The key parameters noted for the evaluation of air, water and noise is the level of industrial development, and the key anthropogenic activities of the area. Watershed conditions and potential natural hazards were evaluated based on the field observation taking into account of the land usage, forest coverage, historical records of natural events and activities of the communities located in the project areas.

3.2.1.2 Data Analysis

The data obtained from the literature review and the field investigations on the topography and geomorphology, Climate and hydrology, Geology, Soil, Erosion and Land instability, Air quality, Water quality, Noise level, Watershed conditions and Natural hazards were collated to generate comprehensive sets of database in the respective field. Geomorphic features were analyzed in the context of the geomorphic processes that led to the development of the geomorphic features. The climatic and hydrological records of the area were analyzed to generate spatial and temporal variations that characterize the area. Geologic maps were prepared to identify the weak geologic zones that are

critical in terms of geologic instabilities. The erosion and land stability features were analyzed in terms of the geology and geomorphologic process including climate and hydrological variations to activate the erosion and land instabilities. Based on the industrial and anthropogenic activities of the area, the air quality, water quality and noise levels of the project area were evaluated.

3.2.2 Biological Environment

3.2.2.1 Data Requirement and Collection Methods

The TOR of the study identified forest and vegetation, ecology, status and types; vegetation biodiversity and significance; wildlife status and habitats; wildlife biodiversity and significance; as primary data requirements of the project for the evaluation of the biological environment.

The vegetation survey was carried out by walkover survey throughout the project's direct and indirect impact area. Type of vegetation and forest were identified based on the species composition. Forest sampling (random sampling and stratified sampling) was carried out to collect quantitative baseline data on the forest structure, composition, density and dominance by establishing quadrate sampling plots. Ethno-botanical information was obtained by conducting Rapid Rural Appraisal method. The loss of trees including protected vegetation (rare, endangered, indigenous etc. as per IUCN Red Book, CITES Appendices, and GON list) species were enumerated based on appropriate sample survey in the direct impact areas of the project.

Wildlife biodiversity, habitats, mobility ranges, migratory routes etc. were studied in the field through transect walk over surveys and gathering information through community consultations. The indicator wildlife and threatened or endangered species (as per IUCN Red Book, CITES Appendices, and GON list) in the area were identified by direct observational surveys and consultation with the local communities.

Birds in the area were studied by observation of sight and sound. Bird calls, tracks, eggs and nests were referred in recognizing the presence of birds and the extent of their territory. The number of different kinds of birds including rare, endangered etc (as per IUCN Red Book, CITES Appendices, and GON list) heard or observed during a walk within the specified time of specified length, direction were used as an indicator to estimate abundance, range and typical habitats for feeding, breeding and nesting requirements.

3.2.2.2 Data Analysis

The quantitative data from forest sampling plots were used for the analysis of density, basal area, crown coverage, and wood volume and biomass. These quantitative field data obtained on the sampling plots were used for the estimation of the loss of trees and vegetation and loss of vegetation diversity including the loss of rare and endangered species by the project implementation. Similarly, the data for wildlife, and birds were used for the estimations of abundance, range, typical habitats for feeding, breeding and nesting requirements within the project area.

3.2.3 Socio-economic and Cultural Environment

3.2.3.1 Data Requirement and Collection Methods

The following data were envisaged in TOR to carry out the environmental evaluations of the project.

1 Land use and land capability of KCTLP Impact VDCs
2 Demographic characteristics (population, ethnicity, literacy, religion, health and sanitation, occupational status, income and expenditure, economic activities etc.) of KCTLP impact VDCs

3 Demographic characteristics (population, ethnicity, literacy, religion, health and sanitation, occupational status, income and expenditure, economic activities etc.) of KCTLP potentially direct impact Households
4 Infrastructure and support service facilities of the KCTLP impact VDCs
5 Infrastructure and support service facilities of KCTLP direct impact areas
6 Agriculture practice and production of the KCTLP impact VDCs
7 Agriculture practice and production of KCTLP direct impact area
8 Prevailing market price of land and property in the KCTLP direct impact areas

Information on general socio-economic conditions of the people of the project area VDCs were collected through focus group discussions or informal discussions with the key informants at the VDC level by the use of Rapid Rural Appraisal Methods. ***Annex 3.1*** represents the list of people present in RRA meetings in different locations at different times and their concerns on the project during the study. The information was collected through pre-designed checklists, which include key socio-economic characteristics of the people of all class, caste and economic categories. The information included demographic features of the households, migration pattern, employment, landholding size, agricultural production, food sufficiency, other productive resources, livestock, access to different social infrastructures such as drinking water, education, health-posts, general health, hygiene and sanitation condition, etc.

Sample survey of the potentially directly affected households was conducted to understand the socio-economic conditions using structured questionnaires ***(Annex 3.2)***. The survey question included family size, education, health, religion, economic activities, land holding size, agricultural production, horticultural production, livestock, household income (farm and off farm), general household expenditures, etc. to assess the status of the affected households. ***Annex 3.3*** represents the name List of people questioned in household survey.

Information on social infrastructures such as schools, health posts, drinking water etc. was collected from the VDC or Ward offices, consultation with village elites and through focus group discussions at VDC levels.

All sites of religious, cultural and historical importance on the directly project affected area were visited and observed in the area. The social, cultural and religious values and significance of these sites were noted through consultation with the communities.

3.2.2.2 Data Analysis

The data on the general socio-economic conditions of the project area VDCs were tabulated statically in order to evaluate the social and economic status of the people of the project area VDCs. The data derived from the socio-economic questionnaire surveys of the directly project affected households were tabulated using statistical tools to evaluate the current social and socio-economic status of the affected households. Similarly, the primary data on the social infrastructures were analyzed statistically to assess the current situation of these facilities and the general sanitation status of the project area community.

The religious, cultural, and historical sites were evaluated in terms of their religious and historical significance based on the spiritual and historical linkage of the people of the area.

3.3 Impact Identification and Prediction

The environmental impacts of the project were identified by overlapping the project baseline with the project layout and the project activities. GIS tools, projection of losses and benefits including the expert judgment and the lessons learned from the past projects of similar nature were the key tools used while identifying the project impacts. The project impacts were predicted in terms of direct/indirect impacts;

extent of impacts, duration of impacts, etc to assess the magnitude of the impacts as per the National EIA Guideline, 1993. Unlike National EIA Guideline, the assessment of environmental impacts in this study is based mostly on analogy methods, and Delphi technique taking into consideration of reversible, irreversible nature of impact and mitigation possibility of impacts.

3.4 Preparation of Environmental Management Plan

Environmental management plan (EMP) is prepared to ensure and evaluate the effectiveness of each of the mitigation and monitoring measures adopted to minimize the environmental impacts and to enhance overall environmental conditions within the region of influence. The basic objectives of EMP are that it clearly spells out the environmental concerns of the project and prescribes a systematic environmental management system to be followed by all concerned to attain continuous environmental improvements in the project vicinity.

3.5 Public Involvement

Consultation with the project area communities has been a regular feature of this IEE study. Since the proposal started prior to the amendment of EPR, as per the legal requirement a public notification to the local area people was published in the Rajdhani Dainik (Nepali National Daily) on 2066/5/19 B.S. i.e. 4th of Sept 2009 to inform the people of local area and other national stakeholders to register their concerns and suggestions with regard to the project (***Annex 3.4***). During this period, the Public Notice published in the national daily was also posted to each of the project area VDCs and public deeds of enquiry were carried out (***Annex 3.5).*** Later with the amendment of the EPR, the Ministry of Energy approved the original TOR prepared for EIA study with some modifications. The revised TOR for IEE study was approved by the ministry of energy. The local area people were informed of the change in legislation and on the changed status of study from EIA to IEE level.

Rapid Rural Appraisal were carried out in the different project sites to inform the people with regard to the project and to get their feedback (refer ***Annex 3.1***). Community consultation while conducting field level physical, biological and socio-economic environmental surveys were the essential element of the studies. Without the cooperation of the local communities of the project area, this IEE study would not have been accomplished. ***Annex 3.6*** presents the recommendation letters of the affected VDCs, and community forests.

The comments and suggestions received at different times from the various stakeholders (***Annex 3.1, Annex 3.6***) have been given due attention while forecasting the impacts and in designing the impact mitigation and environmental enhancement of the project. The ***Annex 3.7*** presents a brief overview of how the comments and suggestions of the local communities, VDCs and Community Forest User Groups have been integrated in the mitigation and environmental management plan.

Chapter 4: REVIEW OF PLANS/POLICIES, LEGISLATIONS, GUIDELINES, STANDARDS AND CONVENTIONS

Design, Planning, Construction and Operation of KCTLP has to comply with a range of policy and legislative requirements, including guidelines and standards promulgated under the purview of the legislation by the concerned government line ministries and departments. Key policies, legislations, guidelines, and standards are briefly outlined below. However, KCTLP will also be subjected to sectoral policies and legal provisions not discussed below and KCTLP will have to comply with all the legal provisions of the government of Nepal.

4.1 Plans and Policies

4.1.1 Interim Development Plan (2007)

The Interim development plan has given special emphasis on Domestic and foreign investment for the development of hydro-electricity and Transmission Lines. In order to promote hydropower development and transmission lines, the plan ensures to adopt clear, simple and transparent procedure to increase the participation of the private sector, the community and local bodies in production, transmission, consumption and export of hydro-electricity. Further, it emphasize for the gradual implementation of the Nepal Water Resource Strategy (2002) as well as the plan provisions in National Water Plan (2005).

4.1.2 Nepal Biodiversity Strategy (2002)

The Nepal Biodiversity Strategy has given due emphasis on the protection and wise use of the biologically diverse resources of the country. The development projects, as per the strategy should give due attention on the protection of ecological processes and systems, and to honor obligations under the Convention on Biological Diversity for sustainable development.

4.1.3 Nepal Water Resources Strategy (2002)

The Nepal water resource strategy emphasize the development of cost effective hydropower and transmission lines through the involvement of private sector by integrating social and environmental elements as guiding principle for sustainable development.

4.1.4 National Water Plan (2005)

The National Water Plan (NWP) approved by the government has a broad objective of ensuring planned development in a balanced manner to meet the overall national goals of economic development, poverty alleviation, food security, public health and safety, decent standards of living for the people and protection of the natural environment. It sets out a 20 year development program in the hydropower sector including transmission line with specific targets for 2007, 2017 and 2027.

4.1.5 Hydropower Development Policy (2002)

Over all policy goal is to develop environmental friendly hydropower and transmission line to meet the country energy needs and to encourage private sector to invest in hydropower and transmission line. The policy have a provision to make public the programs and measures identified by the IEE study for implementation to the local area people. The private parties developing hydropower and transmission line projects are encouraged to acquire the private land and property required for the project on their

own costs. If the lands and houses are not available, the government ensures to acquire such property to the private developers according to prevailing laws. However, private developers will have to borne all expenditures for such acquisition, and resettlement and rehabilitation of affected people. The government lands shall be made available to the private developers on lease basis or according to the prevailing laws.

4.1.6 Forest Policy (2002)

The Forest Policy (2000) emphasizes the protection of soil, water, flora and fauna constituting the main element of forestry to sustain biodiversity. It recognizes that the sustainable forests management is only possible when it give adequate attention to meet the basic needs of the people, sustainable utilization of forest resources, participation in decision making and sharing of benefits and above all on socio-economic growth.

4.1.7 Nepal Environmental Policy and Action Plan (NEPAP) 1993

Nepal Environmental Policy and Action Plan (NEPAP), endorsed by the government of Nepal in 1993, emphasized the need for mitigating adverse environmental impacts of infrastructure development projects. The Action Plan for Infrastructure Development within NEPAP emphasize on the need of a comprehensive EIA guidelines for infrastructure development projects.

4.2 Legislations

4.2.1 Ancient Monument Protection Act (1956)

This act has the objective of protection and conservation of the ancient monuments, temples, arts, paintings, etc. of age older than 100 years. The Act empowers the government to declare any such artifacts, temples, etc. under protection category by giving pubic notification. The act stipulates that any such artifacts, temples etc. declared under protection lists should not be disturbed or removed from their places without the consent of the government.

4.2.2 National Parks and Wildlife Protection Act (1972)

The conservation of ecologically valuable areas and indigenous wildlife is provided by the National Parks and Wildlife Conservation Act (NPWCA). Rule 30 of the Mountain National Parks Regulations (1979) stipulates that permission from the government of Nepal, Ministry of Forest and Soil Conservation must be obtained in the case of any plan to be implemented within a mountain national park. In Section 10, complete protection is accorded to 26 species of mammals, nine species of birds and three species of reptiles.

4.2.3 Land Acquisition Act, 2034 (1977)

Land Acquisition Act 2034 (1977) Amendment 2049 is the main legislation to guide the involuntary acquisition of land in the country. Government can acquire land at any place in any quantity by giving the compensation pursuant to the Act for the land required for any public purpose or for the operation of any development project initiated by government or government authorized institution (sections 3 and 4).

4.2.4 Soil and Water Conservation Act, 2039 (1982)

Section 3 of the Act empowers government to declare any area a protected watershed area. Under Section 10 of the Act, power is extended to the Watershed Conservation Officer to grant permission to construct dams, drainage ditches and canals, cut privately owned trees, excavate sand, boulders and

soil, discharge solid waste, and establish industry or residential areas within any protected watershed. The Act outlines the essential parameters necessary for proper watershed management (including both rivers and lakes). The Act is applicable only to protected watersheds.

4.2.5 Electricity Act (1992) and Electricity Regulation (1993)

Under section 4, sub-section 1 of the Act, requires any person or corporate body who wants to conduct survey, generation, transmission or distribution of electricity over 1 MW to submit an application to the designated authority along with the economic, technical and environmental study report. The environmental study report refers to IEE/EIA report. The proponent will have to show in the EIA report that the proposed, development project is not likely to cause soil erosion, flood, landslide and air pollution etc. Electricity Regulation, 1993, under rule 12(f) and 13(g) related to EIA, emphasize that the EIA report should include measures to be taken to minimize the adverse affects of the project on social, biological and physical environments, and should also elaborate utilisation of local labour, 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. Electricity Regulation, further has provisions of safety for the electricity equipment under Rule 48 to 67, which provides general guidelines for ground clearance height, line span, distance from nearest structure, thunder protection, restriction on ROW etc.

4.2.6 Water Resource Act, 2049 (1992) and Water Resource Regulations 2050 (1993)

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 EIA 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. Under the Water Resource Regulation, it is mandatory under Rule 17(e) of the regulation that any person or corporate body, who desires to obtain a license for utilization of water resources must state in his application that appropriate measures will be taken to lessen the adverse effects due to the project on the overall environment. Measures are to be taken for the conservation of aquatic life and water- environment, and for mitigating social and economic effects of the project in the concerned area. Local labor should be utilized and the local people should get benefits after the completion of the project. The regulation also emphasizes training to the local people in relation to construction, maintenance and operation of the project. The mitigation plan should give details of people to be evacuated and a necessary plan for their rehabilitation. Rule 19 stipulates that the water resources committee shall publish a notice giving detail information about the project to the people. If any person finds that the construction and operation of concerned project is likely to cause adverse effects, he or she may furnish his/her reaction stating the reasons within the thirty-five days from the date of publication of the notice. If the committee is satisfied with the reason given by the people, the proponent will be asked to revise the plan.

4.2.7 Forest Act, 2050 (1993), and Amendments (1995) and Forest Rules (1955)

Forest Act, 1993 and Forest Rules (1995) recognize the importance of forests in maintaining a healthy environment. The Forest Act requires decision makers to take account of all forest values, including environment services and biodiversity, not just the production of timber and other commodities. The basis of the Act's approach to forest and forest products is "resource oriented" rather than "use oriented". Section 49 of the Act prohibits reclaiming lands, setting fires, grazing, removing or damaging forest products, felling trees or plants, wildlife hunting and extracting boulders, sand and soil from the National forest without the prior approval. The Act empowers the government to permit the use of any part of government managed forest, community forest, leasehold forest, if there is no alternative except

to use the forest area for the implementation of a plan or project of national priority without significantly affecting the environment.

4.2.8 Environmental Protection Act 2053 (1997) and Environmental Protection Rule 2054 (1997)

The environmental Protection is the umbrella environmental act. Section 3 of the Act requires the proponent to conduct an IEE and EIA in relation to the prescribed proposals. . Section 4 of the Act prohibits implementation of development proposals without prior approval of the concerned agencies or Ministry of Environment (MOEnv). Section 5 of the Act provides that all the IEE/EIA of the development proposals should be presented to the concerned agencies for approval. Under Sections 6 of the Act, the relevant agency is empowered to grant approval for the IEE/EIA report as per the provisions of the Act. Under section 7 of the Act, industries or any others development projects owners are required not to discharge, emit or dispose waste, sound, radiation or any such acts. Section 10 of the Act prohibits any activity without the approval in the environmentally protected areas declared by GON. Section 17 of this Act is concerned about compensation.

The proposals requiring IEE/EIA studies are broadly listed in Schedule 1 and Schedule 2 under Rule 3 of the EPR enforced under the provisions of EPA. As per Rule 5, proponent of both IEE and EIA proposals has to prepare Terms of Reference (TOR) of the proposal for approval. Rule 7 of EPR provides that the IEE proposal proponents to publish fifteen days public notifications in the national daily and present the notification to the public institutions of the affected area for comments and suggestion on IEE proposals during the study phase. Rule 10 of EPR stipulates that all the proposals submitted for approval will have to take letter of recommendations from the concerned affected VDCs and municipalities on the proposals. However, the rule is silent on the status of the IEE/EIA if it is approved contrary to public and the affected VDCs and municipality opinion. Rule 12 of EPR stipulates that the proponent is obliged to follow the terms of conditions set by concerned agencies or Ministry. Rule 13 provides that the concerned agency to be responsible for the project monitoring. Rule 14 provides that the MOEnv to be responsible for environmental audit after two years of project implementation.

4.2.9 Local Self-Governance Act (1998) and Local Self Governance Rules (1999)

The Local Self-Governance Act (1998) and Local Self Governance Regulation (1999), provides more autonomy to District Development Committees, Municipalities and Village Development Committees. Section 25 of the Act provides the functions, rights and duties of the Ward Committee. Section 25(e) of the Act requires the ward to help for protection of environment through plantation over the bare land, cliff and mountains. Section 28 has mentioned the functions, rights, and duties of VDC. The VDCs are required to protect the environment, nature and natural resources. Section 55 empowers VDC to levy taxes on utilization of natural resources. Section 68 lists the property of the VDC, which includes natural resources. Apparently, natural resources include mineral resources and thus VDCs have an absolute authority over the natural resources.

4.2.10 Interim Constitution (2006)

The Interim Constitution of Nepal, 2006 (B.S. 2063) has given high priority on the protection and conservation of natural resources and the environment. While recognizing the importance of the natural resources, it has emphasized on the utilization of the resources on sustainable basis for the national development through judicious management and protection of the natural resources.

4.2.11 Land Reform Act (1964)

The land reform act has set a ceiling on the landholding for individual or households. Land holding above the land ceiling could be confiscated as per the provisions of the act. However, with the permission of the authorized government officials, landholding ceiling could be increased for the organizations as per the requirement of the organizational works.

4.3 Manuals/Guidelines

4.3.1 National EIA Guidelines (1993)

The guideline besides describing methods of project screening, scoping etc. provides criteria for project impact identification and prediction using valuation criteria for the project impact nature (direct/indirect) impact extent (site specific, Local and regional) and impact duration (short term, medium term and long term) to estimate the project impact magnitudes.

4.3.2 Water Resources Sector Guidelines for Power & Irrigation, (1994) (Draft)

The guideline was developed by the Ministry of Water Resources. The salient features of the guidelines are: a) identification of positive and negative impacts of water resource projects over both short-term and long-term period on natural and human environments, b) development of mitigation management and monitoring plan, and c) public hearing and interaction with affected group, NGOs, donors and the relevant government agencies.

4.3.3 Forestry Sector EIA Guidelines (1995)

The forestry sector EIA guidelines (1995), aim to facilitate the sustainable use of forest resources for the socio-economic development and to meet the basic needs of the communities for forest products. The positive and negative impacts of any development project in the forest area are to be identified and plans must be developed to minimize environmental damage, conserving genetic resources and bio-diversity.

4.3.4 Department of Electricity Development Manuals

Department of Electricity Development, Government of Nepal, in collaboration with the United States Agency for International Development and International Resource Group have developed a series of manuals for the conduction and preparation of EIA and IEE documents in the power and transmission line development sector. Important manuals developed are:

- Manual for Preparing Terms of References (ToR) for Environmental Impact Assessment (EIA) of Hydropower Projects, with Notes on EIA Report Preparation, (2001)
- Manual for Preparing Environmental management Plan (EMP) for Hydropower Projects, (2002)
- Manual for Developing and Reviewing Water Quality Monitoring Plans and Results for Hydropower Projects, (2002)
- Manual for Conducting Public Hearings in the Environmental Impact Assessment Process for Hydropower Projects, (2004)
- Manual for Addressing Gender Issues in Environmental impact Assessment/Initial Environmental examination for Hydropower Projects, (2005)

The manuals set fort by DoED provide systematic details of methods and tools for the conduction of IEE/EIA public hearing, IEE/EIA level assessment of gender related issues, preparation of IEE/EIA level environmental management plans, review of IEE/EIA level water quality assessment, and preparation of IEE/EIA terms of reference.

4.3.5 Department of Forest Guidelines

Department of Forest has made public various guidelines with relevance to environmental assessment of the development projects as under:

- Forest Produces Collection, Sale and Distribution Guidelines, (1998);
- Community Forest Guidelines, (2001);
- Community Forest Inventory Guidelines, (2005);
- Guidelines for use of forest area for the development works (2006)

The forest produces collection; sale and distribution guideline details the procedures and formats for getting approval for vegetation clearance, delineation of lands for vegetation clearance, evaluation of wood volume etc. The community forest guidelines and community forest inventory guidelines provide procedures for the inventory of forest resources and preparation of forest management plans. The guideline for the use of forest area for the development projects details the conditions for the development projects and provide the guideline for minimum mitigation measures to be complied for the loss of the forest area and forest resources.

4.3.6 Ministry of Environment Guidelines

Ministry of Environment has published following guidelines for the compliance while conducting IEE/EIA of the hydropower development projects;

1. A Guide to Environmental Management Plan of Hydropower Projects (MOEST,2006)
2. A Guide to Environmental Auditing of Hydropower Projects (MOEST, 2006)
3. A Guide to Environmental Monitoring of Hydropower Projects (MOEST, 2006)

The guidelines set forth detail methods and procedures for the preparation of environmental management plan, environmental auditing and environmental monitoring of the hydropower development projects.

4.3.7 National Health Care and Waste Management Guidelines (2002)

The guideline sets procedures for handling of health care waste. Which includes details of collection, separation, and final disposal of the waste for the safety of human health and hygiene vis a vis environmental contamination.

4.4 International Conventions and Treaties

International conventions and agreements to which Nepal is a signatory, and which have some relevance to the project, include:

4.4.1 Convention on Biological Diversity (1992)

Power projects that may be planned for lands that are designated as UN Biosphere Reserves, national parks, nature reserves or conservation areas will be affected by this UN Charter. Besides, the convention emphasizes on the conservation of biodiversity in any other sites.

4.4.2 Convention (No.169) Concerning Indigenous and Tribal Peoples in Independent Countries

The Article 7 of the convention provide right to the indigenous and tribal people to decide their own priorities for the process of development. However, for the national development plans and programs, it mandates consultation with them in the formulation of the plans and programs. Article 12, 13, 14 and 15 safeguards rights of the indigenous people in the land and natural resources in territories traditionally occupied by them. In the event that the state retains the right of the natural resources in their territories, it mandates formulation of special provisions under the state legislation for participation

in the decision making process and resettlement process with full compensation of the resulting loss or injury (Article 16).

4.4.3 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

The convention classifies species according to criteria where access or control is important (e.g. I - species threatened with extinction; II - species which could become endangered; III - species that are protected; E - Endangered; V - Vulnerable, R – Rare (CITES 1983)). The project will have to minimize impacts to the CITES species as far as possible.

Chapter 5: STUDY REQUIREMENTS

5.1 Time Schedule

The time required for the IEE study of the KCTLP is presented in Table 5.1

Table 5.1: Schedule for IEE Report Preparation

SN	Activity	Timeframe in Months						
		1	2	3	4	5	6	7
1	Approval of ToR			O				
2	Fieldwork baseline information documentation on physical biological and socio-economic and socio-cultural environments including detailed household socio-economic survey of affected people	.....	.....	.....	———	———		
3	Preparation of Draft IEE Report				———	———	———	———
5	Final IEE Report Submission for Approval							O

The Terms of Reference (TOR) of IEE was approved on 2066/11/25 (March 9, 2010).

5.2 Estimated Budget

Estimated budget for IEE study is about NRs. 3 million

5.3 Requirement of Specialists/Experts

The main experts involved for the 132 Transmission line IEE study were:

- Team Leader – (Environmentalist)
- Environmental Engineer
- Electrical Engineer
- Socio-economic Expert
- Social-environmental Planner,/Sociologist
- Terrestrial Ecological/ Watershed Management Expert
- Botanist/Forester
- Wildlife Expert

Other short-term support experts as and when needed basis involved were geologist, surveyor, enumerators, GIS expert, hydrologists, hygiene and Health specialists.

Chapter 6: DESCRIPTIONS OF EXISTING ENVIRONMENTS

This section describes the existing environmental status of the project area based on the site specific information gathered at field during the IEE study. The objective of the environmental baseline description in this section is to provide basis for the identification and prediction of the environmental impacts of the project.

6.1 Physical Environment

6.1.1 Physiography and Topography

From the physiographic consideration, the proposed KCTLP route extends from the Terai via Siwalik Zone, Mahabharat Zone to Midland Zone (Hagen, 1998). The longitudinal profile of the KCTLP alignment presents the topographic characteristics of the terrain in the different physiographic zone (***Figure 6.1***).

Figure 6.1: Longitudinal Profile of KCTLP

The starting point of KCTLP at Lakhanpur VDC lies in the flat lying Terai Plain, gently sloping due south. The land elevation along the KCTLP alignment increases from south to north from about 130m to 180m. Nearly 8% of the alignment lies within the Terai Zone. The KCTLP alignment north of Terai Zone passes for about 12% of the alignment through the Siwalik Zone. Siwalik Zone is a highly rugged terrain characterized by low lying hill system but of short and steep hill slopes dissected by drainage lines. The altitude of Siwalik zone along the alignment varies between 180 m to 500 m. The Mahabharat Zone (51% of the alignment) north of Siwalik, is also a system of hills and valleys. The southern slopes of Mahabharat is rather steep than the northern flank. The ground level altitude in the Mahabharat range varies between 500 m to 2073 m at the highest summit. The midland zone north of

the Mahabharat Zone (29% of the alignment) is also a system of hills and valleys but of lower altitude than the Mahabharat i.e. 500 m at the Tamor valley to 1447 m at the summit level.

6.1.2 Geology and Soil

On the regional geological framework of Nepal, the KCTLP alignment traverse through the Non-himalayan component – Gangatic alluvium to Himalayan component comprising of sedimentary, meta-sedimentary and high grade metamorphic rocks involved in a complex tectonism of faults, thrusts and folding (Figure 6.2).

The Terai Geomorphic Zone is characterized by the Gangatic Alluvium consisting of unconsolidated sediments of gravel, sand, silt and clay layers of above 100s of meter thickness. These represent the quaternary deposits deposited in the trough in front of the rising Himalayas and are the most recent sediments of the region.

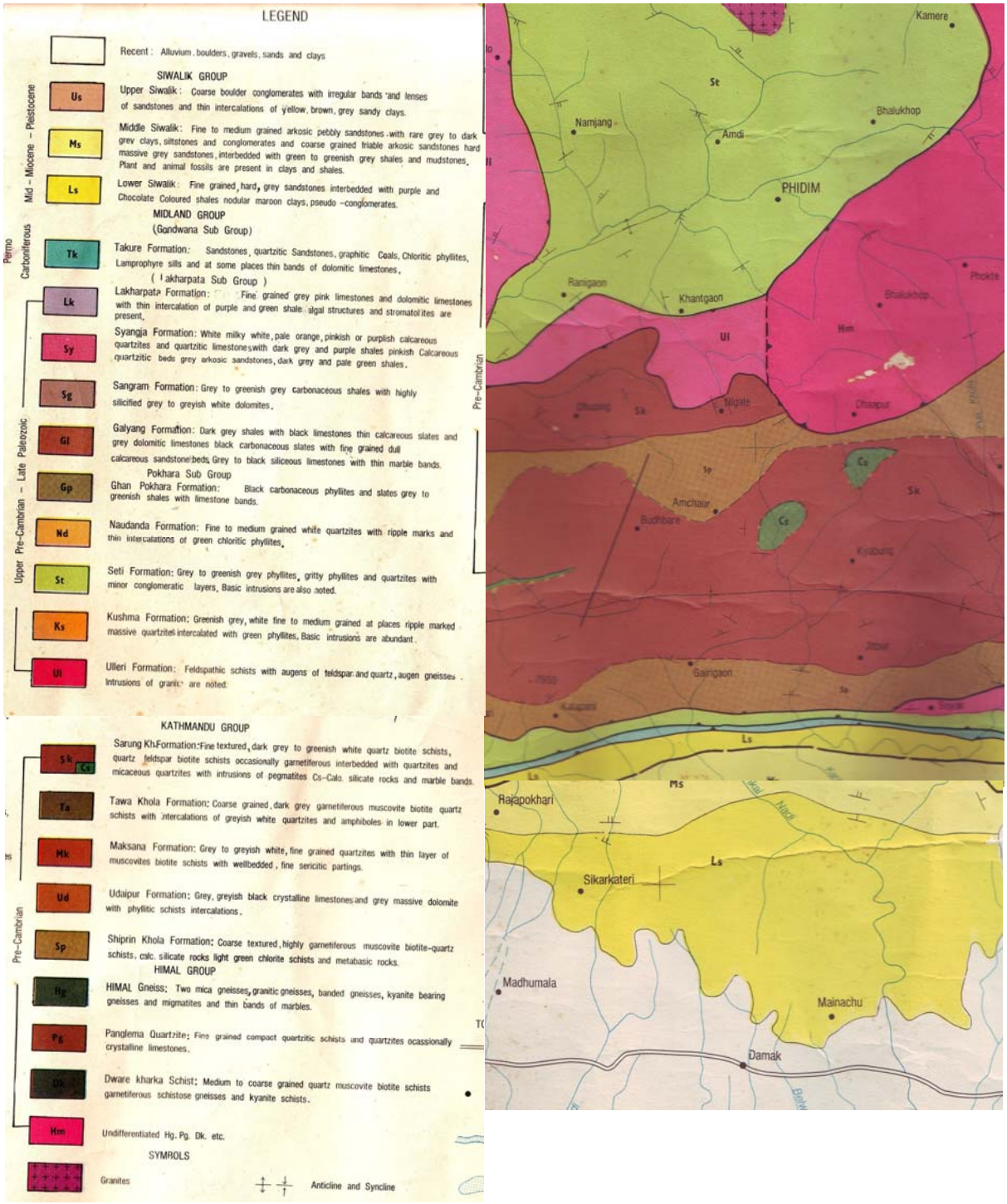
The Siwalik Geomorphic Zone, north of the Gangatic Alluvium is represented by conglomerates, sandstones, and clay stones of diverse colors and thickness. The zone is separated in the south with the Gangatic alluvium by Main Frontal Thrust, much of which is under the thick cover of recent sediments and is not discernible at the surface. To the north, it is separated by the Main Boundary Thrust from the Lesser Himalayan Lithotectonic Units. The tertiary sediments of Siwalik because of poor compaction and indurations are highly fragile and susceptible to erosion and mass wasting.

The Mahabharat Physiographic Zone is tectonically complex. The succession north of the Main Boundary Thrust, on the southern slopes of Mahabharat Ranges, is represented by Permo-carboniferous rocks of Midland Group and Gondwana Sub-group named Takure Formation (DMG, 1984). It is comprised of sandstones, quartizitic sandstones, coal, chloritc phyllites and lamprophyres. Tectonically resting over the Gondwana Sub-group is the Lakharpata Sub-group of Midland Group. It is of late Paleozoic to Pre-cambrian age, and the formation exposed along the alignment is Seti Formation. The rock assemblages of Seti Formation are grey to greenish grey phyllites, gritty phyllites, quartizites intruded by the basic igneous rocks. Tectonically, the Seti Formation rocks are considered sub-allocthonous. Ridding tectonically over the Seti Formation of Lakharpata Sub-group of Midland Group is the allocthonous rock mass of Kathmandu Group in the regional synclinorium structures (Ilam Synclinorium). The succession on the southern flank of Mahabharat Range starts with a augen gneisses (Ulleri Augen Gneisses) followed by Sprin Khola Formation (garnetifersous schists and phyllites) and Sarung Khola Formation (biotite scists, garnetiferous schists and quartzites). The Kathmandu Group rocks represent a typical nappe structure, where the thrusted rock mass are preserved in the regional synclinorium structure. To the north of Ilam Synclinorium, again the rock of Lakharpata sub-group of Midland Group is exposed along the tectonic window zone of Taplejung. The dominant rocks of the tectonic window are the rock assemblages of Seti Formation.

Soil in the Terai are alluvial, deposited by the streams and rivers draining the area whereas soil in the Siwalik hills are colluvial and thin, even exposing the bare rocks at the surface at number of places. Similarly, in the Mahabharat and Midland, the major portion of the soil is colluvial formed from the phyllites and schists. However, alluvial deposits occupy the valley bottoms with some recent coarse deposits. The substation at Lakhanpur lies on the Terai alluvial deposits where as sub-station at Ilam (Godak) and Phidim are also located on the alluvial/colluvial deposits.

Site specific information on the geology and soil conditions of the tower foundation sites are yet to be accertained, however will lie within the described regional geological framework.

Figure 6.2: Geological Map of the KCTLP Alignment



6.1.3 Climate

The KCTLP corridor, as explained in section topography, passes through the altitudes ranging from 130 m to 2073 m. The altitude below 500 m has tropical climate, between 500 to 1000 m it is sub-tropical, and between 1000 to 1500 m is a warm temperate climate. Above 1500 m it is cool temperate climate. In essence, the climate of the corridor is dependent upon the altitudinal variation along the corridor. Table 6.1.1 presents the climatological records of Jhapa, Ilam, and Panchthar.

Table 6.1.1: Climatological Records of Project District

District/VDC	Year	Temperature (°C)					Precipitation		Humidity%	
		Mean			Absolute extreme					
		Min	Max	Daily	Max	Min	Max in 24hr/Month	Total	08:45 NST	17:45 NST
Jhapa (Kechana)	2006	19.7	31.0	25.4	38.9/Apr	7.5/Nov	187/Jul	1824	80	80
Ilam (Kanyam)	2006	12.3	20.3	16.3	26.0/Sep	3.2/Jan	131/Sept	2841	77	79
Panchthar (Phidim)	2006	15.7	26.9	21.3	34.5/Aug	6.0/Jan	54/July	1311	82	75
Terhathum	2006	-	-	-	-	-	48/April	1410	-	-

Source: Climatological Records of Nepal, 2006

The summer is hot, dry and humid; while winter is cool to chilly depending upon the altitudinal location. The area is influenced by southeast monsoon. Nearly 75% of the annual precipitation occurs during the four monsoon months (June to September). From Terai to Mahabharat, precipitation increases from an annual average of 1800 mm to 2800 mm. North of Mahabharat, due to orographic effects of Mahabharat range, the rainfall is around 1300 mm. Monsoon precipitation are often very intense and are potential to cause floods in the Terai and slope failure due to water saturation in the Siwaliks and Mahabharat hill slopes.

6.1.4 Drainage and Hydrology

Tamor River, Mai Khola and Chaju River are the principal perennial drainages in the project area. While Sano Chaju Khola, Tamake Khola, Sanduwa Khola, Kharpa khola, Lankhuwa Khola, Sabjunn Khola, Deumai Khola, Hoyonma Khola, Hibhu Khola, Pichuk Khola, Siwa Khola and Hawa Khola are other minor tributaries of some prominence across the T/L corridor. Tamor and its tributaries are being fed from the Himalayan Glaciers while Mai River, which is the major river system of Illam district, originates from the Mahabharat mountain ranges. Most of these river lie within the Mahabharat mountain range.

6.1.5 Land Stability and Erosion

Terai Zone is predominantly depositional area. Sheet erosion with limited gully and river lateral cutting are the dominant erosion forms in this zone.

Siwalik Zone is most fragile eco-zone of the KCTLP. The geologic and tectonic make up of the area make this zone as one of the most vulnerable zones in terms of erosion and erosion related land stability. All forms of erosion ranging from gully, sheet, debris flow and landslide are expected in this region due to steep and rugged topographic forms. Activities indulging drainages disturbance and vegetation clear felling in the area are noted to increase the incidents of land instability and erosion in the Siwalik zone.

The presence of strong folds and faults in the geological formations in the Mahabharat and Midland zone make these zones vulnerable to natural surface erosion, landslides and slips. It has been estimated that 50% to 70% of the landslides in the region are of geological origin (Laban, 1979). The landslips and erosion in these zones are further aggravated by extensive annual rainfall and the deterioration of the forest cover. However, the Mahabharat and Midland zones are stable compared to the Siwalik Zone.

The Principle Rivers and tributary streams draining the different physiographic zones of KCTLP depending upon their drainage character and behavior during monsoon influence on the land stability and erosion features of the physiogrphic zones. In the terai and Siwaliks, the flash flood associated with upland erosion and low land sedimentations along the drainage influence area are very prominent. In the Mahabharat and Midland, river erosion is limited to the vicinity of the flood plains, where as debris flows and landslips in the thick soil areas and geologically weak zones are conspicuous.

6.1.6 Watershed Condition

The northern slope of the Siwalik is gentler and moist with dense vegetation compared to steep and warm southern slopes. Siwalik watersheds are geologically fragile. Most of the Siwalik hill slopes are prone to erosion and land slides. High erosion rate, land slide and steam bank cutting are aggravating sedimentation and Flood hazards on the agricultural land in the plain particularly along the Sano Chaju Khola close to the TL alignment. The Mahabharat Zone/Midland Zone, in the area, is under extreme agricultural pressure. Forest areas are confined to small patches. Besides, the river in the region transports high volume of bed load. Watershed condition in the Mahabharat /Midland is fair to good despite extreme agricultural pressure.

6.1.7 Air Quality, Water Quality and Noise Levels

There are no instrumentally monitored baseline data on air, water and noise in the area. As most of the KCTLP stretch lies in the cultivated zone and forested zone far from the city centers and at distance from the rural settlements, the quality of air, water and noise along the KCTLP corridor is not polluted. The air quality is assumed to be within the National Ambient Air Quality Standard (NAAQS). The water quality in the streams and river are good except for bacteriological contamination and high suspended solids in the monsoon. The bacterial contamination potential of the stream and river is high because of the poor sanitation conditions of the rural settlements in the watershed areas.

6.1.8 Land Use

Land use of the VDCs across the KCTLP is presented in Table 6.1.2. The cultivation area (46.39% dominates the other land use in the KCTLP traversed VDCs followed by forest land use (45.16%), Sandy areas (3.38%) and grassland (2.81%). The other land uses constitute small fractions of the land units.

The land use across KCTLP corridor is 50.50% agricultural land followed by 39.31% forestland, 5.45% water body and flood plain, 3.98% barren land and rest roads and foot trails.

Table 6.1.2: Land Use of the KCTLP Traversed VDCs

District	VDC	Landuse Area (Ha)														Total Area (Ha)
		Bush Area	Cliff	Cult Area	Forest	Grass land	Sand	Water body	Pond Lake	Barren Land	Scattered Trees	Nursery	Orchard	Built up Area	Bamboo	
Terathum	Chhatedhunga	14.81	1.64	1753.07	455.17	17.02	11.83	27.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**2281.21**
Panchthar	Amarpur	51.16	0.00	1881.83	1326.80	37.71	46.92	46.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**3391.20**
	Subhang	42.76	0.79	1734.91	1440.78	3.08	21.86	19.97	0.46	0.00	0.00	0.00	0.00	0.00	0.00	**3264.61**
	Bharapa	5.06	2.43	1974.32	938.27	229.11	12.43	23.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**3184.97**
	Phidim	0.00	1.48	2025.54	1555.20	85.55	20.91	26.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**3715.52**
	Chokmagu	3.22	0.00	1105.48	286.28	43.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1438.49**
	Siwa	0.00	0.00	994.87	368.80	70.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1433.99**
	Imbun	2.49	0.00	702.03	256.95	14.27	3.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**978.76**
	Nawamidada	8.45	0.00	1527.50	604.39	26.79	11.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**2178.61**
	Pauwasartap	100.46	0.00	1049.52	736.99	74.04	1.80	0.00	0.11	0.72	0.00	0.00	0.00	0.00	0.00	**1963.64**
	Chilinden	0.00	0.00	946.05	331.19	133.59	8.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1419.54**
Ilam	Phakphok	22.86	0.00	1626.81	711.21	477.65	15.56	0.00	0.00	2.72	0.00	0.00	0.00	0.00	0.00	**2856.81**
	Chamaita	154.08	0.00	1734.72	1318.51	293.67	10.78	0.00	0.00	3.70	0.00	0.00	0.00	0.00	0.00	**3515.46**
	Ekatappa	6.88	0.00	1550.48	574.86	151.76	35.08	0.14	0.00	1.02	0.00	0.00	0.00	0.00	0.00	**2320.22**
	Mangalbare	5.90	0.00	1584.74	1121.35	264.67	16.05	0.00	0.00	13.32	0.00	0.00	0.00	0.00	0.00	**3006.03**
	Sangrumba	3.26	0.96	1625.59	856.20	186.63	43.62	1.17	0.00	11.87	0.00	0.00	0.00	0.00	0.00	**2729.30**
	Siddhithumka	14.69	0.00	1440.78	1481.88	51.35	55.03	18.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**3062.48**
	Soyak	0.00	0.81	1469.10	783.51	3.37	81.73	28.69	0.00	0.00	0.12	0.00	0.00	0.00	0.00	**2367.33**
	Godak	14.24	1.19	1092.68	971.31	24.88	53.19	25.92	0.00	0.00	0.15	0.00	0.00	0.00	0.00	**2183.56**
	Chisapani	2.80	10.32	1459.58	1636.25	17.74	115.01	30.91	0.00	0.00	0.68	88.05	0.00	0.00	0.00	**3361.34**
	Danabari	5.38	10.14	3047.80	6996.09	27.87	613.31	123.39	0.17	14.76	0.39	309.02	0.00	0.00	0.00	**11148.32**
	Mahamai	0.00	0.00	2537.59	6539.76	60.46	846.51	117.34	0.02	124.52	0.00	0.00	0.00	0.00	0.00	**10226.20**
	Bajho	215.45	2.59	2422.01	6932.60	169.05	242.92	13.12	0.00	186.25	6.36	0.00	0.00	0.00	0.00	**10190.35**
	Chulachuli	23.45	0.00	3001.95	3400.40	37.58	479.26	0.69	3.89	67.21	0.00	0.00	13.51	0.00	0.00	**7027.94**
Jhapa	Lakhanpur	0.00	0.00	2963.52	481.30	113.72	403.26	0.96	5.51	8.68	0.00	0.00	5.33	0.47	1.32	**3984.07**
Total		**697.40**	**32.35**	**43252.47**	**42106.05**	**2615.39**	**3150.27**	**505.69**	**10.16**	**434.77**	**7.70**	**397.07**	**18.84**	**0.47**	**1.32**	**93229.95**
Percentage		0.75	0.03	46.39	45.16	2.81	3.38	0.54	0.01	0.47	0.01	0.43	0.02	0.00	0.00	100.00

6.2 Biological Environments

The project area lies outside any the biodiversity conservation sites (National Parks, Strict Nature Reserve, Wildlife Reserve, Hunting Reserve, Conservation Area, and Buffer Zone) officially declared by the Government of Nepal.

6.2.1 Forest and Vegetation Composition

6.2.1.1 Forest Types Regional Perspective

The project site, i.e. Damak –Kabeli Corridor, falls in the far eastern part of the country. It covers four districts (Jhapa, Ilam, Tehrathum and Panchthar) ranging in altitude from approximately 100-2000m. As Nepal is centrally located in the main Himalayan range, there is a dominance of eastern Himalayan flora in this part of the country (East of 86^{o} 30'E), which is much humid than the drier western part.

Climatologically, this area is characterized as a humid region receiving the full force of the summer monsoon. The sub-tropical zone has an abundance of *Castanopsis* spp. with common presence of *Schima wallichii*. The tropical zone has a number of east Himalayan species such as *Cycas pectinata, Pandanus nepalensis, Gnetum montanum* and tree ferns (TISC, 2002) along with principal tree component of the climatic zone such as *Shorea robusta, Terminalia tomentosa, Adina cordifolia*, etc.

Very few reports are available explaining the regional vegetation status and biodiversity of the project area. (Kanai, 1966; Ohashi,1975). Some recent publications provide a glimpse of the forests of the KCTLP corridor with information on status and diversity of the project sites on regional basis (Bajracharya, Shakya & Chetri, 1997; Bhattarai, 2008; Kharel & Siwakoti, 2002; Oli, 1999; Sharma, 2002). TISC (2002) revised ecological map of Nepal fairly explain the vegetation types of the KCTLP from south to north as under.

- **Tropical zone**
  Riverine Forest (Khair-Sissoo)
  *Tropical Deciduous Riverine Forest (*Silk cotton, *Anogeissus*, *Terminalia*, Schleichera)
  Tropical Evergreen Riverine Forest (Sal, *Duabanga*, Tooni, Garuga, *Albizzia*, Screwpine, Podocarpus, Cycas, Tree fern)
  Upper Tropical Riverine Forest (Sal, Silk cotton, Tooni, Screwpine, *Albizzia*,Tree fern)

- **Sub-tropical zone**
  Alder Forest (*Alnus nepalensis*)
  Alder-birch (Betula alnoides) *Forest* (mixed with Tooni and *Albizzia*)

- **Temperate Zone**
  Deciduous Maple-Magnolia Forest

- **Sub-alpine zone**
  Birch-Willow-Sorbus
  Larch Forest (*Larix griffithiana*)
  Myricaria-Seabuckthorn-Willow

- **Alpine zone**
  Cotoneaster, Potentilla, Grasses, Sedges, etc.

As the project area is limited to tropical and sub-tropical parts,only *Hill Sal Forest, Lower Tropical Sal Forest and Mixed Broadleaved Forests* are recognized in the tropical zone. Similarly *Schima – Castanopsis Forest and Chirpine-Broadleaved Forests* are recognized in the sub-tropical zone.

6.2.1.2 Forest Types across KCTLP

Several sample plots were laid down in the KCTLP passing through the different forested/vegetated stands to grasp the structure, composition, diversity and the general environmental condition. Based on the field survey, the following principal forest types were recognized.

1. ***Shorea forest***: This forest is recognized from 240-1000m altitude and is almost dominated by *Shorea robusta*. Other component tree species in this forest are *Terminalia tomentosa, Schima wallichii, Bauhinia purpurea, Adina cordifolia* etc.
2. ***Mixed Sal forest***: This forest is recognized from 450-600m altitude and *Shorea robusta* is the principal tree component of the forest. Other component tree species in this forest are *Terminalia tomentosa, Schima wallichii, Bauhinia purpurea, Acacia catechu*, etc.
3. ***Mixed Broadleaved forest***: This forest is recognized from 400-2000m altitude. Component tree species in this forest are Shorea *robusta, Bombax ceiba, Terminalia tomentosa, Schima wallichii, Bauhinia purpurea, Adina cordifolia,* etc.
4. ***Adina mixed forest***: This forest is recognized at around 500m altitude and *Adina cordifolia* is principal tree component of the forest. Other component tree species in this forest are *Lagestroemia parviflora, Mallotus philippinensis, lannea coromandelica, Acacia catechu*, etc.
5. **Sal-Chilaune *forest***: This forest is recognized at around 900m altitude and the principal tree components of the forest are *Shorea robusta* and *Schima wallichii*. Other component tree species in this forest are *Pinus roxburghii, Lagestroemia par*viflora, etc.
6. ***Schima wallichii forest***: This forest is recognized at around 1200m altitude and the principal tree components of the forest are *Castanopsis indica, Bombax ceiba*, etc.
7. ***Castanopsis-Pinus forest***: This forest is recognized at around 1300m altitude and the principal tree components of the forest are *Castanopsis indica, Pinus roxburghii, Schima wallichii*, etc.
8. ***Mixed-Rhododendron forest***: This forest is recognized at around 1400m altitude and the principal tree components of the forest are *Eugenia* sp*., Englehardtia spicata, Schima wallichii*, etc
9. ***Pinus roxburghii forest***: This forest is recognized between 1300-1400m altitude and the principal tree components of the forest are *Pinus roxburghii, Schima wallichii, Castanopsis indica,* etc.
10. ***Alnus forest***: This forest is recognized between 1300-1800m altitude and the principal tree components of the forest are, *Alnus nepalensis, Schima wallichii, Englehardtia spicata*, etc.
11. ***Mixed-Alnus forest***: This forest is recognized between 1300-2000m altitude and the principal tree components of the forest are, *Alnus nepalensis, Schima wallichii, Englehardtia spicata*, etc.

6.2.1.3 Forest Management

Most of the KCTLP right of the way natural forests is government managed forest (24.04 km). The private woodlands of small size are found scattered (6.57 km), however, are not officially registered under private forestry. The government managed forest is managed directly by the district forest office (10.82 km) or are given for management to the local community as community forestry (13.22 km) under the community forestry rules and guidelines.

Within the KCTLP affected area, the above two categories of government managed forest exist. The name and VDC wise locations of the community forests under KCTLP right of the way are presented in Table 6.2.1.

Table 6.2.1: List of Community Forests under KCTLP Right of the Way

SN	Name of the Community Forest	VDC	Ward No
1	Chukfara Community Forest	Bharappa	9
2	Jun Tara Community Forest	Chisapani	9
3	Adarchuli Paryatakiya Community Forest	Siddhithumka	3
4	Shree Dada Community Forest	Phidim	4
5	Shree Deurali Community Forest	Phidim	4
6	Shree Khandechuli Community Forest	Danabari	9
7	Shree Laxmi Community Forest	Danabari	9
8	Shree My Valley Community Forest	Soyak	9
9	Shree Nagemba Community Forest	Chokmagu	5
10	Shree Salle Sisne Community Forest	Chattedhunga	8
11	Shree Salleri Community Forest	Bharappa	8
12	Shree Sita Devi Community Forest	Soyak	6
13	Shree Sukuna Community Forest	Chulachuli	5
14	Shree Supare Bagthala Community Forest	Chattedhunga	7
15	Shree Surodaya Community Forest	Danabari	9
16	Shree Suryodaya Community Forest	Godak	3
17	Shree Tamakhe Community Forest	Mahamai	5

Source: Field Survey 2010

6.2.1.4 Regional Plant Diversity

The project region, though highly influenced by the human activities and cattle grazzing, due to moist climatic conditions and good soil thickness is characterized by appreciable vegetation diversity. A total of 501 species belonging to more than 135 family of vegetation are reported (***Annex 6.2.1***) in the project VDCs of KCTLP.

6.2.1.5 ROW Vegetation Diversity

The list of regional flora fairly explains the vegetation richness and diversity. But the inhabitants of the surrounding population have largely modified the natural vegetation, especially in the last 3-4 decades in the KCTLP.The vegetation sample plot survey along the KCTLP during IEE study reveals the vegetation characteristic and diversity (***Annex 6.2.2***). The details of the sample plots are presented in ***Annex 6.2.3.***

6.2.1.6 Rare, Endangered, Threatened Vegetation Species

There are several plants in the KCTLP right of the way that fall under different threat categories (Table 6.2.2) of the government of Nepal, IUCN redbook and the CITES Appendices. There are total of 21 recorded vegetation species of conservation significance. Out of which 6 species are protected by the government of Nepal, 15 species are listed in the conservation list of IUCN (6 endangered, 4 vulnerable, 2 rare and 3 commercially threatened) and 5 species are listed in the CITES Appendix II .The field survey could not list species under indogenous category in the KCTLP right of the way.

Table 6.2.2: Protected, Endangered, Vulnerable, Rare, and commercially threatened vegetation species of KCTLP

SN	Scientific Name	Govt. Protected	IUCN Red Book	CITES		
				I	II	III
1.	*Cycas pectinata*		EN		+	
2.	*Dioscorea deltoidea*		CT		+	
3.	*Calamus acanthospathus*		EN			
4.	*Calamus latifolius*		EN			
5.	*Calamus leptospadix*		EN			
6.	*Michelia champaca*	P	EN			
7.	*Crateva unilocularis*		R			
8.	*Elaeocarpus sphaericus*		V			
9.	*Choerospondias axillaris*		R			
10.	*Areca catechu*		CT			
11.	*Dalbergia latifolia*	P	V			
12.	*Alstonia scholaris*		R			
13.	*Rouwolfia serpentina*		EN		+	
14.	*Swertia chirayita*		V			
15.	*Oroxylon indicum*		V			
16.	*Cythea spinulosa*				+	
17.	*orchidaceae*				+	
18.	*Cinnamomum glaucescens*	P				
19.	*Lichens*	P				
20.	*Bombax ceiba*	P				
21.	*Shorea robusta*	P				

Source: Field Survey 2010
Note: P = Govt. Protected, EN = Endangered, CT = commercially threatened, V = Vulnerable, R = Rare

6.2.1.7 Agro-biodiversity

The local people of the KCTLP corridor have been using various crop plants of local origin as well as introduced plants for their everyday use. Though the project area expands from low tropical to the upper subtropical and temperate region, most of the area is mountainous. Hence, there is no significant difference on the availability and usage except in rice and wheat crops. In higher elevations, the local people are still using the traditional plants for their usage but in the lowlands, both introduced and improved varieties are found to grow. The IEE field survey listed a total of 105 varieties of cereal crops, legumes, fruits and spieces (***Annex 6.2.4***). More than 26 types of plants have been used for fodder, while 4 types of plants are used for timber and fodder and other two plants for various agro-economic purposes.

More than 289 plant species have been used for various ethnobotanical puprposes by the local people (***Annex 6.2.5***). About 164 plant species of the local area are used as medicine, 15 as wild ornamental purpose, 18 species as fodder, 30 species for timber, 2 as fuelwood, 60 species as non timber forest products, 7 species as fruits, 7 species as wild edibles and 9 species as ornamental plants.

6.2.2 Wildlife

The area to be affected by the project (directly and indirectly) lies outside the designated National Parks, Wildlife Conservation or any other areas recognized as important from biodiversity point of view. Natural forest area are highly influenced by the human activities within the directly project affected areas. In some places, natural forests have been converted to amrisho farming. The project affected areas are private *Alnus* forests, agricultural lands including cash crop farming such as amrisho, alaichi and tea gardens. Forest is the prime habitat of wildlife in this area (Natural, Private). Focus Group Discussions were carried out for the collection of information on wildlife in different Village Development Committee apart from direct observation and surveys. Section below briefly describes the wildlife found in the area.

6.2.2.1 Mammals

According to the local people, the project area supports moderate population of wild mammals. As the KCTLP traverse from Mahabharata range to Terai; climatic variation results in greater number of wild mammalian species. The total number of mammalian species recorded was 45 (***Annex 6.2.6***). Few species of mammals are common throughout the KVTLP. Details of the mammalian species project district and VDC wise are presented in ***Annex 6.2.7.a, b, c and d.***

6.2.2.2 Reptiles and Amphibians

A total of 55 herpetofauna have been recorded from the KCTLP corridor (***Annex 6.2.8***). Few species of reptiles and amphibians are common throughout the KVTLP. Details of the reptiles and amphibians species project district and VDC wise are presented in ***Annex 6.2.9. a, b, c and d.***

6.2.2.3 Birds

A total of 201 species of birds were recorded in the affected VDC's of the KCTLP **(*Annex 6.2.10*)**. Few species of birds are common throughout the KCTLP. The district and VDC wise details of the avian species within the project area are presented in ***Annex 6.2.11. a, b, c and d.***

6.2.2.4 Rare, Endangered, and Threatened Wildlife Species

Out of 45 reported mammalian species, two species are listed as protected species by NPWC Act 2029; six species are listed in CITES Appendix I, one is listed in Appendix III and three species are listed in IUCN Red List (Table 6.2.3).

Out of 55 reported species of herpetofauna, two species are listed as protected species by NPWC Act 2029; three species are listed in CITES Appendix 1, four are listed in appendix II and one is listed in Appendix III (6.2.3).

Among the recorded avian species, one species is listed as protected species by NPWC Act 2029. Similarly, two species are listed in CITES Appendix I and two are listed in Appendix II. Similarly, two species are listed in IUCN Red List (Table 6.2.3).

Table 6.2.3: Rare, Endangered, and Threatened Wildlife Species of KCTLP Area

SN	Common Names	Scientific Names	IUCN Category	Protected by NPWC Act 2029	Listed in CITES Appendices		
					I	II	III
Mammals							
1	Assam Macaque	*Macaca assamensis*		√			
2	Barking Deer	*Muntiacus muntjak*					√
3	Bengal Fox	*Vulpes bengalensis*	DD				
4	Chinese Pangolin	*Manis pentadactyla*		√			
5	Clouded Leopard	*Neofelis nebulosa*	VU		√		
6	Common goral	*Naemorhedus goral*			√		
7	Eurasian Otter	*Lutra lutra*			√		
8	Golden Jackel	*Canis aureus*			√		
9	Indian Grey Mongoose	*Herpestes edwardsi*			√		
10	Nepal Grey Langur	*Semnopithecus schistaceus*			√		
11	Rhesus Macaque	*Macaca mulatta*	VU				
Reptiles and Amphibians							
1	Bengal monitor	*Varanus bengalensis*			√		
2	Burmese rock python	*Python molurus*		√	√		
3	Chequered keelback water snake	*Xenochrophis piscator*			√		
4	Indian bull frog	*Hoplobatrachus tigerinus*				√	

SN	Common Names	Scientific Names	IUCN Category	Protected by NPWC Act 2029	Listed in CITES Appendices		
					I	II	III
5	King cobra	*Ophiophagus hannah*				√	
6	Monocled cobra	*Naja kaouthia*				√	
7	Olive keelback water snake	*Atretium schistosum*					√
8	Spectacled cobra	*Naja naja*				√	
9	Yellow monitor	*Varanus flavescens*		√	√		
Avian Species							
1	Great Hornbill	*Buceros bicornis*		√	√		
2	Greater Adjutant	*Leptoptilos dubius*	EN				
3	Hill Myna	*Gracula religiosa*				√	
4	Rose-ringed Parakeet	*Psittacula krameri*				√	
5	White-tailed Eagle	*Haliaeetus albicilla*	VU		√		

Source: Field Survey 2010
Note: Note: EN= Endangered, VU= Vulnerabl

6.3 Socio-economic Environment

The socio-economic environment of the KCTLP project is presented at three levels namely Project District level, VDC level and Household level of the people living close to the TL corridor. The socio-economic information at the three levels is envisaged to give a fair knowledge of the directly impacted people in relation to the VDCs and Districts.

6.3.1 Project Districts

Table 6.3.1 presents the generalized character of the project districts in terms of area, rank by size compared to other districts, area percentile in relation to Nepal and the number of local level administrative units (VDCs and Municipalities).

Table 6.3.1: Physical Characteristics of the Project Districts.

District Name	District Area (km^2)	Rank by Size, among 75 District	Area % in relation to Nepal	Administrative units	
				VDCs	Municipality
Jhapa	1606	42nd	1.09	49	3
Ilam	1703	38th	1.15	47	1
Panchthar	1241	57th	0.84	41	
Terhathum	679	71st	0.46	32	

Source: CBS, 2001

6.3.1.1 Population

The project districts have a total population of 12, 86,082 with 6, and 38,083 male and 6, 47,999 female. The male female ratio is 1:1.02. There are 2, 49,808 households. The average household size is 5.15 and the population density is 283 heads per square kilometer. The population characteristics are depicted in ***Table 6.3.2.***

Table 6.3.2: Demographic Characteristics of the Project Districts

District	Jhapa	Ilam	Panchthar	Terhathum	Total of Project Districts
Total Population	688,109	282,806	202,056	113,111	1,286,082
Male	341,675	142,434	99,042	54,932	638,083
Female	346,434	140,372	103,014	58,179	647,999
Male Female ratio	1.01	0.99	1.04	1.06	1.02

District	Jhapa	Ilam	Panchthar	Terhathum	Total of Project Districts
No. of House Hold	137,301	54,565	37,260	20,682	249,808
Average Household Size	5.01	5.18	5.42	5.47	5.15
Area in sq. Km.	1,606	1,703	1,241	679	4,550
Population Density Person/Sq. Km.	428	166	163	167	283

Source: CBS, 2001

Individually, the project districts Jhapa, Ilam, Panchthar and Terhathum constitute 2.97, 1.12, 0.87 and 0.49 percent of the total National Population. By population counts, these districts are placed in the 5th, 35th, 52nd and 65th position out of 75 districts of Nepal. Among the four districts, Jhapa has highest average population density with 428 person / Km^2 and Panchthar has the least with 163 person / Km^2. However, the average population density for all districts is higher than the national average value 157 people / Km^2.

Female population is found to be comparatively higher in three districts than the male population, while in Ilam, the ratio is 1:0.98, which is lower than the national average i.e. 1:1.002. The population below the 14 years of age constitutes about 40% of the total district population. The average household size of Jhapa Ilam and Panchthar are found to be lower than that of the national average household size, 5.44 while for Terhathum the figure is slightly higher than the national average.

6.3.1.2 Ethnic Composition including Adivasi Janajati (Indigenous/Tribal Groups) and Vulnerable Groups

There are more than 70 ethnic/caste groups in the project districts. ***Table 6.3.3*** depicts the major ethnic composition of the project districts. In total Brahman (22.98%) is the major ethnic group reported in the project development district and is followed by Limbu (18.76%), Chettri (16.53%), Rai (12.17%), Rajbanshi (5.45%), Tamang (5.26%), Newar (3.60%), Kami (3.53%) and Magar (3.46%). Other ethnic group like Muslim, Gurung, Sherpa, Damai, Sarki, Sunuwar and other unidentified are also reported in these districts but in a very small proportion constituting only less than 2% of the total population. In total Brahman is the major ethnic group in these districts. However, it differs district wise. Among the four districts, only in Jhapa, Brahman and Chettri are the major ethnic groups while in Panchthar and Ilam Limbu and Rai are the major ethnic groups. Contrary to these, Limbu and chettri are the major ethnic group in Terhathum.

According to the National Foundation for Development of Indigenous Nationalities Act of 2002, Adivasi Janajati, that is, indigenous peoples or nationalities, are defined as those ethnic groups or communities that “have their own mother tongue and traditional customs, distinct cultural identity, distinct social structure and written or oral history of their own”. The Government of Nepal officially lists 59 groups as Adivasi Janajati.

In the project district there are more than 10 etnic groups falling in the category of Adibasi Janajati which have a sizable population. Together they constitute 52.40 percent of the project district population. Of the total 10 ethnic groups 8 are Hill Janajati while 2 are Terai Janajati. Among Janajati group Limbu has the highest population followed by Rai, Rajbansi, and Santhal. Gurung, Newar, Tamang, Serpa constitute only a small fraction of the project district population. By population distribution, the project districts are the districts with higher population of Adivashi Janjati. Of the Adivashi janjati Limbu and Rai group in the hill and Rajbansi and Santhal in the Terai are the real indigenous ethnic group of the project districts, while others have migrated into the districts in the last few decades.

Apart from this excluding Muslim, there are three distinct ethnic groups (Kami, Damai/Dholi and Sarki) in the district, which have been recognized as vulnerable group collectively. They constitute 4.7% of the project district population. These are the groups which have been marginallised, economically, socially, and politically since ages in Nepal both by high caste group and the Janajati groups.

Table 6.3.3: Ethnic Composition of the Project Districts

Caste/ Ethnicity	Jhapa		Ilam		Panchthar		Terathum		Total	
	Population	%	Population	%	Population	%	Population	%	Population	%
Brahman Hill	158699	23.06	42805	15.14	25304	12.52	17771	15.71	244579	22.98
Chettri	94,640	13.75	38320	13.55	21520	10.65	21506	19.01	175986	16.53
Rajbanshi	58024	8.43							58024	5.45
Limbu	37646	5.47	40524	14.33	81488	40.33	40020	35.38	199678	18.76
Rai	30242	4.39	68901	24.36	28157	13.94	2225	1.97	129525	12.17
Santhali	23172	3.37	-	-	-	-	-	-	23172	2.18
Newar	21205	3.08	10850	3.84	3113	1.54	3127	2.76	38295	3.60
Muslim	18511	2.69	-	-	-	-	-	-	18511	1.74
Kami	16726	2.43	9500	3.36	6537	3.24	4788	4.23	37551	3.53
Tamang	16338	2.37	19302	6.83	13788	6.82	6548	5.79	55976	5.26
Magar	13557	1.97	14496	5.13	6389	3.16	2441	2.16	36883	3.466
Gurung	-	-	-	-	3133	1.55	3192	2.82	6325	0.59
Sherpa	-	-	4389	1.55	-	-	-	-	4389	0.41
Damai/Dholi	-	-	4130	1.46	3647	1.8	3163	2.8	10940	1.03
Sarki	-	-	-	-	-	-	1575	1.39	1575	0.15
Sunuwar	-	-	3604	1.27	1985	0.98	-	-	5589	0.52
Unidentified Caste	14888	2.16	-	-	1124	0.56	1506	1.33	17518	1.65
Janajati (indigenous group) Hill	***118988***	***23.63***	***162066***	***63.10***	***138053***	***70.37***	***57553***	***53.36***	***476660***	***44.78***
Janajati (indigenous group) Terai	***81196***	***16.12***	***0***	***0.00***	***0***	***0.00***	***0***	***0.00***	***81196***	***7.63***
Vulnerable Group	***16726***	***3.32***	***13630***	***5.31***	***10184***	***5.19***	***9526***	***8.83***	***50066***	***4.***
HIgh caste groups	***253,339***	***50.30***	***81,125***	***31.59***	***46,824***	***23.87***	***39,277***	***36.41***	***420,565***	***39.51***
Muslims and others	***33399***	***6.63***	***0***	***0.00***	***1124***	***0.57***	***1506***	***1.40***	***36029***	***3.38***

Source: CBS, 2001

6.3.1.3 Religion

Table 6.3.4 presents the religion practiced in the project development districts. Although the project districts are marked by cultural plurality, majority of the population when evaluated as total of the project districts practice Hindu (65%) religion followed by Kirat (21%), Buddha (9%) and Islam (1%). Among the 4 project district, only in Panchthar, majority of population (53%) practiced Kirat religion followed by Hindu (32%) and Buddha (11%) while in other three districts, majority of population practiced Hindu religion followed by Kirat, Buddha and Islam. Even among the three districts Jhapa, Ilam and Terhathum, Jhapa has the highest number of people (79%) practicing Hinduism compared to other two districts. In addition to aforementioned religion, less than 1% of population is also found practicing Christian, Jain and Sikh religion.

Table 6.3.4: Religion in the Project Districts

Religion	Jhapa		Ilam		Panchthar		Terhathum		Total	
	Population	%	Population	%	Population	%	Population	%	Population	%
Hindu	502451	79.37	133718	47.28	69112	34.2	57994	51.27	763275	65.04
Buddha	31648	5	44354	5.68	22894	11.33	12836	11.35	111732	9.52
Islam	19367	9.15	127	0.04	64	0.03	66	0.06	19624	1.67
Christian	4824	0.76	1601	0.57	873	0.43	520	0.46	7818	0.67
Jain	298	0.05	27	0.01	16	0.01	13	0.01	354	0.03
Sikh	1658	0.26	289	0.1	36	0.02	10	0.01	1993	0.17
Kirat	-	-	102302	36.17	108104	53.5	41367	36.57	251773	21.45
Others	15228	2.41	406	0.14	1046	0.52	384	0.34	17064	1.45

Source: CBS, 2001

Though the Adivashi janjati have been recognized as having a distinct and separate religious group other than the dominant hindu groups, the available statistics of the religion in the district shows that a number of the Adivashi janjati population are found to observe hindu religion. Total population of Janajati is about 52%, while only 35 % observe religion other than Hinduism. Most of the conversion in the religion in the project district is to Hinduism and Christianism from the traditional religion observed by the janjati groups. The reasons for change in the religious practice could be many; however, influence of the Hinduism, the religion of the ruling ethnic groups has a significant role.

6.3.1.4 Mother Tongue

Majority of population in the project districts (total) speaks Nepali (59.33%) and Limbu (17.25%) language as mother tongue although these districts are marked by the presence of more than 13 different languages. While evaluating district wise, in all districts population speaking Nepalese language is comparatively higher than those speaking Limbu language except in Panchthar district where majority of population speaks Limbu language although the difference between population speaking Limbu language and Nepali language is small. Population speaking other language than Nepali and Limbu language such as Tamang, Bantawa, Rajbans, Gurung, Newar, Urdu, Magar and others are present only in a small proportion constituting less than 5 percent of the total population (***Table 6.3. 5)***.

Table 6.3.5: Mother Tongue Language of the Project Districts

Mother tongue	Jhapa		Ilam		Panchthar		Terhathum		Total	
	Population	%	Population	%	Population	%	Population	%	Population	%
Nepali	365243	53.08	152804	54.03	67556	33.43	59838	52.9	645441	59.33
limbu	34730	5.05	35868	12.68	79949	39.57	37047	32.72	187594	17.25
Bantawa	17822	2.59			24744	12.25	1769	1.56	44335	4.08
Tamang	10956	1.59	14145	5	13369	6.62	5852	5.17	44322	4.07
Rajbanshi	84846	12.33	-	-	-	-	-	-	84846	7.80
Santhali	22732	3.3	-	-	-	-	-	-	22732	2.09
Gurung			3407	1.02	2084	1.03	1686	1.49	7177	0.66
Maithali	11891	1.73							11891	1.09
Magar			10766	3.81	6068	3	2306	2.04	19140	1.76
Urdu	8512	1.24	-	-	-	-	-	-	8512	0.78

Mother tongue	Jhapa		Ilam		Panchthar		Terhathum		Total	
	Population	%	Population	%	Population	%	Population	%	Population	%
Newar	-	-	-	-	1330	0.66	1755	1.55	3085	0.28
Sherpa	-	-	3766	1.33	-	-	1258	1.11	5024	0.46
Sunuwar	-	-	2215	0.78	1481	0.73			3696	0.34

Source: CBS, 2001

A remarkable shift is observed when the population statistics in terms of ethnicity and mother tongue is compared. Only 41% of the total population speaks other mother tongue than Nepali, while 52% of the populations have been categorized as Adivashi Janjati having a separate mother tongue. Influence of the state language on the traditional mother tongue of the janajati ethnic groups is apparent.

6.3.1.5 Education and Literacy

The average literacy rate for both the total literacy rate as well as literacy rate for male and female aged 6 year and above is higher than that of the national average for all districts. In all districts, male shows higher literacy rate than the female with male to female literacy ratio of 1:0.77, 1:0.78, 1:0.69 and 1:0.67, figure higher than the average national ratio 1:0.65 (***Table 6.3.6***)

Table 6.3.6: Literacy Rate in Project Districts

District	Literacy rate (%)		
	Total	Male	Female
Nepal	53.74	65.08	42.49
Jhapa	67.1	75.6	58.8
Ilam	65.5	74.4	58.6
Panchthar	55.4	65.7	45.6
Terhathum	59.3	71.3	48.2

Source: CBS, 2001

Disagregated statistics on literacy rate of the Adivahsi janjati and vulnerable group is not available. Traditionally these groups have been considered as the ethnic groups with minimum literacy in Nepal. In the recent years, however, due to opening of schools and increase in awreness level, has change the historical situation.

6.3.1.6 Educational Institutions

In total, 2,163 registered schools are reported from the project districts. In each district, the share of the primary school is significantly higher compared to other lower secondary, secondary higher secondary or private schools. Of the total School registered in the project districts, primary school ranges from 65 to 78% while other lower secondary, secondary higher secondary and private schools ranges only from 10 to 30% (CBS, 2001)

In all district, the net enrollment in the primary level is found to be higher (68%) than in the lower secondary (22%) or secondary (9%) indicating higher number of dropout by the enrollment in the lower secondary or secondary level. Therefore, despite of the encouraging number of enrollment in the primary level, the scenario is very pessimistic due to the higher number of dropout by the enrollment in the higher level. Besides, girls and disadvantage group comprised about 48% and 8% of the total student enrolled, in the primary level of the project development district respectively (Department of Education, 2000*)*.

6.3.1.7 Health Institutions

Number and type of health institution in the project districts are presented in ***Table 6.3.7.*** Among the project development districts, Jhapa district has the highest number of health institution i.e. 51 and Terhathum district has the least number of health institutions i.e. 32 while other two districts Ilam (51) and Panchthar (49) have more or less similar number of the health institution as Jhapa district. The

figure of number of the population per health institution indicates that the existed number of health institution is not sufficient in the all districts.

Table 6.3.7: Number of Health institution in the Project Districts

Districts	Jhapa	Ilam	Panchthar	Terhathum
VDC	49	47	41	32
Municipality	3	1	0	0
Hospitals (Govt.)	1	1	1	1
PHCC/HC	5	3	2	2
HP	7	7	10	9
SHP	38	38	29	20
Total Health Institution	51	49	42	32
Population/health institution	13492	5772	4811	3535

Source: CBS, 2001

6.3.1.8 Health Services

Table 6.3.8 depicts the status of the health facilities in heath institutions of the project districts. Among these four project districts; Jhapa has comparatively higher health facilities with the presence of highest number of doctors and beds compared to other three districts. Although the number of health institutions in Ilam and Panchthar district is more or less similar to that of Jhapa district, the numbers of doctor as well as beds in these districts are significantly lesser than Jhapa district. Both, the figure of population per doctor and population per hospital bed indicate that health care services facilities in the project districts are sub-standard (CBS, 2001). Thus, in case of the complicated and complex health problems, people have to travel other bigger cities in search of the good treatment as the district's hospitals/health institutions are unable to provide good treatment due to the lack of the adequate facilities.

Table 6.3.8: Health Facilities in the Project Districts

Districts	Jhapa	Ilam	Panchthar	Terhathum
Bed No	100	15	15	15
Doctors	22	6	5	4
population per hospital bed	7965	20883	15032	8718
population per doctor	36206	52207	45096	32693

Source: CBS, 2001

6.3.1.9 Common Disease

Acute Respiratory Track Infection (ARTI), Diarrhea, Dysentery, Skin Disease and Gastritis are reported as the most common disease in the project districts. Many of these diseases are related directly or indirectly to the polluted water, poor quality energy and poor sanitation practices.

6.3.1.10 Water Supply and Sanitation

Drinking water facility in the project districts except Terhathum seems to be comparatively poor when compared to the national average of 67% (***Table 6.3.9***). Around 52-60% of the population has access to drinking water in Jhapa, Ilam and Panchthar districts while in Terhathum district, it is about 85% of the total population. While evaluating the source of the drinking water, majority of households, >70%, in Jhapa district use well and tube well water for drinking purpose and only 25% household has access to pipe or tap water. Contrast to this, in other three districts majority of the household i.e.69-75%, has access to piped or tap water for drinking and only 15% household use well or tube well water for drinking. There are still some percentages of household that use spring water or other water sources for the drinking purpose.

Table 6.3.9: Source of drinking water in the Project Districts

District	Tap/piped	Well and Tube-well	Spout, River, Spring& Other	Not Stated
Jhapa	25.19	70.9	3.44	0.52
Ilam	75.56	12.42	11.61	0.41
Panchthar	69.09	17.11	13.57	0.24
Terhathum	72.7	14.37	11.63	1.3

Source: National Population Census 2001. (These figures are based on the enumerated population only; census Work was disturbed in these districts)

Around 62% of the house holds in the project districts have toilet facility (***Table 6.3.1.10***).Among the household having toilet facilities, 17% household have modern toilet with flush.

Table 6.3.10: Toilet facilities in the Project Districts

District	Modern toilet with flush	Ordinary Toilet	No Toilet	Not stated
Jhapa	29.72	33.01	36.66	0.66
Ilam	26.16	49.78	23.48	0.58
Panchthar	5.92	50.91	42.77	0.41
Terhathum	10.14	42.93	45.18	1.76

Source: National Population Census 2001.(These figures are based on the enumerated population only)

6.3.1.11 Energy

In the project development districts, *fire wood* is the basic sources of energy for cooking. More than 95% household in the Panchthar and Terhathum districts use fire wood for cooking, while in other two districts Jhapa and Ilam, 65% and 73% household respectively use firewood for cooking. The remaining households use either kerosene or biogas or guitha and others (***Table 6.3.11***)

Table 6.3.11: Types of cooking fuel used in the Project Districts

District	Firewood	Kerosene, LP-gas	Biogas	Guitha and other	Not Stated
Jhapa	65.97	25.35	2.66	5.52	0.5
Ilam	78.43	20.07	0.32	0.8	0.3
Panchthar	95.71	4.07	0	0	0.21
Terhathum	95.77	1.87	1.03	0	1.33

Source: National Population Census 2001. (These figures are based on the enumerated population only.)

Similarly, for lightening purpose also, majority of household have to rely on kerosene as only limited percentile of households in the project districts have access to the electricity (***Table 6.3.12***). In Panchthar and Terhathum districts 91% and 83% household respectively use kerosene for lightening purpose while in Jhapa and Ilam districts 66% and 56% household respectively use *kerosene* for lightening purpose. The remaining households either use electricity or other sources for lightening while those using biogas constitute less than 1%.

Table 6.3.12: Lightening facilities in the Project Districts

District	Electricity	Kerosene	Biogas	Other
Jhapa	32.56	66.24	0.21	1
Ilam	42.98	56.04	0.14	0.84
Panchthar	5.1	91.55	0.32	3.02
Terhathum	12.54	83.3	0.57	3.59

Source: National Population Census 2001. (These figures are based on the enumerated population only)

6.3.1.12 Food Balance and Landholdings

Table 6.3.13 presents the food balance situation in the project districts. Jhapa and Terhathum are food sufficient district and the per capita food production is high, whereas the districts of Ilam and Panchthar are food deficient.

Table 6.3.13: Food Balance Situation of the Project Districts

District	Per Capita Food Production (kg/person)	Total Food Production (MT)	Food Balance (MT)
Jhapa	3066.1	238518	105218
Ilam	1819.8	60774	-1646
Panchthar	1686.8	38182	-5150
Terhathum	2613.8	31888	8069

Source: Intensive study and Research Center, 2008

The average household landholdings and average size and numbers of landholding parcels is presented in Table 6.3.14. Average landholding is high in the Ilam and Panchthar Districts but the land fragmentation is also high, whereas in the Jhapa and Terhathum districts, the average landholding size is comparatively small, and average size of the parcel is relatively larger.

Table 6.3.14: HH Land holding, and Average Size of the Parcel, Project VDCs

District	Average HH total Landholding (ha)	Average No of Parcels/HH (Nos)	Average size of parcel (ha)
Jhapa	0.77	0.83	0.78
Ilam	1.65	1.61	0.72
Panchthar	1.21	4.00	0.30
Terhathum	0.27	0.30	0.47

Source: Intensive study and Research Center, 2008

6.3.1.13 Road Infrastructures

The status of the road infrastructure in the project VDCs is presented in **Table 6.3.15**. The road density in the three project district namely Jhapa, Ilam and Panchthar is almost similar whereas the road density in the Terhathum district is poor. However, population influenced per kilometer of road is almost similar between Jhapa and Terhathum district.

Table 6.3.15: Status of Road Infrastructures, Project District

District	Total Raod Length (km)	Pop influenced /km of Road	Road Density km/100km^2
Jhapa	196.61	3500	12
Ilam	228.48	1238	13
Panchthar	145.4	1390	12
Terhathum	32.89	3439	5

Source: Intensive study and Research Center, 2008

6.3.1.14 Economic Activities

Around 60% of the population of 10 year and over in the project development districts are economically active. Gender wise, in all districts Jhapa, Ilam, Panchthar and Terhathum, male counterparts are found to be more economically active than the female counterpart with male to female ratio of 1:0.61, 1:0.77, 1:91 and 1:0.88 respectively (***Table 6.3.16***).

Table 6.3.16: Population 10 Years of Age and Over by usually Economic Activity

Districts	Percent of Total	Percent of Male	Percent of Female	Ratio
Jhapa	53.01	65.96	40.34	1: 0.61
Ilam	57.14	64.41	49.77	1: 0.77
Panchthar	61.25	64.14	58.54	1: 0.91
Terhathum	61.42	65.23	57.92	1: 0.89
Average	58.205	64.935	51.6425	1: 0.79

Source: CBS, 2001

Among the project districts, only in Terhathum majority of the economically active populations are the farmers while in other three districts majority of people are engaged either in production work or in skilled professional or craft trade work rather than agriculture. In Terhathum district, around 79% of total economically active population is engaged in agricultural activities followed by Craft Trade, Professional skill, Services worker, Production work and others. Contrast to this, in Jhapa district, 55.40 % are engaged in Production work followed by craft trade, Professional skill, Service worker, agriculture and others while in Panchthar districts 87% are engaged in Production work followed by Professional skill, craft trade, Service worker, agriculture and others. Conversely, in Ilam district 35.51% are engaged in the Professional skill work followed by craft trade work, service, agriculture, and others (***Table 6.3. 17***).

Table 6.3.17: Types of Economic Activities in the Project Districts

Economic Activity by Types	Jhapa		Ilam		Panchthar		Terhathum	
	Population	%	Population	%	Population	%	Population	%
Farmers	5383	2.57	2284	7.91	408	0.43	43320	78.07
Service Workers	4227	2.02	2404	8.33	784	0.82	1554	2.80
Professional Skill Workers	23551	11.27	10246	35.51	4243	4.46	2449	4.41
Craft Trade Workers	33956	16.24	7525	26.08	2432	2.55	3578	6.45
Production Workers	115809	55.40	146	0.51	82925	87.10	280	0.50
Others	26131	12.50	6252	21.67	4413	4.64	4308	7.76

Source: CBS, 2001

6.3.1.13 Development Indicators

Nepal Human Development Report (2004) has calculated the Human Development Index (HDI) for all 75 districts based on the three key indicators. According to this report, the project development districts namely Jhapa, Ilam, Panchthar and Terhathum are placed on 18th, 11th, 24th and 10th position among 75 districts with HDI value 0.494, 0.521, 0.484 and 0.523 respectively, figure higher than the national HDI value of 0.471.

While in the Human Poverty Index (HPI), the districts Jhapa, Ilam, Panchthar and Terhathum are placed on 4th, 11th, 36th, and 30th ranks among the 75 districts of Nepal with HPI value 29.2, 33.7, 42.1 and 40.9 respectively. The HPI for Jhapa and Ilam districts are higher than the national average HDI figure while for Panchthar and Terhathum the lower than the national average HDI figure i.e.39.6.

Similarly, in Gender related Development Index (GDI), the districts Jhapa, Ilam, Panchthar and Terhathum are on 17th, 9th, 24th, and 12th position among the 75 districts of Nepal with GDI value 0.482, 0.513, 0.472 and 0.504 respectively; figure higher than the average national GDI of 0.452.

6.3.2 Project VDCs

The KCTLP corridor extends across the following VDCs of the Jhapa, Ilam, Panchthar and Terhathum districts.

Jhapa District: Lakhanpur VDC (**Sub-station***);
Ilam District: Bajho VDC, Chulachuli VDC; Mahamai VDC; Danabari VDC; Chisapani VDC; Soyak VDC; Godak VDC (**Substation***); Sidhithumka VDC; Sangrumba VDC; Mangalbare VDC; Ektappa VDC; Chameta VDC; and Phakphok VDC
Panchthar District: Chilindin VDC; Pauwasartap VDC; Imbung VDC; Nawamidanda VDC; Siwa VDC; Chokmagu VDC; Phidim VDC(**Substation**); Bharapa VDC; Subhan VDC; and Amarpur VDC
Terhathum District: Chhatedunga VDC

6.3.2.1 Population

According to 2001 census, the project VDCs have a total population of 168747 constituting 13% percent of the total population of the project districts. Average household size is 5.34 with male to female ratio of 1:1.02. The figure for household size of the project VDCs is higher than those of the project districts. ***Table 6.3.18*** presents the population of the affected VDCs with respective household size, male and female population plus their ratio.

Table 6.3.18: Population Distribution in the Project VDCs

Village Development Committee	2001 Census Data							
	Total Population	Total HH	HH size	Male	%	Female	%	Ratio
Jhapa District								
Lakhanpur	13911	2723	5.11	6715	48.27	7196	51.73	1: 1.07
Ilam District								
Bajho	7324	1308	5.60	3717	50.75	3607	49.25	1: 0.97
Chulachuli	18176	3349	5.43	9018	49.61	9158	50.39	1: 1.02
Mahamai	10776	1964	5.49	5351	49.66	5425	50.34	1: 1.01
Danabari	12693	2400	5.29	6351	50.04	6342	49.96	1: 100
Chisapani	4923	935	5.27	2473	50.23	2450	49.77	1: 0.99
Sopak	3378	619	5.46	1712	50.68	1666	49.32	1: 0.97
Godak	4600	924	4.98	2338	50.83	2262	49.17	1: 0.97
Sidhithumka	3454	676	5.11	1700	49.22	1754	50.78	1: 1.03
Sangrumba	5497	1048	5.25	2739	49.83	2758	50.17	1: 1.01
Mangalbare	6799	1281	5.31	3424	50.36	3375	49.64	1: 0.99
Ektappa	4875	918	5.31	2374	48.70	2501	51.30	1: 1.05
Chameta	6210	1082	5.74	3049	49.10	3161	50.90	1: 1.04
Phakphok	5288	906	5.84	2681	50.70	2607	49.30	1: 0.97
Panchthar District								
Chilindin	3918	727.00	5.39	1928	49.21	1990	50.79	1: 1.03
Pauwasartap	4322	801.00	5.40	2083	48.20	2239	51.80	1: 1.07
Imbung	2378	455.00	5.23	1144	48.11	1234	51.89	1: 1.08
Nawamidanda	4345	797.00	5.45	2090	48.10	2255	51.90	1: 1.08
Siwa	3970	700.00	5.67	1916	48.26	2054	51.74	1: 1.07
Chokmagu	4133	744.00	5.56	1987	48.08	2146	51.92	1: 1.08
Phidim	13652	2927.00	4.66	6854	50.21	6798	49.79	1: 0.99
Bharapa	7268	1301.00	5.59	3560	48.98	3708	51.02	1: 1.04

Village Development Committee	2001 Census Data							
	Total Population	Total HH	HH size	Male	%	Female	%	Ratio
Subhan	5316	954.00	5.57	2602	48.95	2714	51.05	1: 1.04
Amarpur	7743	1375.00	5.63	3743	48.34	4000	51.66	1: 1.07
Terhathum District								
Chhatedunga	3798	695	5.46	1811	47.68	1987	52.32	1: 1.10
Total	**168747**	**31,609**	**5.34**	**83360**	**49.40**	**85387**	**50.60**	**1: 1.10**

Source: CBS, 2001

About 40% of the total populations in the project VDCs are below 14 years of age while those above the 60 years of age constitute 6% of the total population. The population between 15 to 59 years of age constitutes 54%. The age wise distribution pattern of population in the project VDCs is similar to those of the project districts although the population of younger and older is slightly higher in the project VDCs than in the project districts (***Table 6.3.19***).

Table 6.3.19: Population of Different Age Group and Sex, Project Affected VDCs

District VDC	SEX	TOTAL	AGE GROUPS											
			0-4 YEARS	%	5-14 YEARS	%	15-24 Years	%	25-49 Years	%	50-59 Years	%	Over 60	%
Jhapa														
Lakhanpur	Both Sexes	13911	1204	8.66	4631	33.29	3246	23.33	3334	23.97	1659	11.93	1041	7.48
	Male	6715	594	8.85	2355	35.07	1510	22.49	1525	22.71	793	11.81	532	7.92
	Female	7196	610	8.48	2276	31.63	1736	24.12	1809	25.14	866	12.03	509	7.07
Ilam														
Chulachuli	Both Sexes	18176	1930	10.62	5263	28.96	4147	22.82	4720	25.97	1052	5.79	1064	5.85
	Male	9018	996	11.04	2701	29.95	2032	22.53	2189	24.27	549	6.09	551	6.11
	Female	9158	934	10.20	2562	27.98	2115	23.09	2531	27.64	503	5.49	513	5.60
Chameta	Both Sexes	6210	733	11.80	2626	42.29	1266	20.39	1433	23.08	539	8.68	346	5.57
	Male	3049	368	12.07	1311	43.00	570	18.69	707	23.19	279	9.15	182	5.97
	Female	3161	365	11.55	1315	41.60	696	22.02	726	22.97	260	8.23	164	5.19
Chisapani	Both Sexes	4923	545	11.07	1912	38.84	1048	21.29	1218	24.74	465	9.45	280	5.69
	Male	2473	271	10.96	951	38.46	515	20.82	619	25.03	239	9.66	149	6.03
	Female	2450	274	11.18	961	39.22	533	21.76	599	24.45	226	9.22	131	5.35
Danabari	Both Sexes	12693	1412	11.12	5220	41.13	2622	20.66	3039	23.94	1211	9.54	601	4.73
	Male	6351	693	10.91	2590	40.78	1291	20.33	1496	23.56	652	10.27	322	5.07
	Female	6342	719	11.34	2630	41.47	1331	20.99	1543	24.33	559	8.81	279	4.40
Ektappa	Both Sexes	4875	556	11.41	1900	38.97	1017	20.86	1140	23.38	457	9.37	361	7.41
	Male	2374	272	11.46	971	40.90	473	19.92	523	22.03	218	9.18	189	7.96
	Female	2501	284	11.36	929	37.15	544	21.75	617	24.67	239	9.56	172	6.88
Godak	Both Sexes	4600	480	10.43	1665	36.20	961	20.89	1192	25.91	485	10.54	297	6.46
	Male	2338	246	10.52	861	36.83	459	19.63	612	26.18	248	10.61	158	6.76
	Female	2262	234	10.34	804	35.54	502	22.19	580	25.64	237	10.48	139	6.15
Mahamai	Both Sexes	10776	1334	12.38	4719	43.79	2234	20.73	2343	21.74	1013	9.40	467	4.33
	Male	5351	675	12.61	2346	43.84	1082	20.22	1118	20.89	554	10.35	251	4.69
	Female	5425	659	12.15	2373	43.74	1152	21.24	1225	22.58	459	8.46	216	3.98
Mangalbare	Both Sexes	6799	632	9.30	2478	36.45	1497	22.02	1719	25.28	697	10.25	408	6.00
	Male	3424	316	9.23	1278	37.32	721	21.06	842	24.59	376	10.98	207	6.05

District VDC	SEX	TOTAL	AGE GROUPS											
			0-4 YEARS	%	5-14 YEARS	%	15-24 Years	%	25-49 Years	%	50-59 Years	%	Over 60	%
	Female	3375	316	9.36	1200	35.56	776	22.99	877	25.99	321	9.51	201	5.96
Phakphok	Both Sexes	5288	632	11.95	2141	40.49	1064	20.12	1262	23.87	492	9.30	329	6.22
	Male	2681	330	12.31	1089	40.62	522	19.47	640	23.87	254	9.47	176	6.56
	Female	2607	302	11.58	1052	40.35	542	20.79	622	23.86	238	9.13	153	5.87
Soyak	Both Sexes	3378	339	10.04	1253	37.09	717	21.23	826	24.45	357	10.57	225	6.66
	Male	1712	205	11.97	655	38.26	360	21.03	408	23.83	180	10.51	109	6.37
	Female	1666	134	8.04	598	35.89	357	21.43	418	25.09	177	10.62	116	6.96
Sidhithumka	Both Sexes	3454	364	10.54	1279	37.03	736	21.31	860	24.90	326	9.44	253	7.32
	Male	1700	190	11.18	641	37.71	349	20.53	421	24.76	171	10.06	118	6.94
	Female	1754	174	9.92	638	36.37	387	22.06	439	25.03	155	8.84	135	7.70
Sangrumba	Both Sexes	5497	634	11.53	2150	39.11	1136	20.67	1284	23.36	562	10.22	365	6.64
	Male	2739	314	11.46	1077	39.32	547	19.97	640	23.37	282	10.30	193	7.05
	Female	2758	320	11.60	1073	38.91	589	21.36	644	23.35	280	10.15	172	6.24
Panchthar														
Chilindin	Both Sexes	3918	569	14.52	1741	44.44	670	17.10	901	23.00	362	9.24	244	6.23
	Male	1928	294	15.25	884	45.85	305	15.82	427	22.15	180	9.34	132	6.85
	Female	1990	275	13.82	857	43.07	365	18.34	474	23.82	182	9.15	112	5.63
Pauwasartap	Both Sexes	4322	593	13.72	1860	43.04	853	19.74	935	21.63	427	9.88	247	5.71
	Male	2083	308	14.79	940	45.13	384	18.43	410	19.68	212	10.18	137	6.58
	Female	2239	285	12.73	920	41.09	469	20.95	525	23.45	215	9.60	110	4.91
Imbung	Both Sexes	2378	311	13.08	982	41.30	444	18.67	510	21.45	262	11.02	180	7.57
	Male	1144	168	14.69	479	41.87	208	18.18	251	21.94	114	9.97	92	8.04
	Female	1234	143	11.59	503	40.76	236	19.12	259	20.99	148	11.99	88	7.13
Nawamidanda	Both Sexes	4345	499	11.48	1195	27.50	913	21.01	1095	25.20	265	6.10	378	8.70
	Male	2090	238	11.39	591	28.28	440	21.05	522	24.98	116	5.55	183	8.76
	Female	2255	261	11.57	604	26.78	473	20.98	573	25.41	149	6.61	195	8.65
Siwa	Both Sexes	3970	509	12.82	1646	41.46	784		865	21.79	433	10.91	242	6.10
	Male	1916	246	12.84	801	41.81	365	19.05	393	20.51	229	11.95	128	6.68
	Female	2054	263	12.80	845	41.14	419	20.40	472	22.98	204	9.93	114	5.55
Chokmagu	Both Sexes	4133	569	13.77	1721	41.64	789	19.09	883	21.36	431	10.43	309	7.48
	Male	1987	292	14.70	856	43.08	366	18.42	399	20.08	215	10.82	151	7.60

District VDC	SEX	TOTAL	AGE GROUPS											
			0-4 YEARS	%	5-14 YEARS	%	15-24 Years	%	25-49 Years	%	50-59 Years	%	Over 60	%
	Female	2146	277	12.91	865	40.31	423	19.71	484	22.55	216	10.07	158	7.36
Phidim	Both Sexes	13652	1579	11.57	5279	38.67	3043	22.29	3563	26.10	1169	8.56	598	4.38
	Male	6854	787	11.48	2669	38.94	1419	20.70	1836	26.79	618	9.02	312	4.55
	Female	6798	792	11.65	2610	38.39	1624	23.89	1727	25.40	551	8.11	286	4.21
Bharapa	Both Sexes	7268	930	12.80	3093	42.56	1419	19.52	1649	22.69	645	8.87	462	6.36
	Male	3560	434	12.19	1508	42.36	722	20.28	788	22.13	319	8.96	223	6.26
	Female	3708	496	13.38	1585	42.75	697	18.80	861	23.22	326	8.79	239	6.45
Subhan	Both Sexes	5316	608	11.44	2171	40.84	1037	19.51	1180	22.20	491	9.24	437	8.22
	Male	2602	324	12.45	1114	42.81	482	18.52	543	20.87	234	8.99	229	8.80
	Female	2714	284	10.46	1057	38.95	555	20.45	637	23.47	257	9.47	208	7.66
Amarpur	Both Sexes	7743	1033	13.34	3351	43.28	1450	18.73	1724	22.27	645	8.33	573	7.40
	Male	3743	531	14.19	1647	44.00	690	18.43	818	21.85	315	8.42	273	7.29
	Female	4000	502	12.55	1704	42.60	760	19.00	906	22.65	330	8.25	300	7.50
Terhathum														
Chhatedunga	Both Sexes	3798	455	11.98	1473	38.78	744	19.59	859	22.62	376	9.90	346	9.11
	Male	1811	221	12.20	722	39.87	339	18.72	403	22.25	180	9.94	167	9.22
	Female	1987	234	11.78	751	37.80	405	20.38	456	22.95	196	9.86	179	9.01

Source: CBS, 2001

6.3.2.2 Ethnic Composition (including Advhashi/janjati) and Religion

There are more than 70 caste/ethnic groups in the project VDCs. Distribution of different caste/ethnic groups within the project VDCs are presented in ***Table 6.3.20***. Unlike in the project district, Limbu (24%) and Rai (17%) are the major caste reported in the project VDCs and is followed by Brahman (15%), Chettri (11%), Tamang (6%),, Kami (6%), Magar (3%), while other castes like Rajbanshi, Dhimal, Gurung, Hindi, Tharu, Maithali, Newar, Yakka, Sunuwar, Koche etc are also present in the project VDCs but constitute less than 2% of the total population.

Table 6.3.20: Caste/Ethnic Groups in the Project VDCs

	VDCs	Total No.	%
1	Chhetri	18742	10.61
2	Brahman - Hill	27956	15.82
3	Newar	4922	2.79
4	Gurung	1647	0.93
5	Teli	84	0.05
6	Sonar	89	0.05
7	Kumal	676	0.38
8	Lohar	28	0.02
9	Rajput	9	0.01
10	Dhimal	660	0.37
11	Magar	7045	3.99
12	Kami	6297	3.56
13	Limbu	42925	24.29
14	Sanyasi	999	0.57
15	Baniya	31	0.02
16	Kanu	2225	1.26
17	Kumhar	10	0.01
18	Badhae	18	0.01
19	Tajpuriya	687	0.39
20	Muslim	35	0.02
21	Damai/Dholi	2983	1.69
22	Kurmi	45	0.03
23	Brahman - Tarai	31	0.02
24	Hajam/Thakur	24	0.01
25	Majhi	714	0.40
26	Kayastha	48	0.03
27	Yakkha	275	0.16
28	Tharu	250	0.14
29	Yadav	131	0.07
30	Thakuri	125	0.07
31	Musahar	104	0.06
32	Gharti/Bhujel	719	0.41
33	Rajbansi	316	0.18
34	Danuwar	53	0.03
35	Santhal/ Sattar	212	0.12
36	Unidentified Dalit	432	0.24
37	Tamang	10613	6.01
38	Rai	29350	16.61
39	Sarki	823	0.47
40	Sherpa	682	0.39
41	Kalwar	15	0.01
42	Sunuwar	1416	0.80
43	Haluwai	74	0.04
44	Jhagar/ Dhagar	170	0.10
45	Unidentified Caste	903	0.51
46	Bhote	24	0.01
47	Hayu	4	0.00
48	Dhobi	6	0.00
49	Koiri	14	0.01
50	Baniya	30	0.02
51	Darai	8	0.00
52	Mallah	10785	6.10
53	Tatma	7	0.00
54	Rajbhar	6	0.00
55	Meche	3	0.00
56	Munda	6	0.00
57	Sudhi	7	0.00
58	Badi	1	0.00
59	Thakali	2	0.00
60	Lepcha	111	0.06
61	Marwadi	39	0.02
62	Bangali	12	0.01
63	Gaine	3	0.00
64	Dom	11	0.01
65	Kalwar	6	0.00
66	Raute	0	0.00
67	Khatwe	4	0.00
68	Thami	4	0.00
69	Dhimal	7	0.00
70	Churaute	10	0.01
71	Koche	1	0.00
72	Nuniya	2	0.00
73	Chepang	6	0.00
	Total	176712	100.00

Source: CBS, 2001

The Janajati (Hill and Terai) constitute nearly 58.57% of the project VDCs. The Hill Janjati is dominant group comprising nearly 56.83% of the population (Table 6.3.21). The Dalit constitute about 6.15% of the population.

Table 6.3.21: Population Distribution in terms of Adivashi Janjati, Dalit (Vulnerable) and High Caste Groups in the Project VDCs

Project VDCs	Particulars	Janjati Hill	Janjati Terai	Dalit	Highcaste	Others	Total
Laxmanpur	**No.**	3879.00	2060.00	1110.00	6646.00	216.00	13911.00
	%	27.88	14.81	7.98	47.78	1.55	100.00
Bajho	**No.**	6813.00	1.00	292.00	214.00	4.00	7324.00
	%	93.02	0.01	3.99	2.92	0.05	100.00
Chulachuli	**No.**	11967.00	188.00	1150.00	4562.00	309.00	18176.00
	%	65.84	1.03	6.33	25.10	1.70	100.00
Mahamai	**No.**	8094.00	67.00	689.00	1481.00	11221.00	21552.00
	%	37.56	0.31	3.20	6.87	52.06	100.00
Danabari	**No.**	8655.00	118.00	832.00	2823.00	266.00	12694.00
	%	68.18	0.93	6.55	22.24	2.10	100.00
Chisapani	**No.**	2848.00	55.00	477.00	1476.00	66.00	4922.00
	%	57.86	1.12	9.69	29.99	1.34	100.00
Soyak	**No.**	2158.00	0.00	212.00	970.00	38.00	3378.00
	%	63.88	0.00	6.28	28.72	1.12	100.00
Goduk	**No.**	2690.00	4.00	462.00	1403.00	41.00	4600.00
	%	58.48	0.09	10.04	30.50	0.89	100.00
Siddhithumka	**No.**	2241.00	1.00	199.00	981.00	32.00	3454.00
	%	64.88	0.03	5.76	28.40	0.93	100.00
Sangrumba	**No.**	2709.00	6.00	169.00	1762.00	2.00	4648.00
	%	58.28	0.13	3.64	37.91	0.04	100.00
Mangalbare	No.	3514.00	7.00	345.00	2906.00	27.00	6799.00
	%	51.68	0.10	5.07	42.74	0.40	100.00
Ektappa	No.	3038.00	9.00	248.00	1514.00	66.00	4875.00
	%	62.32	0.18	5.09	31.06	1.35	100.00
Chameta	No.	4337.00	0.00	259.00	1596.00	18.00	6210.00
	%	69.84	0.00	4.17	25.70	0.29	100.00
Phakphok	No.	2786.00	1.00	138.00	2373.00	6.00	5304.00
	%	52.53	0.02	2.60	44.74	0.11	100.00
Chilingdin	No.	3447.00	2.00	293.00	251.00	27.00	4020.00
	%	85.75	0.05	7.29	6.24	0.67	100.00
Pauwasartap	No.	1731.00	4.00	228.00	475.00	12.00	2450.00
	%	70.65	0.16	9.31	19.39	0.49	100.00
Embung	No.	1909.00	0.00	147.00	308.00	14.00	2378.00
	%	80.28	0.00	6.18	12.95	0.59	100.00
Chokmagu	No.	3176.00	5.00	211.00	643.00	27.00	4062.00
	%	78.19	0.12	5.19	15.83	0.66	100.00
Nawamidanda	No.	785.00	2.00	273.00	1059.00	2226.00	4345.00
	%	18.07	0.05	6.28	24.37	51.23	100.00
Siwa	No.	4160.00	2.00	143.00	258.00	27.00	4590.00
	%	90.63	0.04	3.12	5.62	0.59	100.00
Phidim	No.	7586.00	104.00	748.00	4668.00	53.00	13159.00
	%	57.65	0.79	5.68	35.47	0.40	100.00
Bharap	No.	4001.00	142.00	530.00	2398.00	13.00	7084.00
	%	56.48	2.00	7.48	33.85	0.18	100.00
Subhan	No.	2813.00	1.00	635.00	2090.00	11.00	5550.00
	%	50.68	0.02	11.44	37.66	0.20	100.00
Amarpur	No.	3168.00	186.00	563.00	3374.00	143.00	7434.00

Project VDCs	Particulars	Janjati Hill	Janjati Terai	Dalit	Highcaste	Others	Total
	%	42.62	2.50	7.57	45.39	1.92	100.00
	No.	1916.00	116.00	519.00	1102.00	140.00	3793.00
ChhateDhunga	%	50.51	3.06	13.68	29.05	3.69	100.00
	No.	100421.00	3081.00	10872.00	47333.00	15005.00	176712.00
Total	%	56.83	1.74	6.15	26.79	8.49	100.00

Source: CBS, 2001

Note:

Hill Janjati: Newar, Gurung, Kumal, Magar, Limbu, Yakkha, Gharti/Bhujel, Tamang, Rai, Sherpa, Sunuwar, Bhote, Hayu, Thakali, Lepcha, Thami, Chepang.

Terai Janjati : Dhimal, Tajpuriya, Majhi, Tharu, Rajbansi, Danuwar, Santhal/ Sattar, Jhagar/ Dhagar, Darai, Meche, Raute, Dhimal, Koche.

Dalit/Vulnerable: Sonar, Lohar, Kami, Damai/Dholi, Kurmi, Hajam/Thakur, Musahar, Unidentified Dalit, Sarki, Dhobi, Koiri, Badi, Gaine, Dom, Churaute, Nuniya.

High Caste Group: Chhetri, Brahman – Hill, Teli, Rajput, Baniya, Brahman – Tarai, Kayastha, Yadav, Thakuri, Kalwar, Haluwai, Baniya, Marwadi, Bangali, Kalwar.

Others: Sanyasi, Kanu, Kumhar, Badhae, Muslim, Unidentified Caste, Mallah, Tatma, Rajbhar, Munda, Sudhi, Khatwe

Hill Janjati group constitute more than 50% of the population in all most all VDCs except in Laxmanpur, Mahamai, Nawamidanda and Amarpur. In the Laxmanpur Terai janjati constitute nearly 14% of the population but is dominated by high caste group (above 47%), while in Mahamai and Nawamidanda other caste group constitute over 50% of the population. In the Amarpur high caste group constitute above 45% of the population. The population distribution in terms of Adivashi janjati and other groups, of the total 25 project VDCs, 21 VDCs can be broadly categorized as the Adivahsi Janjati VDCs with more than 50% of the population. Dominantly Adivashi janjati VDCs are Siwa, Chilingdin, Pauwasartap, Embung, Chokmagu, Chameta, and Bajho where more than 70% of the population is Adivashi janjati.

More than 8 religions is practiced in the project VDCs. The Hindu religion by far dominates the other religion (45.97%) followed by Kirat (41.13%) and Boudhha (12.02%). Other religious groups are less one percent of the total (***Table 6.3.22***).

6.3.2.3 Mother Tongue

Like caste/ethnic group, the project VDCs is also marked by linguistic plurality. In total, more than 36 languages are spoken in the project VDCs. However, majority of the population speak Nepali (47%) and Limbu (26%) as in the project district. In addition to Nepali and Limbu, population speaking Bantawa (13%), Tamang (7.69%) and Magar (3%) are also present in a sizable numbers. Besides, other languages such as Rajbanshi, Dhimal, Gurung, Santhali, Tharu ,Maithili, Newa ,Yakka, Chamling, Sunuwar, Sangpang Khaling, Manjhi, Thulung, Kumal, Sherpa, Thulung, Hindi etc are also spoken in the project VDCs although the population speaking those languages constitute only less than 1% of the total population as in the project districts. Distribution of population of different mother tongue is presented VDCs wise in ***Table 6.3.23***.

6.3.2.5 Education and Literacy

Table 6.3.24 depicts the literacy status of the project VDCs. In the project VDCs, of the total population above 6 years of age, 60% of the population could read and write and 1.8% population can read only while those who could not read and write constitute 37% of the total population. If one evaluates at the proportion of the male and female who could not read and write, female constitute higher percentage i.e.70% than male i.e. 30% (***Table 6.3.25***). In the project VDC, male have higher literacy rate i.e. 57% than the female i.e. 43%. ***Table 6.3.26*** presents the total or sex-wise school attending percentage.

Table 6.3.22: Population by Religion for Project VDCs

District & VDC Name	Hindu		Buddha		Islam		Kirat		Jain		Christian		Sikha		Bahai		Not Stated		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	Popn	%	
Lakhanpur	9990	71.81	750	5.39	9	0.06	2825	20.31	1	0.01	54	0.39	7	0.05	1	0.01	274	1.96	13911
Chulachuli	7752	42.65	1033	5.68	1		9201	50.62	1	0.01	154	0.85	4	0.02	1	0.01	29	0.16	18176
Mahamai	3104	28.80	1515	14.06	0	0.00	5995	55.63	0	0.00	154	1.43	1	0.01	0	0.00	7	0.06	10776
Danabari	5565	43.84	1539	12.12	0	0.00	5410	42.62	0	0.00	156	1.23	20	0.16	0	0.00	3	0.02	12693
Chisapani	2641	53.65	1127	22.89	0	0.00	1047	21.27	0	0.00	46	0.93	0	0.00	0	0.00	62	1.26	4923
Sopak	1441	42.66	386	11.43	0	0.00	1529	45.26	0	0.00	21	0.62	0	0.00	0	0.00	1	0.03	3378
Godak	2874	62.48	767	16.67	0	0.00	942	20.48	0	0.00	10	0.22	0	0.00	0	0.00	7	0.15	4600
Sidhithumka	1210	35.03	937	27.13	0	0.00	1286	37.23	1	0.03	15	0.43	0	0.00	3	0.09	2	0.06	3454
Sangrumba	2528	45.99	878	15.97	0	0.00	2034	37.00	0	0.00	55	1.00	0	0.00	0	0.00	2	0.04	5497
Mangalbare	5051	74.29	499	7.34	2	0.03	1242	18.27	0	0.00	0	0.00	5	0.07	0	0.00	0	0.00	6799
Ektappa	2590	53.13	259	5.31	0	0.00	2009	41.21	0	0.00	17	0.35	0	0.00	0	0.00	0	0.00	4875
Chameta	2478	39.90	980	15.78	0	0.00	2746	44.22	0	0.00	6	0.10	0	0.00	0	0.00	0	0.00	6210
Phakphok	2821	53.35	768	14.52	0	0.00	1673	31.64	0	0.00	10	0.19	0	0.00	0	0.00	16	0.30	5288
Chilindin	428	10.92	17	0.43	0	0.00	3468	88.51	0	0.00	5	0.13	0	0.00	0	0.00	0	0.00	3918
Pauwasartap	576	13.33	1314	30.40	1	0.02	2406	55.67	0	0.00	10	0.23	3	0.07	1	0.02	11	0.25	4322
Imbung	450	18.92	452	19.01	0	0.00	1474	61.98	0	0.00	1	0.04	0	0.00	0	0.00	1	0.04	2378
Nawamidanda	1507	34.68	618	14.22	1	0.02	2211	50.89	1	0.02	5	0.12	0	0.00	0	0.00	2	0.05	4345
Siwa	481	12.12	836	21.06	2	0.05	2647	66.68	0	0.00	4	0.10	0	0.00	0	0.00	0	0.00	3970
Chokmagu	960	23.23	186	4.50	0	0.00	2967	71.79	1	0.02	9	0.22	0	0.00	8	0.19	2	0.05	4133
Phidim	7023	51.44	1481	10.85	24	0.18	5031	36.85	0	0.00	70	0.51	0	0.00	2	0.01	21	0.15	13652
Bharapa	3127	43.02	1231	16.94	0	0.00	2745	37.77	3	0.04	23	0.32	0	0.00	1	0.01	138	1.90	7268
Subhan	2832	53.27	287	5.40	4	0.08	2174	40.90	0	0.00	11	0.21	0	0.00	6	0.11	2	0.04	5316
Amarpur	4784	61.78	996	12.86	0	0.00	1924	24.85	0	0.00	37	0.48	0	0.00	1	0.01	1	0.01	7743
Chhatedunga	1709	45.00	547	14.40	1	0.02633	1415	37.26	0	0	5	0.13	0	0	0	0	121	3.19	3798
Total	**73922**	**45.79**	**19403**	**12.02**	**45**	**0.03**	**66401**	**41.13**	**8**	**0.00**	**878**	**0.54**	**40**	**0.02**	**24**	**0.01**	**702**	**0.43**	**161423**

Source: CBS, 2001

Table 6.3.23: Mother Tongue in the Project VDCs

Project VDCs	Total Pop.	Nepali		Limbu		Bantawa		Tamang		Magar		Rajbansi		Dhimal		Gurung		Others*	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Laxmanpur	13911	8404	60.41	1397	10.04	1073	7.71	237	1.70	188	1.35	954	6.86	574	4.13	186	1.34	914	6.57
Chullachuli	18176	7120	39.17	4973	27.36	4215	23.19	691	3.80	361	1.99			83	0.46			719	3.96
Mahamai	10776	3106	28.82	3448	32.00	2110	19.58	905	8.40	518	4.81					10	0.09	692	6.42
Danabari	12693	5620	44.28	2532	19.95	2226	17.54	412	3.25	1517	11.95					32	0.25	354	2.79
Chisapani	4923	3271	66.44	428	8.69	344	6.99	441	8.96	403	8.19							36	0.73
Sopak	3378	1373	40.65	1343	39.76	310	9.18	194	5.74	132	3.91							26	0.77
Goduk	4600	3686	80.13	19	0.41	449	9.76	287	6.24	38	0.83							121	2.63
Sidhithumka	3454	1221	35.35	451	13.06	748	21.66	843	24.41	94	2.72							97	2.81
Sangrumba	5497	2439	44.37	1465	26.65	618	11.24	774	14.08	162	2.95							39	0.71
Mangalbare	6799	4831	71.05	390	5.74	822	12.09	256	3.77	139	2.04							361	5.31
Ektappa	4875	2744	56.29	1656	33.97	313	6.42	33	0.68	87	1.78							42	0.86
Chameta	6210	2718	43.77	71	1.14	2731	43.98	77	1.24	107	1.72					168	2.71	359	5.22
Phakphok	5288	2816	53.25	707	13.37	981	18.55	549	10.38	196	3.71							18	0.34
Chilingdin	3918	551	14.06	3083	78.69	247	6.30	13	0.33		0.00							24	0.61
Pauwasartap	4322	740	17.12	1638	37.90	471	10.90	1243	28.76		0.00							230	5.32
Embung	2746	770	28.04	1328	48.36	184	6.70	69	2.51	66	2.40							329	11.98
Nawami Danda	4345	1488	34.25	2202	50.68	15	0.35	604	13.90									36	0.83
Siwa	3970	423	10.65	2009	50.60	566	14.26	143	3.60	783	19.72							46	1.16
Chokmagu	4133	966	23.37	2666	64.51	253	6.12	184	4.45		0.00							64	1.55
Phidim	13652	6992	51.22	2795	20.47	1788	13.10	593	4.34	364	2.67	11	0.08			112	0.82	997	7.30
Bharap	7268	3404	46.84	2403	33.06	142	1.95	1040	14.31		0.00					23	0.32	256	3.52
Subhan	5316	2790	52.48	2123	39.94	65	1.22	235	4.42		0.00					32	0.60	103	1.94
Awarpur	7743	4835	62.44	1558	20.12	262	3.38	965	12.46		0.00							91	1.18
Chhatedunga	3798	1732	45.60	996	26.22	264	6.95	540	14.22	18	0.47		0.00					248	6.53
Total	**157446**	**74040**	**47.03**	**41681**	**26.47**	**21197**	**13.46**	**11091**	**7.04**	**5173**	**3.29**	**965**	**0.61**	**657**	**0.42**	**563**	**0.36**	5954	3.78

Note: * *Santhali, Tharu (dagaura/rana), Maithili, Hindi, Newar, Chamling, Yakkha, Sunuwar, Jhangar/ Dhangar, Koche, Khaling, Koi/ Koyu, Majhi, Thulung, Sherpa, Kulung, Sangpang, Sam, Kumal, Danuwar, Lepcha/ Lapche, Bhujel/ Khawas, Sanskrit, Bhojpuri, Others*

Source: CBS 2001

Table 6.3.24: Literacy Status of the Project VDCs

VDCs	Total	Can't read & Write	%	Can read only	%	Read and Write	%	Not Stated	%
Lakhanpur	12371	3048	24.64	780	6.31	8543	69.06	0	0
Bajho	6076	1754	28.87	649	10.68	3651	60.09	23	0.38
Chulachuli	15950	4388	27.51	1653	10.36	9851	61.76	58	0.36
Mahamai	9017	3705	41.09	1307	14.49	4005	44.42	0	0.00
Danabari	10859	4136	38.09	1176	10.83	5514	50.78	33	0.30
Chisapani	4108	1533	37.32	612	14.90	1933	47.05	30	0.73
Soyak	2983	1007	33.76	257	8.62	1710	57.32	9	0.30
Godak	4071	1120	27.51	591	14.52	2197	53.97	164	4.03
Sidhithumka	3036	948	31.23	131	4.31	1958	64.49	0	0.00
Sangrumba	4703	1675	35.62	302	6.42	2710	57.62	17	0.36
Mangalbare	6070	1302	21.45	661	10.89	3866	63.69	241	3.97
Ektappa	4236	1454	34.32	546	12.89	2236	52.79	0	0.00
Chameta	5229	1728	33.05	516	9.87	2985	57.09	0	0.00
Phakphok	4532	1253	27.65	711	15.69	2542	56.09	26	0.57
Chilindin	3230	1174	36.35	129	3.99	1917	59.35	9	0.28
Pauwasartap	3590	1488	41.45	152	4.23	1950	54.32	0	0.00
Imbung	1985	819	41.26	82	4.13	1084	54.61	0	0.00
Nawamidanda	1985	1390	70.03	428	21.56	1811	91.23	17	0.86
Siwa	1985	1314	66.20	89	4.48	1874	94.41	9	0.45
Chokmagu	1985	1418	71.44	176	8.87	1918	96.62	0	0.00
Phidim	1985	2543	128.11	257	12.95	8861	446.40	0	0.00
Bharapa	1985	2506	126.25	151	7.61	3247	163.58	8	0.40
Subhan	1985	1553	78.24	233	11.74	2780	140.05	18	0.91
Amarpur	1985	2529	127.41	466	23.48	3302	166.35	9	0.45
Chhatedunga	3205	1203	37.5351014	59	1.840873635	1943	60.62402	0	0

Source: CBS, 2001

Table 6.3.25: Literacy Status of Population, Male and female above 6 Years of Age of Project VDCs

VDCs	Population			Can't read & write			Can Read only			Read & Write			Not Stated		
	Total	Male %	Female %	Total	Male %	Female %	Total	Male %	Female %	Total	Male %	Female %	Total	Male %	Female %
Lakhanpur	12371	47.5	52.5	3048	29.76	70.24	780	57.18	42.82	8543	52.95	47.04	0		
Bajho	6076	51.53	48.49	1754	39.45	60.55	649	50.85	49.15	3651	57.55	42.45	23	34.78	65.22
Chulachuli	15950	49.52	50.48	4388	36.24	63.76	1653	54.02	45.98	9851	54.80	45.20	58	31.03	68.97
Mahamai	9017	49.02	50.98	3705	35.36	64.64	1307	58.76	41.32	4005	58.48	41.50	0		
Danabari	10859	50.76	49.24	4136	39.70	60.29	1176	56.55	43.37	5514	57.94	42.07	33	30.30	6.97
Chisapani	4108	50.39	49.61	1533	39.47	60.53	612	48.20	51.80	1933	60.53	39.47	30	0.00	10.00
Soyak	2983	49.01	50.99	1007	35.35	64.64	257	50.58	49.81	1710	57.08	42.92	9	0.00	10.00
Godak	4071	48.93	51.09	1120	35.00	64.91	591	57.53	42.30	2197	54.57	45.43	164	36.59	6.34
Sidhithumka	3036	49.44	50.56	948	35.13	64.87	131	54.20	45.80	1958	56.03	43.92			
Sangrumba	4703	50.27	49.76	1675	38.75	61.25	302	57.61	42.05	2710	56.83	43.17	17		10.00
Mangalbare	6070	49.88	50.12	1302	28.11	71.96	661	58.09	41.91	3866	56.31	43.69	241	42.32	5.77
Ektappa	4236	46.88	53.12	1454	32.53	67.46	546	38.64	61.36	2236	58.23	41.77	0		
Chameta	5229	49.38	50.62	1728	34.49	65.50	516	50.96	49.22	2985	57.76	42.28	0		
Phakphok	4532	49.87	50.13	1253	33.36	66.64	711	54.71	45.29	2542	56.53	43.47	26	61.54	3.46
Chilindin	3230	50.53	49.47	1174	36.63	63.37	129	58.14	41.86	1917	58.79	41.26	9		100.00
Pauwasartap	3590	45.82	54.18	1488	37.03	62.97	152	32.89	67.11	1950	53.59	46.41	0		
Imbung	1985	46.60	53.40	819	23.69	76.31	82	70.73	29.27	1084	62.08	37.92	0		
Nawamidanda	3646	48.41	51.56	1390	35.11	64.89	428	57.24	42.52	1811	56.99	43.01	17		100.00
Siwa	3286	48.17	51.83	1314	33.56	66.44	89	65.17	34.83	1874	57.90	42.16	9		100.00
Chokmagu	3512	48.41	51.62	1418	32.93	67.14	176	43.18	57.39	1918	60.32	39.68	0		
Phidim	11660	50.23	49.77	2543	28.20	71.80	257	42.41	57.20	8861	56.78	43.22	0		
Bharapa	5912	49.05	50.95	2506	33.96	66.04	151	60.26	39.74	3247	60.30	39.70	8		100.00
Subhan	4584	48.69	51.31	1553	30.65	69.35	233	42.06	57.94	2780	59.64	40.36	18		100.00
Amarpur	6306	47.97	52.01	2529	40.25	59.75	466	51.50	48.50	3302	53.54	46.46	9		100.00
Chhatedunga	3205	49.55	50.42	1203	29.84	70.16	59			1943	61.25	38.75	0		

Source: CBS, 2001

Table 6.3.26: Population 6 Years of Age and Over By Status of School Attendance of Project VDCs

VDCs	Total	Currently attending						Currently not attending					
		Total	%	Male	%	Female	%	Total	%	Male	%	Female	%
Lakhanpur	5673	4020	70.86	1859	46.24	2160	53.73	1654	29.16	725	43.83	725	43.83
Bajho	3242	1943	59.93	1011	31.18	932	47.97	1299	40.07	608	46.81	608	46.81
Chulachuli	8867	6242	70.40	3303	52.92	2939	47.08	2625	29.60	1144	43.58	1481	56.42
Mahamai	5084	2899	57.02	1507	29.64	1393	48.05	2185	42.98	952	43.57	952	43.57
Danabari	6017	3806	63.25	2017	33.52	1789	47.00	2212	36.76	985	44.53	985	44.53
Chisapani	2011	1341	66.68	659	32.77	682	50.86	670	33.32	289	43.13	289	43.13
Soyak	1431	837	58.49	465	32.49	372	44.44	594	41.51	220	37.04	220	37.04
Godak	1855	1264	68.14	592	31.91	672	53.16	591	31.86	261	44.16	261	44.16
Sidhithumka	1386	931	67.17	487	35.14	444	47.69	454	32.76	230	50.66	230	50.66
Sangrumba	2414	1787	74.03	843	34.92	944	52.83	626	25.93	332	53.04	332	53.04
Mangalbare	2815	2189	77.76	1137	40.39	1062	48.52	626	22.24	290	46.33	290	46.33
Ektappa	2121	1555	73.31	779	36.73	776	49.90	566	26.69	205	36.22	205	36.22
Chameta	2779	1655	59.55	818	29.44	837	50.57	1124	40.45	506	45.02	506	45.02
Phakphok	2208	1676	75.91	835	37.82	840	50.12	532	24.09	233	43.80	233	43.80
Chilindin	1573	1058	67.26	569	53.78	489	46.22	515	32.74	229	44.47	229	44.47
Pauwasartap	1893	1280	67.62	623	48.67	658	51.41	612	32.33	185	30.23	185	30.23
Imbung	921	1280	138.98	362	28.28	385	30.08	175	19.00	48	27.43	127	72.57
Nawami Danda	1586	1054	66.46	570	54.08	485	46.02	532	33.54	230	43.23	0	0.00
Siwa	1612	985	61.10	494	50.15	491	49.85	627	38.90	251	40.03	251	40.03
Chokmagu	1885	1116	59.20	575	51.52	541	48.48	769	40.80	339	44.08	339	44.08
Phidim	5354	3832	71.57	1961	51.17	1871	48.83	1522	28.43	633	41.59	633	41.59
Bharapa	3059	2153	70.38	1171	54.39	982	45.61	906	29.62	339	37.42	339	37.42
Subhan	2199	1703	77.44	907	53.26	796	46.74	496	22.56	197	39.72	197	39.72
Amarpur	3216	2005	62.34	1015	50.62	990	49.38	1211	37.66	599	49.46	599	49.46
Chhatedunga	1554	849	54.63	452	53.24	397	46.7609	705	45.37	328	46.52	328	46.52482

Source: CBS, 2001

The figure shows that about 67% of the children above the 6 years of age are found to attain school. The percentage of male (51%) attending school was slightly higher than female (48%). However, the percentage of those male and female children not attending school is similar (46%).

6.3.2.6 Educational Institutions

In total, 225 registered schools are reported in the project VDCs (***Table 6.3.27***). As in project districts, the share of the primary school in the project VDCs is significantly higher compared to other lower secondary, secondary, higher secondary or private schools. Of the total school reported in the project VDCs, primary school constitute about 67% while other lower secondary; secondary higher secondary and private schools constitute only about 32 %.

Table 6.3.27: Educational Institutions in the Project VDCs

District	Total	Pri.	L .Sec.	H. Sec.	EBS	Tec Education	Yog ashram
Jhapa							
Lakhanpur	17	6	1	3	4	3	
Ilam							
Bajho	13	10	1	2			
Chulachuli	10	4	5	1			
Chameta	11	9	1	1			
Chisapani	7	6		1			
Danabari	17	14	2	1			
Ektappa	8	5	2	1			
Godak	6	5		1			
Mahamai	9	7	1	1			
Mangalbare	9	7	1	1			
Phakphok	8	5	2	1			
Sangrumba	9	8		1			
Sidhithumka	6	5		1			
Sopak	6	5	1				
Panchthar							
Amarpur	8	6		2			
Bharapa	14	8	3	1	2		
Nawami Danda	NA	NA	NA	NA	NA	NA	NA
Chilindin	6	4	2				
Chokmagu	8	7		1			
Imbung	4	2	1	1			
Pauwasartap	6	3		2	1		
Phidim	25	12	3	3	7		
Siwa	5	3	1	1			
Subhan	13	9	2	1			1
Terhathum							
Chhatedunga	9	6	2	1			
Total	225	150	29	28	14	3	1
%	100	66.7	12.9	12.4	6.2	1.3	0.4

Source: CBS, 2001, Note, NA = Not available

6.3.2.7 Health Institutions

The entire project VDCs has one or other type of government health service facility (***Table 6.3.28***). Majority of the project VDCs have a sub-health post, while a few have Primary Health Post or a Health Center. The Phidim VDC, as it is also a district headquarter of Panchthar district has a government hospital. Considering the area covered by the project VDCs, the number of the health institutions is considered not sufficient.

Table 6.3.28: Health Institutions in the Project VDCs.

Districts/VDCs	Sub-Health post	Primary Health Post	Health Center	Hospital
Jhapa				
Lakhanpur	1			
Ilam				
Bajho			1	
Chulachuli	1			
Chameta	1			
Chisapani			1	
Danabari	1			
Ektappa	1			
Godak	1			
Mahamai	1			
Mangalbare		1		
Phakphok	1			
Sangrumba	1			
Sidhithumka	1			
Soyak	1			
Panchthar				
Amarpur	1			
Bharapa	1			
Nawami Danda	1			
Chilindin	1			
Chokmagu	1			
Imbung	1			
Pauwasartap	1			
Phidim		1		1
Siwa	1			
Subhan	1			
Terhathum				
Chhatedunga	1			
Total	**21**	**2**	**2**	**1**

Source: District Profiles of Ilam, Jhapa, Panchthar and Terhathum

6.3.2.8 Health Services

Normally, the Sub Health Post, Primary Health Post, Health Center and Hospitals in the VDC and district level have provisions of 3, 4, 10 and 15 health workers respectively. However, in most of the health institutions actual health worker present in the site reported is less than half of the provisioned health workers. The above figures amply signify the level of health services provided by the institutions. Apart from the above, the health institutions are poorly equipped with equipments and medicinal facilities.

6.3.2.9 Common Disease

As depicted in the district profiles of the project districts, Acute Respiratory Track Infection (ARTI), Diarrhea, Dysentery, Skin Disease and Gastritis are the most common disease in the project VDCs.

6.3.2.10 Water Supply and Sanitation

Status of water supply and sanitation at the VDC level is not available. It is assumed that the status is not different from the project district level excepting for few project VDCs which are connected with the motorable access.

6.3.2.11 Energy

Status for energy use for cooking and lighting is also not available at the project VDCs level. It is assumed that the status is not different from the project district level excepting for few project VDCs

which are connected with the motorable access and electrical transmission lines. Of the total 25 project VDCs 14 VDCs have full or partial electrification till date. The electrified VDCs are Lakhanpur, Chulachuli, Mahamai, Chisapani, Godak, Soyak, Siddhithumka, Sanrumba, Mangalbare, Ektappa, Chamaita, Phakphok, Chilingdin, and Phidim.

6.3.2.12 Economic Activities

In the project affected VDCs, the percentage of economically active population above 10 years of age is 2.5 fold higher than the economically inactive people. The figure shows that about 71% of the population above 10 years of age is economically active when compared to those of 28% of the economically inactive population. The figure for economically active population in the project affected VDCs is higher than those of the project districts (***Table 6.3.29***). Compared to female (42%), male (58%) are found to be more active economically. Contrast to this, in the economically inactive population, female (62%) comprises higher proportion than male (38%).

Table 6.3.30 present the number of the household involved in the non agricultural activities in the project affected VDCs. The figure shows that only 19% of the households in the project affected VDCs practice non- agricultural economic activities. This means, unlike in the project districts, majority i.e. 81% of households in the project VDCs are farmer and practice agriculture as a major occupation. Among those who practiced non-agricultural activities, majority of households are involved in service (31%) followed by trade and business (25%), manufacturing (9%) while 34% population are involved in other occupation.

In the project VDCs, 91% of the households have land, livestock and poultry. About 9% of the households have none or are property less. These figures also indicate that majority of the households in the project VDCs are farmers and depends mainly on the agriculture related economic activities for livelihood (***Table 6.3.31***).

6.3.2.13 Gender Aspect

Information with regard to gender in the project VDCs is not available. Indicators such as access to education, school enrollment etc reflects discrimination of female in general.

6.3.2.14 Market Price

Market price of the crops and cash crops in the project VDCs collected during RRA discussions is presented in ***Table 6.3.32*** and ***6.3.33***. Costs of the locally grown crops vary widely among the project VDCs and largely depends upon the remoteness and productivity potentials of the VDCs.

Market prices of some of the regularly consumed commodities such as tea, milk, and meat items are presented in ***Table 6.3.34 and 6.3.35. Table 6.3.36*** presents the wage costs in the project VDCs, while ***table 6.3.37*** presents the average land costs in the project VDCs. As like crops the market prices has a wide range variation in the project VDCs.

Table 6.3.29: Population 10 Years of Age and Over by usually Economic Activity of Project VDCs

VDCs	Population					Economically Active						Economically Inactive					
	Total	Male	%	Female	%	Total	%	Male	%	Female	%	Total	%	Male	%	Female	%
Lakhanpur	11147	5241	47.0171	5906		7954	71.36	3878	48.76	4077	51.26	3193	28.64	1364	42.72	1829	57.28
Bajho	5243	2711	51.71	2531	48.27	3933	75.01	2014	51.21	1919	48.79	1310	24.99	697	53.21	613	46.79
Chulachuli	13882	6757	48.67	7124	51.32	9847	70.93	4649	47.21	5198	52.79	4035	29.07	2108	52.24	1926	47.73
Mahamai	7546	3710	49.17	3836	50.83	4703	6.23	2537	53.94	2166	46.06	2843	37.68	1173	41.26	1670	58.74
Danabari	9286	4689	50.50	4597	49.50	6271	6.75	3441	54.87	2831	45.14	3014	32.46	1248	41.41	1766	58.59
Chisapani	3588	1860	51.84	1728	48.16	2445	6.81	1359	55.58	1086	44.42	1143	31.86	501	43.83	642	56.17
Soyak	2686	1323	49.26	1363	50.74	2099	7.81	1044	49.74	1055	50.26	587	21.85	279	47.53	308	52.47
Godak	3723	1852	49.74	1871	50.26	2608	7.01	1340	51.38	1268	48.62	1115	29.95	513	46.01	603	54.08
Sidhithumka	2675	1300	48.60	1375	51.40	2259	8.44	1145	50.69	1115	49.36	416	15.55	155	37.26	261	62.74
Sangrumba	4109	2051	49.91	2059	50.11	2920	7.11	1680	57.53	1240	42.47	1189	28.94	371	31.20	819	68.88
Mangalbare	5315	2639	49.65	2676	50.35	4584	8.62	2284	49.83	2300	50.17	730	13.73	355	48.63	376	51.51
Ektappa	3695	1747	47.28	1948	52.72	2231	6.04	978	43.84	1253	56.16	1464	39.62	769	52.53	695	47.47
Chamita	4508	2211	49.05	2297	50.95	3008	6.67	1527	50.76	1481	49.24	1500	33.27	684	45.60	817	54.47
Phakphok	4021	1998	49.69	2023	50.31	3287	8.17	1669	50.78	1619	49.25	734	18.25	330	44.96	404	55.04
Chilindin	2800	1438	51.36	1362	48.64	1947	69.54	937	48.13	1010	51.87	853	30.46	501	58.73	352	41.27
Pauwasartap	3080	1401	45.49	1679	54.51	2417	7.85	1117	46.21	1300	53.79	663	21.53	284	42.84	379	57.16
Imbung	1701	838	49.27	863	50.73	1466	86.18	744	50.75	722	49.25	235	16.03	93	39.57	141	60.00
Nawamidanda	3145	1454	46.23	1691	53.77	2123	67.50	968	45.60	1155	54.40	1022	48.14	486	47.55	536	52.45
Siwa	2815	1357	48.21	458	16.27	2043	7.26	960	46.99	1083	53.01	773	37.84	398	51.49	375	48.51
Chokmagu	3070	1494	48.66	1577	51.37	2277	7.42	1163	51.08	1113	48.88	793	25.83	330	41.61	463	58.39
Phidim	10179	5196	51.05	4983	48.95	7330	7.20	3936	53.70	3394	46.30	2849	27.99	1260	44.23	1589	55.77
Bharapa	5014	2418	48.22	2596	51.78	4153	8.28	1958	47.15	2195	52.85	862	17.19	460	53.36	401	46.52
Subhan	3943	1947	49.38	1996	50.62	2557	6.48	1252	48.96	1305	51.04	1386	35.15	695	50.14	691	49.86
Amarpur	5363	2550	47.55	2812	52.43	4136	7.71	2074	50.15	2063	49.88	1226	22.86	477	38.91	750	61.17
Chhatedunga	2759	1379	49.98	1380	50.02	1659	6.01	966	58.23	694	41.83	1100	39.87	413	37.55	687	62.45

Source: CBS, 2001

Table 4.3.30: Households Involved in Non Agricultural Activities for Project VDCs

Districts/VDCs	No. of households					Type of Activity										
	Total	Having economic activities	%	Not having economic activities	%	Total	Manufacturing	%	Trade / business	%	Transport	%	Services	%	Others	%
Lakhanpur	2723	789		1934		789	56	7.10	204	25.86	13	1.65	86	10.90	430	54.50
Bajho	1308	70	5.35	1238	94.65	70	11	15.71	28	40.00	1	1.43	11	15.71	19	27.14
Chulachuli	3349	440	13.14	2909	86.86	440	37	8.41	56	12.73	5	1.14	63	14.32	279	63.41
Mahamai	1964	157	7.99	1807	92.01	157	89	56.69	27	17.20	2	1.27	31	19.75	8	5.10
Danabari	2400	616	25.67	1784	74.33	616	16	2.60	117	18.99	13	2.11	120	19.48	350	56.82
Chisapani	935	133	14.22	802	85.78	133	5	3.76	22	16.54	1	0.75	97	72.93	8	6.02
Soyak	619	116	18.74	503	81.26	116	6	5.17	19	16.38	0	0.00	60	51.72	31	26.72
Godak	924	78	8.44	846	91.56	78	2	2.56	37	47.44	4	5.13	15	19.23	20	25.64
Sidhithumka	676	84	12.43	592	87.57	84	6	7.14	19	22.62	0	0.00	26	30.95	33	39.29
Sangrumba	1048	155	14.79	893	85.21	155	33	21.29	30	19.35	1	0.65	40	25.81	51	32.90
Mangalbare	1281	227	17.72	1054	82.28	227	5	2.20	102	44.93	2	0.88	85	37.44	33	14.54
Ektappa	918	50	5.45	868	94.55	50	4	8.00	11	22.00	0	0.00	35	70.00	0	0.00
Chamita	1082	128	11.83	954	88.17	128	10	7.81	53	41.41	5	3.91	17	13.28	43	33.59
Phakphok	906	164	18.10	742	81.90	164	12	7.32	26	15.85	0	0.00	108	65.85	18	10.98
Chilindin	727	109	14.99	618	85.01	109	16	14.68	52	47.71	0	0.00	30	27.52	11	10.09
Pauwasartap	801	101	12.61	700	87.39	101	3	2.97	31	30.69	1	0.99	64	63.37	2	1.98
Imbung	455	106	23.29	349	76.70	106	7	6.60	20	18.87	0	0.00	79	74.53	0	0.00
Nawamidanda	797	141	17.69	656	82.31	141	20	14.18	33	23.40	1	0.71	49	34.75	38	26.95
Siwa	700	119	17	581	83.00	119	37	31.09	17	14.29	0	0.00	41	34.45	24	20.17
Chokmagu	744	170	22.84	574	77.15	170	6	3.53	60	35.29	0	0.00	85	50.00	198	116.47
Phidim	2927	993	33.92	1934	66.07	993	123	12.39	312	31.42	11	1.11	296	29.81	251	25.28
Bharapa	1301	318	24.44	983	75.56	318	26	8.18	65	20.44	0	0.00	188	59.12	39	12.26
Subhan	954	147	15.41	807	84.59	147	24	16.33	37	25.17	1	0.68	51	34.69	34	23.13
Amarpur	1375	190	13.82	1185	86.18	190	10	5.26	50	26.32	1	0.53	97	51.05	22	11.58
Chhatedunga	695	96	13.82	599	86.19	96	3	0.50	18	18.75	1	199.67	29	154.67	45	22.54

Source: CBS, 2001

Table 6.3.31: Households Having Agricultural Land, Livestock & Poultry for Project VDCs

VDCs	HOUSEHOLD HAVING																
	TOTAL HOUSE HOLD	AGRI LAND ONLY	%	LIVE STOCK ONLY	%	POULTRY ONLY	%	LAND AND LIVE STOCK	%	LAND AND APOULTRY	%	LIVE STOCK AND POULTRY	%	LAND ,LIVE STOCK AND POULTRY	%	NONE OF ALL	%
Lakhanpur	2723	161	5.913	205	7.53	9	0.003	886	0.33	17	0.01	103	0.04	1074	0.39	853	0.31
Bajho	1308	265	20.26	2	0.15	0	0	392	0.30	14	0.01	9	0.01	585	0.45	41	0.03
Chulachuli	3349	202	6.03	51	1.52	8	0.002	799	0.24	38	0.01	65	0.02	2122	0.63	65	0.02
Mahamai	1964	107	5.45	7	0.36	3	0.001	233	0.12	45	0.02	21	0.01	1492	0.76	56	0.03
Danabari	2400	227	9.46	76	3.17	4	0.001	293	0.12	49	0.02	33	0.01	1536	0.64	182	0.08
Chisapani	935	49	5.24	44	4.71	5	0.005	128	0.14	21	0.02	54	0.06	559	0.60	75	0.08
Soyak	619	8	1.29	0	0.00	0	0	126	0.20	9	0.01	7	0.01	466	0.75	3	0.00
Godak	924	44	4.76	14	1.52	0	0	200	0.22	3	0.00	41	0.04	556	0.60	66	0.07
Sidhithumka	676	52	7.69	16	2.37	1	0.001	124	0.18	13	0.02	15	0.02	376	0.56	79	0.12
Sangrumba	1048	27	2.58	2	0.19	4	0.003	145	0.14	7	0.01	7	0.01	843	0.80	13	0.01
Mangalbare	1281	75	5.85	9	0.70	2	0.001	328	0.26	5	0.00	32	0.02	591	0.46	239	0.19
Ektappa	918	20	2.18	3	0.33	1	0.001	140	0.15	3	0.00	3	0.00	731	0.80	17	0.02
Chamita	1082	59	5.45	3	0.28	0	0	276	0.26	2	0.00	5	0.00	685	0.63	52	0.05
Phakphok	906	48	5.30	1	0.11	0	0	207	0.23	8	0.01	4	0.00	623	0.69	15	0.02
Chilindin	727	16	2.20	12	1.65	10	0.014	46	0.06	13	0.02	27	0.04	585	0.80	18	0.02
Pauwasartap	801	31	3.87	0	0.00	0	0.000	48	0.06	12	0.01	4	0.00	640	0.80	66	0.08
Imbung	455	12	2.64	0	0.00	2	0.004	60	0.13	7	0.02	2	0.00	369	0.81	3	0.01
Nawamidanda	797	24	3.01	1	0.13	2	0.003	76	0.10	16	0.02	6	0.01	622	0.78	10	0.01
Siwa	700	16	2.29	3	0.43	1	0.001	63	0.09	6	0.01	7	0.01	594	0.85	10	0.01
Chokmagu	744	26	3.49	1	0.13	2	0.003	136	0.18	12	0.02	3	0.00	549	0.74	15	0.02
Phidim	2927	169	5.77	148	5.06	32	0.011	389	0.13	30	0.01	130	0.04	1048	0.36	981	0.34
Bharapa	1301	56	4.30	11	0.85	6	0.005	246	0.19	19	0.01	20	0.02	919	0.71	24	0.02
Subhan	954	31	3.25	12	1.26	5	0.005	197	0.21	10	0.01	35	0.04	638	0.67	26	0.03
Amarpur	1375	49	3.56	27	1.96	3	0.002	219	0.16	5	0.00	40	0.03	934	0.68	98	0.07
Chhatedunga	695	10	1.44	1	0.14	0	0	94	0.14	3	0.00	0	0	582	0.84	5	0.01

Source: CBS, 2001

Table 6.3.32: Market Prices of the Locally Grown Crops

District	VDC	Paddy	Wheat	Maize	Millet	Mustard	Fapar	Legumes	Potato
		Rs/Kg	Rs/Kg	Rs/Kg	Rs/Kg	Rs/Kg	Rs/Kg	Rs/Kg	Rs/Kg
Terathum	Chhatedhunga	16	0	16	22	85	25	75	35
Panchthar	Amarpur	16	0	16	24	0	0	100	25
	Subhan	16	0	19	0	0	0	90.5	20
	Bharapa	16	20	22	22	0	0	100	20
	Phidim	16	0	20	0	80	0	100	40
	Chokmagu	16	0	19	19	50	0	100	30
	Siwa	13	19	25	25	70	0	63	30
	Imbun	15	24	22	22	50	0	50	25
	Nawamidada	0	0	16	22	50	0	70	20
	Pauwasartap	15	30	20	24	63	0	86.5	30
	Chilindin	16	19	19	25	50	0	40	20
Ilam	Phakphok	20	30	30	20	95	15	50	18
	Chamaita	16	32	25	22	63	0	80	35
	Ekatappa	15	32	22	28	80	0	87.5	20
	Mangalbare	22	32	22	22	80	0	70	25
	Sangrumba	0	0	22	22	80	0	0	20
	Siddhithumka	22	25	20	20	50	0	75	15
	Soyak	18	30	20	20	63	0	100	20
	Godak	15	0	25	22	0	0	120	20
	Chisapani	15	25	25	20	0	0	75	20
	Danabari	16	0	20	25	0	0	100	15
	Mahamai	16	0	16	22	90	0	100	20
	Bajho	15	0	22	22	90	0	95	15
	Chulachuli	16	0	20	22	100	22	98.75	14
Jhapa	Lakhanpur	20	0	0	0	90	0	110	12

Source: Field Survey, 2010

Table 6.3.33: Market Prices of the Locally Grown Cash Crops

District	VDC	Tea / Coffee	Ginger	Cardamom	Amriso	Timber	Akabare
		Rs/Kg	Rs/Kg	Rs/Kg	Rs/Kg	Rs/Tree	Rs/Kg
Terathum	Chhatedhunga	200	0	200	0	0	0
Panchthar	Amarpur	0	0	0	0	0	0
	Subhan	0	0	0	0	0	0
	Bharapa	0	0	0	0	0	0
	Phidim	0	0	0	0	0	0
	Chokmagu	15	30	250	0	0	0
	Siwa	160	30	0	0	0	0
	Imbun	160	30	600	50	0	0
	Nawamidada	130	30	600	60	0	0
	Pauwasartap	160	0	600	60	0	0
	Chilindin	24	0	400	50	0	0
Ilam	Phakphok	60	0	500	60	0	0
	Chamaita	0	37.5	700	60	1200	0
	Ekatappa	30	35	500	50	1000	0

District	VDC	Tea / Coffee	Ginger	Cardamom	Amriso	Timber	Akabare
		Rs/Kg	Rs/Kg	Rs/Kg	Rs/Kg	Rs/Tree	Rs/Kg
	Mangalbare	100	30	600	50	1200	0
	Sangrumba	100	30	600	50	0	0
	Siddhithumka	23	40	400	50	2000	0
	Soyak	0	30	500	50	0	0
	Godak	0	35	0	50	0	100
	Chisapani	160	30	0	50	0	0
	Danabari	0	25	0	60	0	0
	Mahamai	0	35	0	60	0	0
	Bajho	0	35	0	70	0	0
	Chulachuli	0	33	0	0	0	0
Jhapa	Lakhanpur	0	0	0	0	0	0

Source: Field Survey, 2010

Table 6.3.34: Market Prices of the Commonly Used Consumer Items

District	VDC	Milk	Sugar	Tea	Salt	Kerosene	LPG
		Rs/Lit	Rs/Kg	Rs/Kg	Rs/Kg	Rs/Lt	Rs/Cyl.
Terathum	Chhatedhunga	20	80	200	20	80	1500
Panchthar	Amarpur	20	80	220	14	70	1400
	Subhan	20	70	140	14	75	1400
	Bharapa	20	65	150	12	75	1400
	Phidim	30	65	250	15	55	1200
	Chokmagu	25	75	200	15	70	1250
	Siwa	25	70	100	15	70	1300
	Imbun	21	70	230	12	75	1500
	Nawamidada	20	70	130	12	95	1300
	Pauwasartap	18	70	200	12	70	1300
	Chilindin	20	100	200	12	70	1300
Ilam	Phakphok	18	100	160	12	60	1250
	Chamaita	20	70	150	15	65	1250
	Ekatappa	25	65	150	15	65	1250
	Mangalbare	20	70	150	15	65	1250
	Sangrumba	20	40	130	12	70	1250
	Siddhithumka	18	40	150	20	70	1250
	Soyak	20	40	150	14	70	1250
	Godak	25	40	200	15	70	1250
	Chisapani	25	40	150	15	70	1300
	Danabari	15	45	120	15	70	1300
	Mahamai	25	45	300	15	65	1250
	Bajho	30	45	120	14	70	1300
	Chulachuli	30	40	200	12	66	1200
Jhapa	Lakhanpur	40	40	200	10	65	1125

Source: Field Survey, 2010

Table 6.3.35: Market Prices of the commonly used Meat Items

District	VDC	Mutton	Chicken	Fish	Pork	Buff
		Rs/Kg	Rs/Kg	Rs/Kg	Rs/Kg	Rs/Kg
Terathum	Chhatedhunga	200	200	135	100	90
Panchthar	Amarpur	200	200	150	200	100
	Subhan	250	200	130	80	80
	Bharapa	250	250	200	120	100
	Phidim	300	300	300	160	160
	Chokmagu	250	260	250	170	140
	Siwa	250	250	200	120	120
	Imbun	300	180	200	120	120
	Nawamidada	300	200	200	120	120
	Pauwasartap	300	190	200	120	100
	Chilindin	340	300	260	130	120
Ilam	Phakphok	300	240	260	150	120
	Chamaita	300	250	200	200	150
	Ekatappa	280	240	140	100	120
	Mangalbare	300	250	200	200	150
	Sangrumba	300	300	200	150	100
	Siddhithumka	300	300	200	150	130
	Soyak	300	250	200	150	130
	Godak	300	350	350	150	150
	Chisapani	300	300	250	150	150
	Danabari	320	250	200	150	120
	Mahamai	300	250	200	140	140
	Bajho	300	250	120	120	120
	Chulachuli	250	260	160	160	160
Jhapa	Lakhanpur	400	300	150	160	200

Source: Field Survey 2010

Table 6.3.36: Wage Labor Prices in the Project VDCs

District	VDC	Wage Labor		Agriculture Labor		Potter		Carpenter	Mason
		Male	Female	Male	Female	Male	Female		
		Rs/Day	Rs/Day	Rs/Day	Rs/Day	Rs/Kg/Km	Rs/Kg/Km	Rs/Day	Rs/Day
Terathum	Chhatedhunga	150	100	100	50	5	5	200	150
Panchthar	Amarpur	150	150	100	100	2	2	200	100
	Subhan	200	150	100	100	2.5	2.5	250	150
	Bharapa	175	100	175	100	2	2	250	200
	Phidim	300	250	150	100	2	2	400	300
	Chokmagu	150	90	140	90	2	2	275	275
	Siwa	200	200	130	130	2	2	325	325
	Imbun	200	200	100	70	3	3	275	225
	Nawamidada	250	250	130	130	5	5	300	250
	Pauwasartap	150	150	100	80	2.5	2.5	250	250
	Chilindin	250	200	250	200	1	1	400	350
Ilam	Phakphok	150	100	150	100	2	2	400	300
	Chamaita	200	200	100	100	2	2	300	200
	Ekatappa	150	150	100	100	4	4	500	200

District	VDC	Wage Labor		Agriculture Labor		Potter		Carpenter	Mason
		Male	Female	Male	Female	Male	Female		
		Rs/Day	Rs/Day	Rs/Day	Rs/Day	Rs/Kg/Km	Rs/Kg/Km	Rs/Day	Rs/Day
	Mangalbare	200	200	100	100	1	1	300	200
	Sangrumba	100	100	100	100	1	1	300	200
	Siddhithumka	200	100	200	100	1	1	300	300
	Soyak	150	120	120	120	2	2	250	200
	Godak	300	300	150	150	2	2	250	200
	Chisapani	100	60	100	60	NA	NA	250	250
	Danabari	100	100	100	100	NA	NA	300	300
	Mahamai	100	100	100	100	2	2	250	250
	Bajho	100	100	100	100	2	2	200	200
	Chulachuli	100	100	100	100	NA	NA	200	200
Jhapa	Lakhanpur	300	300	200	200	NA	NA	400	350

Source: Field Survey, 2010

Table 6.3.37: Average Land Prices in the Project VDCs

District	VDC	Bari	Khet	Kharbari
		Rs/Ropani	Rs/Ropani	Rs/Ropani
Terathum	Chhatedhunga	12500	22500	8500
District Average		***12500***	***22500***	***8500***
Panchthar	Amarpur	40000	60000	NA
	Subhan	25000	50000	10000
	Bharapa	10000	20000	5000
	Phidim	50000	100000	30000
	Chokmagu	35000	50000	22500
	Siwa	27500	45000	17500
	Imbun	30000	40000	20000
	Nawamidada	60000	100000	10000
	Pauwasartap	40000	55000	20000
	Chilindin	25000	70000	10000
District Average		***34250***	***59000***	***16111***
Ilam	Phakphok	27500	50000	17500
	Chamaita	50000	60000	25000
	Ekatappa	20000	30000	20000
	Mangalbare	5000	65000	20000
	Sangrumba	50000	70000	30000
	Siddhithumka	30000	50000	15000
	Soyak	35000	50000	25000
	Godak	60000	90000	40000
	Chisapani	40000	65000	25000
	Danabari	10000	15000	5000
	Mahamai	15000	30000	10000
	Bajho	8000	15000	5000
	Chulachuli	20000	65000	10000
District Average		***28500***	***50385***	***19038***
Jhapa	Lakhanpur	460000	460000	NA
District Average			***460000***	***NA***

Source: Field Survey, 2010

6.3.3 Project Vicinity People

A total of 205 households living close to the transmission line were surveyed. The name list of the surveyed people by the structured questionnaires is presented in ***Annex 3.3***. ***Table 6.3.38*** provides the details of the surveyed household location along the KCTLP. The objective of the survey is to elucidate the socio-economic conditions of the likely project affected people.

Table 6.3.38: Locations of Surveyed Households in Different VDCs across KCTLP

District	V.D.C.	HH Number	HH Percent
Terathum	Chhatedhunga	13	6.34
Subtotal Terathum		**13**	**6.34**
Panchthar	Amarpur	5	2.44
	Bharapa	6	2.93
	Chilindin	10	4.88
	Chokmagu	10	4.88
	Imbung	8	3.90
	Nawamidada	6	2.93
	Pauwasartap	7	3.41
	Phidim	10	4.88
	Siwa	11	5.37
	Subhan	11	5.37
Subtotal Panchthar		**84**	**40.98**
Ilam	Bajho	8	3.90
	Chamaita	8	3.90
	Chisapani	3	1.46
	Chulachuli	7	3.41
	Danabari	8	3.90
	Ekatapa	9	4.39
	Godak	7	3.41
	Mahamai	10	4.88
	Mangalbare	9	4.39
	Phakphok	3	1.46
	Sangrumba	7	3.41
	Siddhithumka	9	4.39
	Soyak	14	6.83
Subtotal Ilam		**102**	**49.76**
Jhapa	Lakhanpur	6	2.93
Subtotal Jhapa		**6**	**2.93**
Grand Total		**205**	**100.00**

Source: Field Survey 2010

A household survey of the potentially Project Affected Households (PAF) was conducted by using a structured questionnaire (***Annex 3.2***). Sections below summarize the findings of the Potential PAF social and socio-economic status.

6.3.3.1 Demographic Concerns

a. Population/Households

A total of 1,244 persons live in the 205 households. The average family size of the surveyed households is 5.08. Highest family size is among the Brahmins and Chhetris which is much higher than the project districts and the national average (***Table 6.3.39***). Adivashi janjati households constitute above 62% of the households, followed by high caste groups and dalits reflecting the likely effects of the project on the Adivashi janjati groups than the other groups.

Table 6.3.39: Caste wise Surveyed HH, Population, and Household Size

Caste	HH Number	HH Percent	Population	Household size
Limbu	57	27.80	344	6.04
Brahmin	38	18.54	251	6.61
Tamang	25	12.20	145	5.80
Rai	24	11.71	145	6.04
Dalit	19	9.27	111	5.84
Chhetri	15	7.32	96	6.40
Magar	12	5.85	63	5.25
Gurung	5	2.44	28	5.60
Newar	5	2.44	28	5.60
Others	5	2.44	33	6.60
Total	**205**	**100.00**	**1,244**	**5.98**
Janajati	**128**	**62.44**	**753**	**5.88**
Dalit	**19**	**9.27**	**111**	**5.84**
High Castes	**53**	**25.86**	**347**	**6.55**
Others	**5**	**2.44**	**33**	**6.60**

Source: Field Survey 2010

Of the total population, 53.14 percent are male while female population is 46.86 percent. The average male: female ratio is 1: 0.92 (6.3.40). The lowest male to female ratio is among janjati groups compared to other groups.

Table 6.3.40: Caste Wise Male – Female Population

HH	Sex of the Family Member				Total		Male Female Ratio (M:F)
	Male		Female				
	No.	%	No.	%	No.	%	
Limbu	187	54.36	157	45.64	344	27.65	0.84
Brahmin	132	52.59	119	47.41	251	20.18	0.90
Rai	82	56.55	63	43.45	145	11.66	0.77
Tamang	74	51.03	71	48.97	145	11.66	0.96
Dalit	56	50.45	55	49.55	111	8.92	0.98
Chhetri	49	51.04	47	48.96	96	7.72	0.96
Magar	36	57.14	27	42.86	63	5.06	0.75
Gurung	16	57.14	12	42.86	28	2.25	0.75
Newar	12	42.86	16	57.14	28	2.25	1.33
Others	17	51.52	16	48.48	33	2.65	0.94
Total	**661**	53.14	**583**	46.86	**1,244**	100.00	**0.92**
Janajati	**407**	**54.05**	**346**	**45.95**	**753**	**60.53**	**0.85**
Dalit	**56**	**50.45**	**55**	**49.55**	**111**	**8.92**	**0.98**
High Castes	**181**	**52.16**	**166**	**47.84**	**347**	**27.9**	**0.92**
Others	**17**	**51.52**	**16**	**48.48**	**33**	**2.65**	**0.94**

Source: Field Survey 2010

The age group below 15 years constitutes about 32.47 percent (***Table 6.3.41***). The age group from 15 to 59 makes up about 60. 93 percent while above 60 years is 6.59 percent. The economically active age group (15 to 60 years of age) is highest among the surveyed households and varies between 54 to 63% among the various ethnic groups.

Table 6.3.41: Percentiles of Population Distribution by Age Group of the Surveyed Households

HH	Age Group						Total
	1 to 5	6 to 15	16 to 30	31 to 45	45 to 60	Above 60	
Limbu	8.72	26.74	32.85	13.66	11.34	6.69	**344**
Brahmin	7.97	20.72	29.48	19.92	11.55	10.36	**251**

Rai	11.72	22.07	37.93	11.03	13.79	3.45	**145**
Tamang	13.10	17.93	39.31	9.66	15.17	4.83	**145**
Dalit	8.11	24.32	33.33	15.32	14.41	4.50	**111**
Chhetri	9.38	30.21	26.04	19.79	8.33	6.25	**96**
Magar	7.94	23.81	31.75	17.46	7.94	11.11	**63**
Gurung	3.57	3.57	46.43	21.43	25.00	0.00	**28**
Newar	3.57	28.57	35.71	17.86	7.14	7.14	**28**
Others	3.03	30.30	42.42	9.09	12.12	3.03	**33**
Total	9.00	23.47	33.60	15.11	12.22	6.59	**1244**

Source: Field Survey 2010

More than 60.90 percent of the households are residing in the area for more than two generation. About 12.68 percent have come to the area since one generation, while 23.41 percent have come to the area very recently. ***Table 6.3.42*** details the status of the residential households according to caste. There has been considerable internal migration in the area. Only 63 percent of the people residing in the area are living in the area for more than two generation, while nearly 37% of the people have migrated in the last 30 to 40 years. Both Janjati and high caste people constitute nearly 65% of the households living in the area for more than two generation.

Table 6.3.42: Period of Settlement

HH	Settlement Since						Total	
	Two Generations		One Generation		Recently			
	Number	%	Number	%	Number	%	Number	%
Limbu	41	71.93	6	10.53	10	17.54	57	27.80
Brahmin	27	71.05	6	15.79	5	13.16	38	18.54
Tamang	20	80.00	2	8.00	3	12.00	25	12.20
Rai	7	29.17	4	16.67	13	54.17	24	11.71
Dalit	10	52.63	4	21.05	5	26.32	19	9.27
Chhetri	7	46.67	3	20.00	5	33.33	15	7.32
Magar	7	58.33	1	8.33	4	33.33	12	5.85
Gurung	4	80.00	0	0.00	1	20.00	5	2.44
Newar	3	60.00	0	0.00	2	40.00	5	2.44
Others	5	100.00	0	0.00	0	0.00	5	2.44
Total	**131**	63.90	**26**	12.68	**48**	23.41	**205**	**100.00**
Janajati	**82**	**64.06**	**13**	**10.16**	**33**	**25.78**	**128**	**62.44**
Dalit	**10**	**52.63**	**4**	**21.05**	**5**	**26.32**	**19**	**9.27**
High Castes	**34**	**65.38**	**9**	**17.31**	**10**	**19.23**	**53**	**25.85**
Others	**5**	**100.00**	**0**	**0.00**	**0**	**0.00**	**5**	**2.44**

Source: Field Survey 2010

About 13.17% of the survey households are adopting joint family system with 2 to 3 generations of families living together under the single roof. About 86.83 percent households are found to practice nuclear family system. It is reported that the nuclear system of family structure has increased over the years. The ratio of families adopting joint family system is higher among Brahmins compared to the other caste groups (***Table 6.3.43***), while traditionally the ethnic minorities constituting Adivashi janjati were observed as adopting joint family system.

Table 6.3.43: Family Structure of Survey Households

HH	Nuclear Family		Joint Family		Total	
	Number	%	Number	%	Number	%
Limbu	52	91.23	5	8.77	57	27.80
Brahmin	26	68.42	12	31.58	38	18.54
Tamang	24	96.00	1	4.00	25	12.20
Rai	21	87.50	3	12.50	24	11.71

HH	Nuclear Family		Joint Family		Total	
	Number	%	Number	%	Number	%
Dalit	16	84.21	3	15.79	19	9.27
Chhetri	13	86.67	2	13.33	15	7.32
Magar	12	100.00	0	0.00	12	5.85
Gurung	4	80.00	1	20.00	5	2.44
Newar	5	100.00	0	0.00	5	2.44
Others	5	100.00	0	0.00	5	2.44
Total	**178**	86.83	**27**	13.17	**205**	**100.00**
Janajati	**118**	**92.19**	**10**	**7.81**	**128**	**62.44**
Dalit	**16**	**84.21**	**3**	**15.79**	**19**	**9.27**
High Castes	**39**	**73.58**	**14**	**26.42**	**53**	**25.85**
Others	**5**	**100.00**	**0**	**0.00**	**5**	**2.44**

Source: Field Survey 2010

b. Household Ethnic/Caste Division

The surveyed households belong to more than 10 ethnic/caste groups. Majority (60.53 %) of the survey households represent *Janajatis* while 27.89 percent are higher caste groups followed by Dalits (8.92 percent). Table 4.3.44 details the percentiles of different caste groups.

Table 6.3.44: Ethnic/Caste Division

HH	Population	Percentage
Limbu	344	27.65
Brahmin	251	20.18
Rai	145	11.66
Tamang	145	11.66
Dalit	111	8.92
Chhetri	96	7.72
Magar	63	5.06
Gurung	28	2.25
Newar	28	2.25
Others	33	2.65
Total	**1244**	**100.00**
Janajati	**753**	**60.53**
Dalit	**111**	**8.92**
High Castes	**347**	**27.89**
Others	**33**	**2.65**

Source: Field Survey 2010

c. Household Religion

The surveyed families practice four religions. Majority of the families of Chhetri, Bhramins, Magars, and Newar (47.32%) have adopted Hindu religion while (33.66%) follow Kirat religion. Buddhist religion is followed by 16.59%. The Christian religion is followed by 2.44 % of the population (***Table 6.3.45***). The population observing Christianity are from among Limbu and Magar caste groups and are said to have converted their religion in last two to three decades.

Table 6.3.45: Religion of the Surveyed Families

Caste	Religion of the HH								Total HH	
	Hindu		Kirat		Bouddha		Christian			
	Number	%	Number	%	Number	%	Number	%	Number	%
Limbu	5	8.77	49	85.96	1	1.75	2	3.51	57	27.80
Brahmin	38	100.00	0	0.00	0	0.00	0	0.00	38	18.54
Tamang	2	8.00	0	0.00	23	92.00	0	0.00	25	12.20
Rai	4	16.67	20	83.33	0	0.00	0	0.00	24	11.71

Caste	Religion of the HH								Total HH	
	Hindu		Kirat		Bouddha		Christian			
	Number	%	Number	%	Number	%	Number	%	Number	%
Dalit	19	100.00	0	0.00	0	0.00	0	0.00	19	9.27
Chhetri	15	100.00	0	0.00	0	0.00	0	0.00	15	7.32
Magar	4	33.33	0	0.00	5	41.67	3	25.00	12	5.85
Gurung	0	0.00	0	0.00	5	100.00	0	0.00	5	2.44
Newar	5	100.00	0	0.00	0	0.00	0	0.00	5	2.44
Others	5	100.00	0	0.00	0	0.00	0	0.00	5	2.44
Total	**97**	**47.32**	**69**	**33.66**	**34**	**16.59**	**5**	**2.44**	**205**	**100.00**
Janajati	**20**	**15.63**	**69**	**53.91**	**34**	**26.56**	**5**	**3.91**	**128**	**62.44**
Dalit	**19**	**100.00**	**0**	**0.00**	**0**	**0.00**	**0**	**0.00**	**19**	**9.27**
High Castes	**53**	**100.00**	**0**	**0.00**	**0**	**0.00**	**0**	**0.00**	**53**	**25.85**
Others	**5**	**100.00**	**0**	**0.00**	**0**	**0.00**	**0**	**0.00**	**5**	**2.44**

Source: Field Survey 2010

Conversion of the religion from the traditional religion is seen among the janjati groups in the recent years. It is likely that the migrating janjati groups from their ancenstral places are adopting other religion than their ancestral religion. The Magars, Gurung, Newars and some Limbu and Rai have changed their religion from the ancestral to either Hindu or Chistian.

6.3.3.2 Quality of Life Values

a.Education

The majority of surveyed Population above 6 years of age (83.84%) is reported to be literate (***Table 6.3.46***). The literacy percentage of population is far better when compared to the average literacy rate of the project VDCs. Of the total population, the female comprises 11.21 % of illiterates compared to 4.95% of male. This reflects some degree of discrimination of female compared to male in provisioning education among the households. Level of high gender discrimination is prevalent in the Dalit and other ethnic groups. Compared to high caste groups, the discrimination of female in education is marginally high in the adivashi janjati groups.

Table 6.3.46: Literacy Status of the Households

Caste of the HH	Illiterate			Literate														Total
				GE		Primary		Lower Secondary		Secondary		S.L.C		Higher Secondary		Literate		
	M	F	Total	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Limbu	4.40	11.95	16.35	6.29	5.03	15.72	11.64	12.26	6.60	6.60	4.40	3.77	2.52	5.03	3.77	49.69	33.96	**83.65**
Brahmin	4.27	5.98	10.26	6.84	6.84	10.68	11.97	4.27	6.41	7.69	6.41	5.98	5.98	11.97	4.70	47.44	42.31	**89.74**
Rai	3.73	8.21	11.94	7.46	4.48	23.13	18.66	11.19	5.22	7.46	3.73	2.24	0.75	2.24	1.49	53.73	34.33	**88.06**
Tamang	6.30	15.75	22.05	2.36	1.57	14.17	13.39	12.60	9.45	4.72	4.72	3.94	3.15	6.30	1.57	44.09	33.86	**77.95**
Dalit	10.48	19.05	29.52	1.90	4.76	13.33	9.52	13.33	8.57	5.71	5.71	4.76	0.00	1.90	0.95	40.95	29.52	**70.48**
Chhetri	3.37	8.99	12.36	4.49	3.37	10.11	14.61	17.98	15.73	6.74	3.37	4.49	2.25	2.25	2.25	46.07	41.57	**87.64**
Magar	6.90	12.07	18.97	6.90	6.90	18.97	6.90	15.52	5.17	3.45	6.90	5.17	0.00	0.00	5.17	50.00	31.03	**81.03**
Gurung	0.00	14.81	14.81	7.41	3.70	11.11	0.00	7.41	3.70	7.41	14.81	7.41	0.00	18.52	3.70	59.26	25.93	**85.19**
Newar	0.00	7.41	7.41	0.00	11.11	7.41	3.70	14.81	18.52	3.70	3.70	0.00	0.00	18.52	11.11	44.44	48.15	**92.59**
Others	6.25	15.63	21.88	9.38	9.38	28.13	15.63	9.38	6.25	0.00	0.00	0.00	0.00	0.00	0.00	46.88	31.25	**78.13**
Total	**4.95**	**11.21**	**16.16**	**5.56**	**5.13**	**14.94**	**12.16**	**11.12**	**7.73**	**6.26**	**5.04**	**4.17**	**2.52**	**5.99**	**3.21**	**48.05**	**35.79**	**83.84**
Janajati	**4.52**	**11.91**	**16.43**	**5.62**	**4.59**	**16.64**	**12.20**	**12.31**	**7.10**	**6.06**	**4.90**	**3.62**	**1.90**	**5.32**	**3.29**	**49.57**	**33.99**	**629**
Dalit	**10.48**	**19.05**	**29.52**	**1.90**	**4.76**	**13.33**	**9.52**	**13.33**	**8.57**	**5.71**	**5.71**	**4.76**	**0.00**	**1.90**	**0.95**	**40.93**	**29.51**	**78**
High Castes	**4.02**	**6.81**	**10.84**	**6.19**	**5.88**	**10.52**	**12.70**	**8.06**	**8.99**	**7.43**	**5.57**	**5.57**	**4.95**	**9.28**	**4.02**	**47.05**	**42.11**	**309**
Others	**6.25**	**15.63**	**21.88**	**9.38**	**9.38**	**28.13**	**15.63**	**9.38**	**6.25**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**46.89**	**31.26**	**26**

Source: Field Survey 2010

b .Energy Use

About 30.24 percent of the sample households are connected with electricity for lighting while 24.39 percent use solar for lighting. About 61.95 and 4.88% also use kerosene and battery for lighting. Nearly 99.51 percent use firewood for cooking, while 2.44% also occasionally use LPG for cooking. ***Table 6.3.47*** details the types of energy usage by different caste groups among the surveyed household.

Table 6.3.47: Households Energy Use

HH	Fuel for Cooking				Fuel for Lighting			
	Fuelwood	Kerosene	LPG	Others	Kerosene	Electricity	Solar	Battery
Limbu	100.00	0.00	1.75	0.00	66.67	29.82	15.79	0.00
Brahmin	100.00	0.00	2.63	2.63	60.53	31.58	31.58	2.63
Tamang	100.00	0.00	0.00	0.00	56.00	48.00	16.00	0.00
Rai	100.00	0.00	4.17	0.00	54.17	33.33	33.33	12.50
Dalit	100.00	0.00	5.26	0.00	73.68	21.05	15.79	15.79
Chhetri	100.00	0.00	0.00	0.00	53.33	26.67	33.33	0.00
Magar	100.00	0.00	0.00	0.00	66.67	8.33	33.33	8.33
Gurung	100.00	0.00	0.00	0.00	40.00	40.00	40.00	0.00
Newar	80.00	0.00	20.00	0.00	60.00	40.00	60.00	0.00
Others	100.00	0.00	0.00	0.00	80.00	0.00	0.00	40.00
Total	**99.51**	**0.00**	**2.44**	**0.49**	**61.95**	**30.24**	**24.39**	**4.88**

Source: Field Survey 2010

Dependency on the dirty energy (fuelwood) for more than 96% of the household energy requirement reflects the quality of life, particularly, of the female, elderly and child of the project area. Nearly 59% of the households has access to the modern energy source for lighting, while about 40% are still relying on the kerosene for household lighting.

From energy perspective, a distinction between the janjati, dalit, and highcaste groups is not very different. However, the dalits has least access to high quality energy for lighting compared to other groups. But this may be due to unavailability of electricity connection.

c. Water Supply and Sanitation

Majority of the Surveyed households (70.24%) have piped water supply for the household water while 12 percent households rely on well and about 10.24 percent household depend upon the natural sprout. About 3.41 percent fetch their water from the river sources whereas 3.41 percent get their household water from multiple sources (***Table 6.3.48***). The statistics of water supply facilities do not show a distinctive diference between the various ethnic groups but seems to have a relevance of geographical location.

Table 6.3.48: Sources of Drinking Water

HH	Piped water system	Spout	River	Well	Others	Total HH
Limbu	68.42	14.04	5.26	12.28	0.00	57
Brahmin	81.58	13.16	0.00	2.63	2.63	38
Tamang	76.00	12.00	4.00	8.00	0.00	25
Rai	62.50	0.00	0.00	37.50	0.00	24
Dalit	63.16	0.00	0.00	26.32	10.53	19
Chhetri	60.00	26.67	0.00	0.00	13.33	15
Magar	58.33	0.00	25.00	8.33	8.33	12
Gurung	60.00	20.00	0.00	0.00	20.00	5
Newar	100.00	0.00	0.00	0.00	0.00	5
Others	80.00	0.00	0.00	20.00	0.00	5
Total	**70.24**	**10.24**	**3.41**	**12.68**	**3.41**	**205**

Source: Field Survey 2010

With regards to the sanitation, 64.39 percent households are using toilets for defecation. Among the different ethnic households, lowest number of households having toilets is reported among Tamangs

followed by Rai and Limbu (***Table 6.3.49***), that is the Adivashi Janjati are not facilitated with toilets compared to other groups. However, the toilets at the household level is still higher than the national and district average.

Table 6.3.49: Households Having Toilet Facility

HH	Yes		No		Total	
	No. HH	% HH	No. HH	% HH	No. HH	%HH
Limbu	37	64.91	20	35.09	57	27.80
Brahmin	29	76.32	9	23.68	38	18.54
Tamang	10	40.00	15	60.00	25	12.20
Rai	13	54.17	11	45.83	24	11.71
Dalit	14	73.68	5	26.32	19	9.27
Chhetri	11	73.33	4	26.67	15	7.32
Magar	9	75.00	3	25.00	12	5.85
Gurung	4	80.00	1	20.00	5	2.44
Newar	4	80.00	1	20.00	5	2.44
Others	1	20.00	4	80.00	5	2.44
Total	**132**	**64.39**	**73**	35.61	**205**	**100.00**
Janajati	**77**	**60.16**	**51**	**39.84**	**128**	**62.44**
Dalit	**14**	**73.68**	**5**	**26.32**	**19**	**9.27**
High Castes	**40**	**75.47**	**13**	**24.53**	**53**	**25.85**
Others	**1**	**20.00**	**4**	**80.00**	**5**	**2.44**

Source: Field Survey 2010

Among the households having toilets, nearly 71.97 percent of the households have temporary pit type toilet, while about 28.3 percent PAF households have a permanent toilet with septic tank and soak pit facility (***Table 6.3.50***). It is interesting to note that the highcaste groups have opted for permanent toilet facilities compared to the other groups.

Table 6.3.50: Households Having Type of Toilet Facility

HH	Temporary		Permanent		Total	
	No.	%	No.	%	No.	%
Limbu	31	83.78	6	16.22	37	28.03
Brahmin	18	62.07	11	37.93	29	21.97
Dalit	11	78.57	3	21.43	14	10.61
Rai	9	69.23	4	30.77	13	9.85
Chhetri	5	45.45	6	54.55	11	8.33
Tamang	8	80.00	2	20.00	10	7.58
Magar	8	88.89	1	11.11	9	6.82
Gurung	2	50.00	2	50.00	4	3.03
Newar	2	50.00	2	50.00	4	3.03
Others	1	100.00	0	0.00	1	0.76
Total	**95**	**71.97**	**37**	**28.03**	**132**	**100.00**
Janajati	**60**	**77.92**	**17**	**22.08**	**77**	**58.33**
Dalit	**11**	**78.57**	**3**	**21.43**	**14**	**10.61**
High Castes	**23**	**57.50**	**17**	**42.50**	**40**	**30.30**
Others	**1**	**100.00**	**0**	**0.00**	**1**	**0.76**

Source: Field Survey 2010

Similarly, only 10.73 percent of the households are using improved cooking stoves in their houses while 89.27 percent households are using traditional system of stoves which generates high smokes and is one of the key factors for indoor air pollution and related health status of the aged and younger population (***Table 6.3.51***). Though the level of household air quality as reflected by the use and non use of the improved cooking stoves is poor among the surveyed households, it is interesting to note that the janjati ethnic groups by statistics have adopted the improved cooking stoves at households compared to the other groups.

Table 6.3.51: Households Adopting Improved Cooking Stoves

HH	Yes		No		Total	
	No.	%	No.	%	No.	%
Limbu	8	14.04	49	85.96	57	27.80
Brahmin	3	7.89	35	92.11	38	18.54
Tamang	3	12.00	22	88.00	25	12.20
Rai	2	8.33	22	91.67	24	11.71
Dalit	0	0.00	19	100.00	19	9.27
Chhetri	0	0.00	15	100.00	15	7.32
Magar	4	33.33	8	66.67	12	5.85
Gurung	0	0.00	5	100.00	5	2.44
Newar	2	40.00	3	60.00	5	2.44
Others	0	0.00	5	100.00	5	2.44
Total	**22**	10.73	**183**	89.27	**205**	**100.00**
Janajati	**19**	**14.84**	**109**	**85.16**	**128**	**62.44**
Dalit	**0**	**0.00**	**19**	**100.00**	**19**	**9.27**
High Castes	**3**	**5.66**	**50**	**94.34**	**53**	**25.85**
Others	**0**	**0.00**	**5**	**100.00**	**5**	**2.44**

Source: Field Survey 2010

d. Health

In the last one year period, nearly 54.15 percent households reported some member of their family falling sick. Among the ethnic groups, the Brahmins and Dalit households reported highest number of sickness followed by Magar, Chhetri and Limbu (***Table 6.3.52***). Sickness, besides others among the surveyed households is a reflection of the water source and quality, sanitational habits, and indoor air quality. High caste groups traditionally have better sanitation habits than the other have a better health records than the other groups, though the observed difference is only marginal.

Table 6.3.52: Households and Members reporting Sickness

HH	Yes		No		Total	
	No. HH	% HH	No. HH	% HH	No. HH	% HH
Limbu	31	54.39	26	45.61	57	27.80
Brahmin	26	68.42	12	31.58	38	18.54
Tamang	12	48.00	13	52.00	25	12.20
Rai	10	41.67	14	58.33	24	11.71
Dalit	13	68.42	6	31.58	19	9.27
Chhetri	8	53.33	7	46.67	15	7.32
Magar	7	58.33	5	41.67	12	5.85
Gurung	1	20.00	4	80.00	5	2.44
Newar	1	20.00	4	80.00	5	2.44
Others	2	40.00	3	60.00	5	2.44
Total	**111**	54.15	**94**	45.85	**205**	**100.00**
Janajati	**62**	**48.44**	**66**	**51.56**	**128**	**62.439**
Dalit	**13**	**68.42**	**6**	**31.58**	**19**	**9.268**
High Castes	**34**	**64.15**	**19**	**35.85**	**53**	**25.854**
Others	**2**	**40.00**	**3**	**60.00**	**5**	**2.439**

Source: Field Survey 2010

Measures taken for cure for sickness as reported by the households were consultation with Dahami/Jhankri - the local traditional healers (8.11%), health post/hospitals (85.59%), Aurvedic (2.7%) and Private clinics (2.7%). Limbu, Rai and Dalits population still practice healing by local sermons, while rest consults the medicinal practitioner (***Table 6.3.53***). The household survey data obtained when disaggregated in thnic terms reflect that the Janjati groups still have a tendency to consult the traditional healers than the modern means of health cure system.

Table 6.3.53: Measures Adopted to Cure the Sickness

HH	Treatment Mode					
	Traditional Healers%	Ayurvedic%	Local Health Posts%	Hospitals%	Private Clinics%	Others%
Limbu	22.58	0.00	6.45	64.52	3.23	3.23
Brahmin	0.00	3.85	15.38	80.77	0.00	0.00
Dalit	7.69	0.00	23.08	53.85	15.38	0.00
Tamang	0.00	8.33	50.00	41.67	0.00	0.00
Rai	10.00	0.00	30.00	60.00	0.00	0.00
Chhetri	0.00	12.50	0.00	87.50	0.00	0.00
Magar	0.00	0.00	0.00	100.00	0.00	0.00
Gurung	0.00	0.00	0.00	100.00	0.00	0.00
Newar	0.00	0.00	0.00	100.00	0.00	0.00
Others	0.00	0.00	0.00	100.00	0.00	0.00
Total	8.11	2.70	16.22	69.37	2.70	0.90

Source: Field Survey 2010

The most common sickness case is the general cough and cold followed by digestive disorder, neuro and spinal, respiratory and heart and blood pressure (***Table 6.3.54***).

Table 6.3.54: Common Disease of the Surveyed HH

Disease	Caste									Total
	Limbu	Brahmin	Dalit	Rai	Tamang	Chhetri	Magar	Newar	Others	
General Sickness	43.59	37.84	26.32	16.67	16.67	36.36	0.00	0.00	50.00	31.69
Gastritis and Digestive Tract	23.08	21.62	21.05	16.67	8.33	27.27	22.22	100.00	0.00	21.13
Neuro and Spinal Disease	2.56	10.81	15.79	8.33	25.00	0.00	22.22	0.00	50.00	10.56
Respiratory	7.69	10.81	10.53	16.67	8.33	9.09	0.00	0.00	0.00	9.15
Heart and Blood	7.69	8.11	0.00	16.67	25.00	9.09	0.00	0.00	0.00	8.45
Skin and External Infections	0.00	2.70	5.26	8.33	16.67	18.18	11.11	0.00	0.00	5.63
Injuries	7.69	0.00	10.53	0.00	0.00	0.00	11.11	0.00	0.00	4.23
Gynaechological	2.56	2.70	5.26	8.33	0.00	0.00	0.00	0.00	0.00	2.82
Liver	2.56	0.00	0.00	0.00	0.00	0.00	11.11	0.00	0.00	1.41
Others	2.56	5.41	5.26	8.33	0.00	0.00	22.22	0.00	0.00	4.93

Source: Field Survey 2010

e. Participation in Organizations

About 50.2 % of the household reported to be participating in the local organization such as VDC, Community forestry, Water users committees etc (Table 6.3.55). Participation of female members, however, is very poor. Among caste groups, Tamang and Gurung have the least participation.

Table 6.3.55: Household Participation in Community Organisations

HH	Yes		No		Total	
	No.	%	No.	%	No.	%
Limbu	28	49.12	29	50.88	57	27.80
Brahmin	22	57.89	16	42.11	38	18.54
Tamang	7	28.00	18	72.00	25	12.20
Rai	16	66.67	8	33.33	24	11.71
Dalit	11	57.89	8	42.11	19	9.27

Chhetri	7	46.67	8	53.33	15	7.32
Magar	5	41.67	7	58.33	12	5.85
Gurung	1	20.00	4	80.00	5	2.44
Newar	4	80.00	1	20.00	5	2.44
Others	2	40.00	3	60.00	5	2.44
Total	**103**	**50.24**	**102**	**49.76**	**205**	**100.00**
Janajati	**61**	**47.66**	**67**	**52.34**	**128**	**62.44**
Dalit	**11**	**57.89**	**8**	**42.11**	**19**	**9.27**
High Castes	**29**	**54.72**	**24**	**45.28**	**53**	**25.85**
Others	**2**	**40.00**	**3**	**60.00**	**5**	**2.44**

Source: Field Survey 2010

6.3.3.3 Economic Concern

a. Occupational Status

Nearly cent percent households depend upon agriculture. However, among the household population, the majority members having a productive economic activity are involved in agriculture (37.54%) followed by foreign employment (5.71%), Business (5.23%), Jobs and services (3.30%) and wage earning (1.61%.),. A significant numbers of population (34.97%) are students and are less engaged in earning activities. Similarly, about 10.93 percent of the population is unable to work. (Table 6.3.56).

Table 6.3.56: Major Occupation of the Households

HH	Occupation of the Family Member							
	Unable to work%	Farming and Livestock%	Daily wages and labour%	Business %	Foreign Employment %	Jobs and Services %	Student %	Others %
Limbu	11.34	37.21	0.58	5.52	2.33	2.62	39.83	0.58
Brahmin	11.95	35.86	1.59	3.59	7.17	6.77	32.67	0.40
Rai	8.28	42.07	1.38	6.90	4.83	1.38	35.17	0.00
Tamang	15.86	43.45	0.00	6.21	7.59	2.76	23.45	0.69
Dalit	7.21	28.83	8.11	6.31	8.11	4.50	36.04	0.90
Chhetri	10.42	38.54	0.00	4.17	4.17	2.08	39.58	1.04
Magar	14.29	36.51	1.59	3.17	7.94	1.59	33.33	1.59
Gurung	3.57	46.43	0.00	0.00	14.29	0.00	28.57	7.14
Newar	7.14	21.43	3.57	17.86	0.00	3.57	46.43	0.00
Others	6.06	42.42	3.03	0.00	15.15	0.00	33.33	0.00
Total	10.93	37.54	1.61	5.23	5.71	3.30	34.97	0.72
Janajati	**11.42**	**39.04**	**0.80**	**5.98**	**4.65**	**2.26**	**35.06**	**0.80**
Dalit	**7.21**	**28.83**	**8.11**	**6.31**	**8.11**	**4.50**	**36.04**	**0.90**
High Castes	**11.53**	**36.60**	**1.15**	**3.75**	**6.34**	**5.47**	**34.58**	**0.58**
Others	**6.06**	**42.42**	**3.03**	**0.00**	**15.15**	**0.00**	**33.33**	**0.00**

Source: Field Survey 2010

At the occupational status there is not marked difference between the Highcast, Adivahi janjati and other goruops. Wage labour occupation, however is practiced by high percentile of Dalit households.

b. Land Holding

About 96% households own certain portion of land within the project area while 3.9 percent households do not own any land (Table 6.3.57). A few households of Limbu, Tamang, Dalit, Magar and Newars do not own any private land. In other words, about 5% of the Janjati and Dalit groups do not won any land.

Table 6.3.57: Landholding Status of Households

HH	Status of Land Holding	Total

	Yes	%	No	%	Number	%
Limbu	54	94.74	3	5.26	57	**27.80**
Brahmin	38	100.00	0	0.00	38	**18.54**
Tamang	23	92.00	2	8.00	25	**12.20**
Rai	24	100.00	0	0.00	24	**11.71**
Dalit	18	94.74	1	5.26	19	**9.27**
Chhetri	15	100.00	0	0.00	15	**7.32**
Magar	11	91.67	1	8.33	12	**5.85**
Gurung	5	100.00	0	0.00	5	**2.44**
Newar	4	80.00	1	20.00	5	**2.44**
Others	5	100.00	0	0.00	5	**2.44**
Total	**197**	96.10	**8**	3.90	**205**	**100.00**
Janajati	**121**	**94.53**	**7**	**5.47**	**128**	**62.44**
Dalit	**18**	**94.74**	**1**	**5.26**	**19**	**9.27**
High Castes	**53**	**100.00**	**0**	**0.00**	**53**	**25.85**
Others	**5**	**100.00**	**0**	**0.00**	**5**	**2.44**

Source: Field Survey 2010

Average land holding size of the households is 1.22 ha. The Dalit caste group has the least landholding size, while other have landholding size above one hector. Good land holding is mostly with Rai, Tamang, Newar, Brahmins and Limbu (Table 6.3.58).

Table 6.3.58: Average Landholding Size

HH	Area of Total Khet (Ha)	Area of Total Bari (Ha)	Area of Total Kharbari (Ha)	Area of Total Forest (Ha)	Area of Total Garden (Ha)	Area of Total Tea Garden (Ha)	Total Landholding ha
Brahmin	0.45	0.69	0.07	0.04	0.00	0.01	1.28
Chhetri	0.29	0.62	0.08	0.23	0.00	0.00	1.23
Dalit	0.18	0.34	0.02	0.05	0.00	0.00	0.60
Gurung	0.06	0.81	0.00	0.20	0.00	0.00	1.08
Limbu	0.46	0.63	0.00	0.06	0.00	0.02	1.18
Magar	0.22	0.71	0.00	0.12	0.01	0.00	1.06
Newar	0.78	0.46	0.00	0.00	0.00	0.00	1.24
Rai	0.28	0.82	0.20	0.16	0.01	0.02	1.49
Tamang	0.23	1.10	0.01	0.13	0.00	0.01	1.48
Others	0.25	1.24	0.00	0.00	0.00	0.00	1.50
Overall Averege	**0.35**	**0.71**	**0.05**	**0.09**	**0.00**	**0.01**	1.22

Source: Field Survey 2010

c. .Agriculture Production and Food Sufficiency

Agricultural crops are grown in the Bari and Khetlands. In the Bariland (rain fed) the principle crops grown are maize and millet. Legume, mustard, Fapar, and potato are also grown along with the principle crops in some parts of Bari land. Average production of different crops varies greatly across the KCTLP corridor VDCs (Table 6.3.59).

Table 6.3.59: Average Production of various Crops in the Bariland along KCTLP based on HH Survey

District	VDC	Productivity of Crops in Bari (MT/Ha)						
		Maize	Millet	Legume	Mustard	Fapar	Potato	Others
Terathum	Chhatedhunga	1.28	1.04	0.59	0.31	0.63	2.49	0.96
	Average Terathum	**1.28**	**1.04**	**0.59**	**0.31**	**0.63**	**2.49**	**0.96**
Panchthar	Amarpur	1.05	1.17	0.34	0.00	0.00	0.00	1.57
	Subhang	1.00	0.70	0.48	0.00	0.00	3.46	0.64
	Bharapa	1.19	0.43	0.47	0.00	0.00	0.00	0.54
	Phidim	0.91	0.00	0.38	0.00	0.00	0.00	0.40
	Chokmagu	0.76	0.66	0.00	0.00	0.00	4.65	0.26

District	VDC	Productivity of Crops in Bari (MT/Ha)						
		Maize	Millet	Legume	Mustard	Fapar	Potato	Others
	Siwa	0.92	1.13	2.52	0.37	0.00	8.29	0.98
	Imbung	0.82	0.86	1.24	0.54	0.00	4.01	0.47
	Nawamidada	0.86	0.62	0.47	0.68	0.00	7.38	0.00
	Pauwasartap	1.25	1.27	1.19	0.10	0.00	7.55	5.03
	Chilindin	0.83	0.68	6.06	0.54	0.00	3.24	1.26
	Average Panchthar	**0.94**	**0.89**	**1.26**	**0.53**	**0.00**	**0.00**	**0.77**
Ilam	Phakphok	1.09	0.88	27.68	0.21	0.73	4.33	0.51
	Chamaita	0.77	0.95	9.55	0.45	0.00	10.08	0.41
	Ekatapa	0.78	1.01	6.91	0.92	0.00	17.30	0.00
	Mangalbare	0.75	0.85	3.71	0.76	0.00	6.57	0.00
	Sangrumba	0.87	0.64	0.00	0.52	0.00	19.66	0.00
	Siddhithumka	0.86	1.36	5.66	0.73	0.00	9.14	0.00
	Soyak	0.84	0.73	0.00	0.58	0.00	4.09	0.00
	Godak	0.90	0.53	2.08	0.00	0.00	0.00	6.29
	Chisapani	0.93	0.61	1.97	0.00	0.00	0.00	0.00
	Danabari	0.88	0.76	15.10	0.00	0.00	3.67	0.00
	Mahamai	1.10	1.22	2.57	0.79	0.00	33.82	0.00
	Bajho	0.91	0.85	0.00	0.20	0.00	5.50	125.82
	Chulachuli	1.12	2.36	3.10	0.75	3.60	35.00	6.00
	Average Ilam	**0.89**	**1.01**	**5.96**	**0.61**	**1.69**	**13.98**	**38.69**
Average KCTLP		**0.94**	**0.97**	**2.65**	**0.58**	**1.42**	**11.03**	**6.58**

Source: Field Survey 2010

In the Khetland, the principle crops grown are paddy, wheat, and Maize. Potato, legume, mustards are the other crops also grown in the Ketland. The average production of the various crops in Khetland is presented in ***Table 5.3.60***.

Table 6.3.60: Average Production of Various Crops in the Khetland - KCTLP based on HH Survey

District	VDC	Average Productivity of Crops in Khet (MT/Ha)						
		Paddy	Wheat	Maize	Potato	Legume	Mustard	Others
Terathum	Chhatedhunga	1.582	0.0000	0.8806	2.7524	0.0983	0.2556	0.0393
Panchthar	Amarpur	1.7226	0.0000	2.0005	0.7864	0.5505	0.0000	1.2425
	Subhang	1.5997	0.0000	1.2451	4.7512	0.0000	0.0000	0.0000
	Bharapa	2.0786	3.2767	0.0000	4.5873	0.0000	0.0000	0.0000
	Phidim	2.3987	0.0000	0.0000	2.6279	0.1573	0.1258	0.0000
	Chokmagu	1.1194	0.0000	0.6127	1.2779	3.6699	0.1966	2.0971
	Siwa	1.765	1.2075	0.6831	4.5218	2.0621	1.2386	1.2484
	Imbung	1.6646	0.5013	0.0000	0.0000	1.5728	0.0000	0.0000
	Pauwasartap	1.5345	1.6584	0.0000	3.9320	1.2582	0.9191	0.0000
	Chilindin	1.9311	0.6362	0.0000	4.4668	0.9437	0.0000	0.0000
Ilam	Phakphok	0.9601	1.0354	0.0000	31.4560	0.0000	0.0000	0.0000
	Chamaita	0.8388	0.6226	0.0000	0.0000	0.0000	0.0000	0.0000
	Ekatapa	1.9348	0.5698	0.0000	0.0000	7.8640	0.0000	0.0000
	Mangalbare	1.0478	0.9207	0.9899	7.4708	5.0330	0.8985	0.0000
	Siddhithumka	1.6759	0.9338	0.9343	12.9319	0.8629	0.0000	12.5824
	Soyak	1.9476	1.3710	1.1705	7.1300	9.3031	0.4587	0.0000
	Godak	1.6315	0.0000	1.4696	3.5388	5.6621	0.0000	2.9883
	Chisapani	2.0261	1.1796	0.9660	2.0971	16.7765	0.0000	0.0000
	Danabari	1.4844	0.0000	1.5109	0.0000	8.6504	0.0000	0.0000
	Mahamai	2.7346	0.0000	1.8400	7.5494	3.8927	0.0000	0.0000
	Bajho	1.9339	0.0000	0.8715	2.0971	0.6291	0.0000	0.0000
	Chulachuli	2.1625	0.0000	1.9149	71.4320	6.3495	0.1966	3.3600
Jhapa	Lakhanpur	1.6048	0.0000	1.0993	61.8874	7.2000	2.2743	0.0000

Average	1.765	1.0237	1.1908	15.3298	5.1543	0.8944	2.9457

Source: Field Survey 2010

Apart from the traditional crops, the project area people also cultivate varieties of cash crops. The principle cash crop of the area is tea, ginger, cardamom, amriso, akabare. The average production of the cash crop along KCTLP is presented in ***Table 6.3.61***.

Table 6.3.61: Average Production of cash Crops along KCTLP based on HH Survey

District	VDC	Average Productivity of the Cash Crops (MT/Ha)					
		Tea	**Ginger**	**Cardamom**	**Amriso**	**Akabare**	**Others**
Terathum	Chhatedhunga	0.7864	0.0000	0.3146	0.0000	0.0000	0.0000
	Subhang	0.0000	0.0000	0.0000	0.0000	0.0000	0.3932
Panchthar	Chokmagu	0.5898	8.7290	0.3932	0.0000	0.0000	0.0000
	Siwa	0.0492	4.7184	0.0000	0.0000	0.0000	0.0000
	Imbung	0.4194	7.8640	0.7307	1.3060	0.0000	0.0000
	Nawamidada	0.1180	4.9150	3.9320	0.8238	0.0000	0.0000
	Pauwasartap	0.1966	0.0000	0.1815	1.1578	0.0000	0.0000
	Chilindin	1.9660	0.0000	0.6291	0.6722	0.0000	0.0000
	Phakphok	0.6488	0.0000	3.1063	1.7126	0.0000	0.0000
	Chamaita	0.0000	10.0266	0.7427	1.0730	0.0000	0.0000
Ilam	Ekatapa	0.3932	20.1843	0.4981	1.2713	0.0000	0.0000
	Mangalbare	0.4374	10.7147	0.4915	1.3060	0.0000	0.0000
	Sangrumba	0.1966	35.5565	1.9660	2.1626	0.0000	0.0000
	Siddhithumka	0.5673	8.8880	0.5898	1.6131	0.0000	0.0000
	Soyak	0.0000	18.0348	0.3932	2.3711	0.0000	0.0000
	Godak	0.0000	8.6504	0.0000	3.1784	5.6621	0.0000
	Chisapani	1.3107	23.5920	0.0000	2.6213	0.0000	0.0000
	Danabari	0.0000	17.2877	0.0000	1.2639	0.0000	0.0000
	Mahamai	0.0000	185.5904	0.0000	1.9660	0.0000	0.0000
	Bajho	0.0000	142.6005	0.0000	0.7864	0.0000	0.0000
	Chulachuli	0.0000	240.0000	0.0000	0.0000	0.0000	0.0000
Average		**0.5833**	**32.6815**	**1.0994**	**1.6243**	**5.6621**	**0.3932**

Source: Field Survey 2010

Despite of good yield, about 80 percent of households have reported food deficiency from their own production. The number of households facing food deficiency is reported highest among Dalit and others (***Table 6.3.62***).

Table 6.3.62: Food Sufficiency Status in Households Level

Caste of the HH	Food sufficiency				Total	
	Yes		No			
	Number	**%**	**Number**	**%**	**Number**	**%**
Limbu	14	24.56	43	75.44	57	**27.80**
Brahmin	10	26.32	28	73.68	38	**18.54**
Tamang	4	16.00	21	84.00	25	**12.20**
Rai	7	29.17	17	70.83	24	**11.71**
Dalit	0	0.00	19	100.00	19	**9.27**
Chhetri	2	13.33	13	86.67	15	**7.32**
Magar	2	16.67	10	83.33	12	**5.85**
Gurung	0	0.00	5	100.00	5	**2.44**
Newar	2	40.00	3	60.00	5	**2.44**
Others	0	0.00	5	100.00	5	**2.44**
Total	**41**	20.00	**164**	80.00	**205**	**100.00**
Janajati	**29**	**22.66**	**99**	**77.34**	**128**	**62.44**
Dalit	**0**	**0.00**	**19**	**100.00**	**19**	**9.27**

High Castes	**12**	**22.64**	**41**	**77.36**	**53**	**25.85**
Others	**0**	**0.00**	**5**	**100.00**	**5**	**2.44**

Source: Field Survey 2010

Among those who have reported food deficiency from their own production, 39.63 percent reported food sufficiency only for 3 months, while 37.80 reported sufficiency for 6 months and 16.46 percent food sufficiency for 9 months (***Table 6.3.63***).

Table 6.3.63: Food Sufficiency Status among Food Deficient Households

HH	Duration of food sufficiency %				Total HH
	Upto three months	Three to six months	Six to nine months	Nine to eleven months	
Limbu	34.88	46.51	18.60	0.00	**43**
Brahmin	28.57	46.43	21.43	3.57	**28**
Tamang	42.86	23.81	14.29	19.05	**21**
Dalit	57.89	21.05	15.79	5.26	**19**
Rai	35.29	52.94	5.88	5.88	**17**
Chhetri	38.46	30.77	23.08	7.69	**13**
Magar	50.00	30.00	10.00	10.00	**10**
Gurung	100.00	0.00	0.00	0.00	**5**
Newar	33.33	0.00	33.33	33.33	**3**
Others	0.00	80.00	20.00	0.00	**5**
Total	39.63	37.80	16.46	6.10	**164**
Janajati	**41.41**	**37.37**	**14.14**	**7.07**	**99**
Dalit	**57.89**	**21.05**	**15.79**	**5.26**	**19**
High Castes	**31.71**	**41.46**	**21.95**	**4.88**	**41**
Others	**0.00**	**80.00**	**20.00**	**0.00**	**5**

Source: Field Survey 2010

To meet the food deficiency, the households are adopting more than one strategy. Wage labour income (29.88%), foreign employment (23.17%), business (15.85%), Jobs and services (7.98%), sales of cash crops (14.63%), borrowing of money (3.66%), and livestock rearing (1.22) are the main strategy adopted by majority of the PAF households (***Table 6.3.64***). Daily wages and foreign employment and sale of cash crop are the primary strategies for all the groupsincluding Adivashi janjati and Dalit groups.

Table 6.3.64: Copping Strategies against Food Deficit (Multiple Response)

HH	Coping Strategy %								Total HH
	Loan	Daily Wages	Business	Livestock Sale	Jobs and Services	Foreign Employment	Sale of cash crops	Others	
Limbu	4.65	41.86	16.28	4.65	2.33	16.28	9.30	4.65	**43**
Brahmin	0.00	21.43	21.43	0.00	17.86	14.29	17.86	7.14	**28**
Tamang	0.00	19.05	19.05	0.00	4.76	33.33	23.81	0.00	**21**
Dalit	5.26	31.58	5.26	0.00	15.79	36.84	5.26	0.00	**19**
Rai	5.88	41.18	17.65	0.00	5.88	5.88	23.53	0.00	**17**
Chhetri	7.69	23.08	15.38	0.00	0.00	15.38	23.08	15.38	**13**
Magar	0.00	10.00	20.00	0.00	10.00	50.00	10.00	0.00	**10**
Gurung	0.00	20.00	0.00	0.00	0.00	60.00	20.00	0.00	**5**
Newar	0.00	33.33	33.33	0.00	33.33	0.00	0.00	0.00	**3**
Others	20.00	40.00	0.00	0.00	0.00	40.00	0.00	0.00	**5**
Total	3.66	29.88	15.85	1.22	7.93	23.17	14.63	3.66	**164**
Janajati	**3.03**	**32.32**	**17.17**	**2.02**	**5.05**	**23.23**	**15.15**	**2.02**	**99**
Dalit	**5.26**	**31.58**	**5.26**	**0.00**	**15.79**	**36.84**	**5.26**	**0.00**	**19**

HH	Coping Strategy %								Total HH
	Loan	Daily Wages	Business	Livestock Sale	Jobs and Services	Foreign Employment	Sale of cash crops	Others	
High Castes	**2.44**	**21.95**	**19.51**	**0.00**	**12.20**	**14.64**	**19.52**	**9.75**	**41**
Others	**20.00**	**40.00**	**0.00**	**0.00**	**0.00**	**40.00**	**0.00**	**0.00**	**5**

Source: Field Survey 2010

d.Livestock

Above 95 percent of the households are rearing at least one type of livestock (***Table 6.3.65***).

Table 6.3.65: Households Rearing Different Kinds of Livestock

HH	Livestock Ownership				Total	
	Yes		No			
	No.	%	No.	%	No.	%
Limbu	55	96.49	2	3.51	57	27.80
Brahmin	37	97.37	1	2.63	38	18.54
Tamang	24	96.00	1	4.00	25	12.20
Rai	23	95.83	1	4.17	24	11.71
Dalit	18	94.74	1	5.26	19	9.27
Chhetri	15	100.00	0	0.00	15	7.32
Magar	10	83.33	2	16.67	12	5.85
Gurung	5	100.00	0	0.00	5	2.44
Newar	4	80.00	1	20.00	5	2.44
Others	5	100.00	0	0.00	5	2.44
Total	**196**	95.61	**9**	4.39	**205**	**100.00**
Janajati	**121**	**94.53**	**7**	**5.47**	**128**	**62.44**
Dalit	**18**	**94.74**	**1**	**5.26**	**19**	**9.27**
High Castes	**52**	**98.11**	**1**	**1.89**	**53**	**25.85**
Others	**5**	**100.00**	**0**	**0.00**	**5**	**2.44**

Source: Field Survey 2010

The average livestock size is 2.74 for cattle, 0.85 for buffalo, 3.42 for goat/sheep, 5.42 for poultry, 0.94 for pigs and 0.04 for other types of livestocks (***Table 6.3.66***). The total animal holding size is estimated to be largest among the Gurung, Magar and Limbu.

Table 6.3.66: Average Number of Livestock Holding

HH	Livestock									
	Cow	Ox	Calves	She Buffalo	He Buffalo	Baby Buffaloes	Goats	Birds	Pig	Others
Limbu	0.74	1.32	0.67	0.23	0.00	0.23	3.04	6.42	1.56	0.09
Brahmin	1.08	0.97	0.87	0.76	0.08	0.61	3.66	1.55	0.00	0.00
Tamang	0.84	0.88	0.76	0.60	0.08	0.44	3.80	3.96	0.84	0.04
Rai	0.96	0.83	0.79	0.29	0.17	0.13	2.00	7.46	1.33	0.00
Dalit	0.53	0.63	0.58	0.16	0.05	0.11	3.05	3.95	1.42	0.00
Chhetri	1.33	1.33	1.20	0.67	0.07	0.53	6.20	6.60	0.00	0.07
Magar	1.25	1.67	1.08	0.17	0.00	0.17	4.08	8.00	1.33	0.00
Gurung	0.80	1.20	0.60	1.20	0.40	0.60	5.00	17.60	0.20	0.00
Newar	0.40	0.40	0.40	0.40	0.40	0.40	2.20	5.20	0.00	0.20
Others	1.40	1.20	0.20	0.40	0.20	0.60	2.00	5.00	1.20	0.00
Overall Average	**0.90**	**1.07**	**0.77**	**0.43**	**0.08**	**0.34**	**3.42**	**5.42**	**0.94**	**0.04**

Source: Field Survey 2010

e. Household Income

The households are generating income from more than one source (***Table 6.3.67***). However, a large majority of the households are deriving income from remittance (23.97%) followed by loan (24.94%), Livestock (10.36%), Business & industry (10.21%), agriculture (9.64%), cash crop (6.77%), and other incomes. Among ethnic groups, Brahmins draw less income from remittance (18.9%) but have income from business (32.22%). None of the ethnic /caste are totally dependent upon the farm based income. The farm based income is less than 40% of the total income, minimum farm based income is seen among Dalit, Newar and other groups. Newar income is substantial from business, while most of the ethnic group depends upon loan. Long term sustainability of the livelihood, if one considers the loan amount taken by the ethnic caste group is questionable as most of the people are still relying on the agriculture which is not even subsistent.

Table 6.3.67: Households Reporting Various Sources of Income

Income Heading	Brahmin	Chhetri	Dalit	Gurung	Limbu	Magar	Newar	Rai	Tamang	Others	Average
Cereals and Legumes	12.91	9.34	6.46	5.10	14.42	11.36	3.58	10.13	10.48	12.65	9.64
Livestock and Milk	13.35	15.80	8.96	13.72	10.39	10.16	3.45	11.43	14.34	1.94	10.36
Fruits and Vegetables	4.59	4.64	1.84	2.88	4.96	4.54	0.83	4.98	4.78	2.44	3.65
Business and Industry	6.15	10.12	6.19	0.00	13.09	4.55	35.53	13.62	12.85	0.00	10.21
Daily Wages	4.82	2.12	12.42	4.87	10.46	5.18	1.57	6.57	3.21	2.15	5.34
Salary and Pension	14.38	4.12	7.36	6.50	10.02	5.90	3.57	6.95	4.46	0.00	6.33
Foreign Currency	18.99	9.78	24.42	50.03	8.14	29.59	0.00	10.43	15.38	72.91	23.97
Rent, Interest and Asset Sale	0.59	2.34	0.00	0.00	1.43	7.64	0.00	0.10	0.00	0.00	1.21
Loan	19.17	31.41	30.15	9.64	17.20	13.72	48.20	22.90	20.10	6.93	21.94
Cash Crops and Herbs	4.65	9.05	2.20	7.26	9.23	7.36	0.65	12.89	14.39	0.00	6.77
Others	0.41	1.29	0.00	0.00	0.64	0.00	2.61	0.00	0.00	0.97	0.59
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	100.00
Farm based	**35.5**	**38.82**	**19.46**	**28.96**	**39**	**33.42**	**8.52**	**39.43**	**43.99**	**17.04**	**30.41**
Off Farm	**64.5**	**61.18**	**80.54**	**71.04**	**60.98**	**66.58**	**91.48**	**60.57**	**56.01**	**82.96**	**69.59**

Source: Field Survey 2010

The average annual household income of the household is estimated to be Rs 3,07,006. The highest annual income is derived by Newars while Dalits has the lowest income (***Table 6.3.68***). The Newar has a considerable income from trade and business compared to the other ethnic/caste groups.

Table 6.3.68: Average Cash Annual Household Income by Source

Income Heading	Brahmin	Chhetri	Dalit	Gurung	Limbu	Magar	Newar	Rai	Tamang	Others	Average Income
Cereals and Legumes	34779	29056	13038	18838	30014	27245	27428	21846	22558	34655	**25946**
Livestock and Milk	35968	49145	18079	50686	21619	24379	26400	24665	30881	5320	**28714**
Fruits and Vegetables	12354	14429	3715	10620	10327	10881	6380	10738	10290	6693	**9643**
Business and Industry	16579	31467	12495	0	27239	10917	272000	29392	27664	0	**42775**
Daily Wages	12974	6600	25053	18000	21772	12417	12000	14167	6920	5900	**13580**
Salary and Pension	38747	12800	14842	24000	20860	14167	27312	15000	9600	0	**17733**
Foreign Currency	51158	30400	49263	184800	16947	71000	0	22500	33120	199800	**65899**
Rent, Interest and Asset Sale	1579	7267	0	0	2982	18333	0	208	0	0	**3037**
Loan	51632	97667	60842	35600	35793	32917	369000	49396	43280	19000	**79513**
Cash Crops and Herbs	12513	28139	4442	26820	19198	17667	5000	27818	30990	0	**17259**
Others	1097	4000	0	0	1330	0	20000	0	0	2650	**2908**
Total	**269380**	**310970**	**201769**	**369364**	**208081**	**239922**	**765520**	**215730**	**215303**	**274018**	**307006**
Farm based	**95614**	**120769**	**39274**	**106964**	**81158**	**80172**	**65208**	**85067**	**94719**	**46668**	**815613**
Off Farm	**173766**	**190201**	**162495**	**262400**	**126923**	**159751**	**700312**	**130663**	**120584**	**227350**	**2254445**

Source: Field Survey 2010

The household income analysed from the perspective of Adivashi janjati, Dalit, and High caste group reveals no difference among the different groups (***Table 6.3.69***). The farm income of Dalit and other groups is very small compared to the janjati and high caste groups. Though, the people of the project affected areas are considered as farmer occupationally, farming as occupation contributes less than 40% of their annual household income.

Table 6.3.69: Percentage of Average Annual Household Income by Source by Ethnic Category

Income Heading	Adivashi Janjati	Dalit	High Caste	Other
Cereals and Legumes	9.18	6.46	11.125	12.65
Livestock and Milk	10.58	8.96	14.575	1.94
Fruits and Vegetables	3.83	1.84	4.615	2.44
Business and Industry	13.27	6.19	8.135	0
Daily Wages	5.31	12.42	3.47	2.15
Salary and Pension	6.23	7.36	9.25	0
Foreign Currency	18.93	24.42	14.385	72.91
Rent, Interest and Asset Sale	1.53	0	1.465	0
Loan	21.96	30.15	25.29	6.93
Cash Crops and Herbs	8.63	2.2	6.85	0
Others	0.54	0	0.85	0.97
Total	**100.00**	**100**	**100**	**100**
Farm	**32.75**	**19.46**	**37.17**	**17.03**
Off Farm	**66.25**	**80.54**	**61.38**	**82.96**

The average annual expenditure is estimated to be Rs. 2,50,428, major portion of which is spend in purchasing food items (36.11%) followed by investment (21.41%), and health and education (14.96%), (***Table 6.3.70***).

Table 6.3.70: Average Annual Household Expenditure

Expense Heading	Brahmin	Chhetri	Dalit	Gurung	Limbu	Magar	Newar	Rai	Tamang	Others	Average	Percentage
Food Stuffs	39090	43131	32630	40087	39274	35163	35022	34245	38171	33165	36998	17.38
Fruits and Vegetables	12133	11029	7705	8480	11168	10006	20726	10662	9714	5800	10742	4.69
Meat and Eggs	7924	10093	9006	9920	10585	8858	13440	8168	9400	10800	9819	4.48
Oil and Spices	12262	10642	8214	11316	9414	9515	10700	8627	11035	7200	9892	4.60
Milk, Sugar and Tea	18715	13033	7930	11802	8097	8243	15920	6421	10823	11000	11198	4.96
Tobacco and Alcohol	2276	1573	3128	5840	4870	1907	1400	3913	3556	4143	3261	1.63
Clothing	12724	12667	8105	11000	10386	12333	16400	11146	11760	8800	11532	5.23
Fuel	3050	2759	2214	3936	2308	3130	7536	1953	2386	1872	3114	1.29
Agricultural Inputs	9639	15347	3276	9876	8305	7508	7600	7296	7424	4250	8052	3.65
Health and Education	31018	31720	17582	69000	27551	37550	121040	21417	10492	22720	39009	14.96
Tax and Transportation	4860	8925	2947	5658	3413	4613	13499	4334	3152	2443	5384	2.15
Festival and Religious work	17187	10401	8552	7018	9520	6555	16819	8367	9040	8203	10166	4.49
Loan and Interest	18487	26067	20080	16840	12406	14600	45920	9401	11552	27360	20271	8.35
Investment	27500	85667	42105	10000	20614	16667	359000	36042	35680	60000	69327	21.41
Others	1728	1667	1221	2200	1467	1417	2600	1563	1544	1200	1661	0.74
Total	**218592**	**284721**	**174695**	**222973**	**179377**	**178065**	**687621**	**173552**	**175729**	**208956**	250428	100

Source: Field Survey 2010

6.3.3.4 Perception on the Project Development

Nearly 99 percent households of the project vicinity when asked about their reaction towards the development of KCTLP along the defined corridor proposed by NEA, showed positive reaction in the

support of the project development (***Table 6.3.71***). Of the total household only 2 households were not in favor of the project development.

Table 6.3.71: People's Perception of the Project

HH	Yes		No		Total
	No.	%	No.	%	No.
Limbu	57	100.00	0	0.00	57
Brahmin	37	97.37	1	2.63	38
Tamang	25	100.00	0	0.00	25
Rai	24	100.00	0	0.00	24
Dalit	18	94.74	1	5.26	19
Chhetri	15	100.00	0	0.00	15
Magar	12	100.00	0	0.00	12
Gurung	5	100.00	0	0.00	5
Newar	5	100.00	0	0.00	5
Majhi	4	100.00	0	0.00	4
Rajbansi	1	100.00	0	0.00	1
Total	203	99.02	2	0.98	205
Janajati	128	100.00	0	0.00	128
Dalit	18	94.74	1	5.26	19
High Castes	52	98.11	1	1.89	53
Others	5	100.00	0	0.00	5

Source: Field Survey 2010

6.3.3.5 Preferred Mode of Compensation to the ROW Land and Property

Nearly 60% households of the project vicinity desired for the full cash compensation to the ROW land and property. About 12 percent households demanded for the land to land compensation while about 16% of the households did not object for the partial compensation to the land in ROW if the landownership certificates remains under their name. Another 11 percent desired to have bilateral negotiation for the mode of land compensation on the ROW at the time of land acquisition or restriction by NEA (***Table 6.3.72***).

Table 6.3.72: Preferred Compensation Modality to the ROW Land and Property

HH	Cash	% HH	Property against Property	% HH	Partial Compensation of Property	% HH	Others	% HH	Total
Limbu	37	64.91	5	8.77	7	12.28	8	14.04	57
Brahmin	18	47.37	8	21.05	10	26.32	2	5.26	38
Tamang	14	56.00	3	12.00	3	12.00	5	20.00	25
Rai	18	75.00	2	8.33	3	12.50	1	4.17	24
Dalit	8	42.11	2	10.53	4	21.05	5	26.32	19
Chhetri	9	60.00	3	20.00	2	13.33	1	6.67	15
Magar	9	75.00	1	8.33	1	8.33	1	8.33	12
Gurung	3	60.00	1	20.00	1	20.00	0	0.00	5
Newar	4	80.00	0	0.00	1	20.00	0	0.00	5
Others	3	60.00	0	0.00	2	40.00	0	0.00	5
Total	**123**	**60.00**	**25**	**12.20**	**34**	**16.59**	**23**	**11.22**	**205**
Janajati	**85**	**66.41**	**12**	**9.38**	**16**	**12.50**	**15**	**11.72**	**128**
Dalit	**8**	**42.11**	**2**	**10.53**	**4**	**21.05**	**5**	**26.32**	**19**
High Castes	**27**	**50.94**	**11**	**20.75**	**12**	**22.64**	**3**	**5.66**	**53**
Others	**3**	**60.00**	**0**	**0.00**	**2**	**40.00**	**0**	**0.00**	**5**

Source: Field Survey 2010

6.3.3.6 Expectation from the Project

The people of project vicinity expect electrification in the VDCs of the corridor area with the development of project. Apart from the electrification, they expected employment opportunities in the project development and operation periods.

6.3.4 Cultural Environment

6.3.4.1 Historical and Archeological Sites

The KCTLP right of the way does not pass through the temples, local shrines, and places of other historical and archeological significance, though the project affected VDCs have a number of temples, and shrines of local significance.

6.3.4.2 Culture

The project districts and VDCs represent an assemblage/conglomeration of culturally diverse society. Hindu, Kirat and Buddhist culture are the dominant culture of the area.

An important principle in the Hindu thought is the law of Karma. It is the law of cause and effect in which each and every action has a reaction, generating conditions to be experienced within this lifetime or the next. Life is looked upon as a continuum in the sense that the pristine life energy is never destroyed. Death is accepted not as a denial of life but as a process of life. As a result, the Hindu view accepts and believes in re-incarnation or the cycle of life-death-rebirth until such time as the individual soul, on self realization of its own essential divinity, emerges into the Absolute. A Hindu accepts on scriptural authority that self realization is possible and attainable within one's own life time and indeed it is the goal and eventual destiny of all life. A Hindu is enjoined to seek personal purification on the path to self realization through one of four or any combination of the four paths which are:

- Ritualistic worship, chanting of prayers, devotional surrender to a higher ideal (the Deity representing the qualities).
- Through service.
- Through yoga and meditation.
- Through inquiry (know thyself).

Of the above four paths, most of the Hindus of the project district and VDCs follow the ritualistic worship, chanting of prayers, devotional surrender to a higher ideal. Hindu festivals such as Dashain, Tihar, Shiva Ratri, Ram Navami and Krishna Asthami are observed and respected by all Hindus of the project districts. Besides, Maghesankranti, Ekadashi, Purnima, Aunsi, Eclipses, are other important festival celebrated by the local people. In these occasions, a numbers of devotees and other people gather in the temples and river banks for worships and holy baths.

The Kirat culture and religion is a blend of animism [(e.g.ancestor worship (Sumnima/Paruhang)], Saivite Hinduism, and Buddhism. Kirats practice shamanism and their rituals are mostly related to the worship of Mother Nature and ancestors. Almost all sacred rituals are performed by nakchong, the kirat priest. Their supreme deity Tagera Nyingmaphuma is personified as Lord Shiva. Many followers wear a tilak on the forehead, as in Hinduism, when they recite their sacred text, the Kiranti Veda. Sakela is the main festival of Kirat which is celebrated twice a year distinguished by two names Ubhauli and Udhauli. Sakela Ubhauli is celebrated during Baisakh Purnima (full moon day, which lies in the month of Baisakh in calenders of the Indian Subcontinent.) and Sakela Udhauli is celebrated during the full moon day in the month of Mangshir. Sakela celebration is the prayer to Goddess of Nature for good crops and protection from natural calamities. The celebration of Sakela is also known as Chandi Nach. On Chandi Nach, they worship Durga, who is known to them as Chandi, or Chandika. Durga Puja is performed by them. Tihar is another festival also known as Deepavali and Lakshmi Puja.

The following are the key Buddhist beliefs:

- All Buddhists believe in reincarnation. This belief shapes their attitude to life and death, making them more at ease with a premature or unexpected death of a loved one and more accepting of their own death when it is imminent. Carers should bear in mind that such stoicism in the face of tragedy comes from their religious beliefs and not from fear or denial.
- Buddhists also believe in the Law of Karma, which explains that one's own happiness or suffering, success or failure, health or illness, and so on, is caused by one's own actions (karma means action), bodily or verbal or mental. Karma is not fatalism, since Buddhists realise that karma is "work-in-progress" and even now they generate the causes for future prosperity or failure. Thus, in times of distress, Buddhists will seek to do good karma to alleviate any unpleasantness.
- Buddhism is not a God-centered faith. Thus Buddhists do not worship, nor surrender their fate to a divine being. However the majority of Buddhists will have statues of the Buddha, Kuan Yin (The Goddess of Mercy), Maitreya (the future Buddha) and other icons in their temples and houses, and pray in front of them for favors. Though these images are meant to be merely images of reflection, to generate inspiration, they are regularly used as a focus for aspirations, ie praying. Also, Buddhists accept the truths of science, such as evolution, the 'Big Bang', genetics and so on.
- Buddhists place an uncommon emphasis on compassion. Since Buddhism holds that one can be reborn from the animal, ghost, heaven or lower realms, and that one can also reincarnate back into those realms (as well as back to the human realm), Buddhists show extraordinary compassion to animals and even insects. Their strong focus on compassion leads Buddhists to be totally accepting of the gay and lesbian community and their lifestyle. In practice, compassion takes the form of not doing anything that harms another or oneself, but instead strives to bring happiness to all beings, including one. This leads on to the basic moral conduct for Buddhists, called the Five Precepts.
- Buddhists try to live by the Five Precepts of harmlessness. However, if they fail, they are still fully accepted within the Buddhist community. The Five Precepts are strongly encouraged. They are: Refraining from intentionally killing any living being; Refraining from any form of stealing; Refraining from sexual misconduct, in particular from committing adultery; Refraining from any form of lying; and Refraining from taking alcohol and non-medicinal drugs.

As of the date all these cultures and religions are observed in greatest harmony and respect by the people of the project districts and VDCs.

6.3.4.3 Traditions

The project area is traditionally known as Pallo Kirant (Regmi, 1974). The Limbus of Pallo Kirant, after the conquest of the area by Prithibi Narayan Shah in late 18th century did not submit totally to the shah rulers. Prior to the conquest of the area by Shah rulers, the people of the area were under the rule of Sen Dynasty of Makawanpur, but use to pay the tax to Sen rulers and rulers of Tibet and Sikkim reflecting their unwillingness to submit with any the rulers of the area.. To bring the people of the Pallo Kirat under crown control the people of the region were granted kipat by the then Shah rulers similar to that of Sen Rulers, whereby, the people of the area were to pay tax based on the household whereas the land was managed by the heads of the communities (belonging to Limbu and Rai ethnic groups) under the Kipat system. In other words, only people were ruled by the crown but the land and natural resources of the area were ruled by the community heads. The division of the land among the community members (only Limbu and Rai ethnic/caste group) and overall management of the other natural resources including forest and grasslands and rivers were rested upon the community heads within the kipat land. The community heads have been called differently in different area such as Talukdar, Subba, Mukhiya etc. The Shah rulers have not kept any records of such kipat lands and maps indicating their boundary demarcations. Studies of the Pallo Kirat area reveals existence of other land category (raikar) in conjunction with the kipat land in the region. Such raikar lands were under the holdings of ethnic/caste groups other than Limbu and Rai. The raikar land is a category of land which was directly under the control of crown and tax of the land is based on the annual production of the land which used to vary annually.

The kipat land tenure system existed till 1968 legaly. With the promulgation of Land Reform Act, the sytem was abolished, however, in practice the kipat system over the agricultural land existed till

1993/94 when the cadastral survey of the area was accomplished and all the kipat lands are brought under raikar land. This conversion of land from Kipat to Raikar ended the rule on the kipat land by the community leaders. In the recent years, the Limbu and Rai ethnic/caste groups have raised this issue of traditional kipat land tenure system and are claiming their traditional right on the land areas of the region including the natural resources.

Chapter 7: ENVIRONMENTAL IMPACTS

The environmental issues identified during the TOR stage of IEE were studied in detail to unraveal the potential impacts of the KCTLP. This section breifly describes the findings of the study investigations pertaining to the environmental impacts in the various aspects of social and natural environments. The environmental impacts were evaluated in terms of the nature of the impacts such as direct/indirect; the extent of the impacts such as site specific, local or regional; and the duration of the impacts such as short term, medium term and long term. Based on the above indicators, the magnitude of the environmental impacts have been evaluated for without mitigation scenario using analogue and Delphi techniques as low, moderate, and high without assigning numerical value to the predicted impact. The adverse and beneficial impacts of the project not identified in this study if identified during the project implementation and operation are covered separately as responsibility of the proponent in chapter 10 section 10.5 and will not be discussed hereunder.

7.1 Beneficial Impacts

7.1.1. Construction Phase

A range of beneficial impacts envisaged during the TOR stage of IEE are found to be the actual beneficial impacts on the social and natural environmental aspects of the KCTLP during the project construction phase, which are briefly described in the sections below:

7.1.1.1 Physical Environment

I. Enhancement of Slope Stability

The KCTLP tower foundation sites require special attention for slope stability. Stable slopes in and around the sub-station is a pre-requisite for sustainable sub-station operation. The KCTLP during construction will take special care of these sites for slope stability. This will be an advantage to the slope protection of some of the specific areas of the KCTLP corridor.

II. Erosion Protection

The KCTLP corridor, particularly the tower foundation sites and sub-station sites require erosion protection works for sustainable operation of the transmission line. The construction works of KCTLP will have to take special management efforts for erosion control of the KCTLP right of the way and the surrounding of the sub-station sites. This will be an added benefit for the erosion control effort of the area, though it is mostly confined to the KCTLP corridor only.

7.1.1.2 Biological Environment

I. Creation of Forest Fire Line Zone

The trees within the KCTLP right of the way is required to be felled and cleared for the protection of the cable and sustainable operation of the transmission line. Such clearing of the standing trees underneath the cables on the right of the way in the forest areas will provide a zone of no trees. In the well managed forest, such zone of no trees are maintained for the protection of the forest to control wide spread forest fires. The transmission line right of way in the forested areas will function as the forest fire lines of the well managed forest and is envisaged to act as fire breaker line to control the accidental forest fires occuring in the KCTLP forested areas.

II. Creation of Ecological Niche Zone

The cleared right of the way of the transmission line corridor in the forest areas provide enough light and space for the new plant species which otherwise could not come up in the matured forest areas. Such stripes of the cleared areas within the mautured forest are the sites of rich plant diversity. Apart from this, such open areas are also the sites of feeding for a range of wildlife species as the site provide open areas to safegurad theselves from the common predators. In the above aspects, the clearance of trees increases the ecological dimention for various plants and wildlife species.

7.1.1.3 Socio-economic and Cultural Environment

I. Increase in the Economic Activity within the Project Sites

The KCTLP construction activities will continue for nearly four years. Though the construction activities is potential to increase economic activities throughout the corridor. The camp sites for material storage, and workforce will be the areas of the economic activities, particularly for the supply of consumer goods, locally grown vegetable items and the hotel and restaurent/tea stall businesses. This will be an added beefit to the local people of the KCTLP corridor during construction phase.

II. Employment Opportunities to the Local Area People

The KCTLP construction activities will require a substantial number of skilled, semi-skilled and unskilled workforce during tower foundation works, cable stringing works and irrection of sub-stations. Except for the skilled workforce, other workforce will be employed from the local area. The socio-economic survey has indicated a large number of unemployed workforce in the area and number of such people migrate seasonally outside in search of jobs. These people will get opportunities to work for the project. This will be the direct benefit to the local area people along KCTLP corridor.

III. Development of New Skills on the TL and Sub-station Construction

The people employed at project will have on the job training on the new skills and techniques of TL and sub-station construction which could be a added advantage to the employment in the similar projects in the other areas in future. Apart from the above, the project envisages to provide specific skill enhancement programs to the local area people as a livilihood skills during the construction period.

7.1.2. Operation Phase

7.1.1.1 Physical Environment

I. Enhancement of Slope Sstability

The KCTLP tower foundation sites require special attention for slope stability. Stable slopes in and around the sub-station is a pre-requisite for sustainable sub-station operation. The KCTLP during operation will take special care of these sites for slope stability. This will be an advantage to the slope protection of some of the specific areas of the KCTLP corridor.

II. Erosion Protection

The KCTLP corridor, particularly the tower foundation sites and sub-station sites require maintainance of erosion protection works for sustainable operation of the transmission line throughout the project life. Normally such maintainance works will be carried out twice a year. For the propose, the KCTLP operation will maintain a number of maintainance staff to observe any erosion along the KCTLP right of the way and the surrounding of the sub-station sites for the safety of the KCTLP.

7.1.1.2 Biological Environment

I. Creation of Forest Fire Line Zone

The trees within the KCTLP right of the way is required to be maintained to heights not affecting the sustainable operation of the transmission line. For the purpose of maintaining the cleared ground under cable, the KCTLP will maintain a maintainance workforce throughout the life of the project. Such maintaince of the clear ground underneath the cables on the right of the way in the forest areas will provide a zone of no trees. In the well managed forest, such zone of no trees are maintained for the protection of the forest to control wide spread forest fires. The transmission line right of way in the forested areas will function as the forest fire lines of the well managed forest and is envisaged to act as fire breaker line to control the accidental forest fires occuring in the KCTLP forested areas.

II. Creation of Ecological Niche Zone

The well maintained cleared right of the way of the transmission line corridor in the forest areas provide enough light and space for the new plant species which otherwise could not come up in the matured

forest areas. Such stripes of the cleared areas within the mautured forest are the sites of rich plant diversity. Apart from this, such open areas are also the sites of feeding for a range of wildlife species as the site provide open areas to safegurad theselves from the common predators. In this context, the clearance of trees increases the ecological dimention for various plants and wildlife species.

7.1.2.3 Socio-economic and Cultural Enviornment

I. Increase in the Economic Activity within the Project Sites

The maintenance of KCTLP will continue for the life of the project. Though the maintainace activities will be limited to few weeks twice a year is potential to increase economic activities throughout the corridor though of lesser extent than that of the construction phase. This will be an added benefit to the local people of the KCTLP corridor during operation phase.

II. Employment Opportunities to the Local Area People

The KCTLP maintainance activities will require a substantial number of semi-skilled and unskilled workforce for the maintaining ROW clearance. All such workforce will be employed from the local area. As emphaisezed earlier, the area has a number of unemployed population. These people will get opportunities to work for the project. This will be the direct benefit to the local area people along KCTLP corridor.

III. Development of New Skills on the TL and Sub-station Operation

The project employed local area people will have a hands on training regarding new skills and techniques of TL and sub-station operation which could be a added advantage to the local people and community.

7.2 Adverse Impacts

7.2.1 Physical Environment

7.2.1.1 Construction Phase

I. Direct/Indirect Soil Erosion and Land Instability Impact

As the T/L corridor passes through the fragile Siwalik terrain and steep section of Mahabharat and Midlands, the land clearance activities and construction of foundations for the tower interacts with the land. This interaction is potential to enhance erosion and instability of land not only at the tower foundations but also on the ROW particularly in the forested areas. Though the activities are concentrated along ROW, have potentials of enhanced erosion, gully formation and landslides due to vegetation clearance. The tower foundations sites during design have been selected in the most stable places, large land failures are not expected. The trail opening is the other potential issue that has potentials of erosion activation leading into gully formation and landslides in the Siwaliks terrain. The envisaged magnitudes of the erosion in none mitigation scenario is low.

II. Direct/Indirect Impact on Land Use

Two types of permanent land use changes are envisaged by the project along T/L ROW. One is permanent change in the land use due to tower pad structures and substation (8.747 ha). The other is the change due to restriction in certain activities under ROW (146.310ha). The temporary land use change is due to foot trail and makes shift camps (6.98ha).

Actual permanent land use change occurs in the tower foundation sites and substation sites only. While restriction along ROW does not change land use as such in the agriculture areas but restricts the land for development of built structures and plantation of tall trees only. Expected land use change by the tower pads and substations in cultivated agriculture land is 6.685 ha and forest land (Government and Community managed and private) is 1.893 ha. Similarly, restriction on land use in cultivated agricultural land is 73.752 ha and in forest land (Government and Community managed and private) is 57.361ha. Rest of the permanent land use changes are in other land categories comprising of barren lands, grass lands, river areas etc. Thus in terms of land use, the impact of the project are of long term with moderate magnitudes only.

III. Direct/Indirect Impacts on Noise Levels

Construction works at substation and tower foundation are potential to generate noise levels higher than the background noise. Similarly, noise are also expected at the construction camp sites and storage area during loading and unloading activities. The expected noise levels are of the level of 70 to 80 dBA at the construction sites but of sporadic nature only. The envisaged impacts are direct, site specific, short duration and of low magnitude.

IV. Direct/Indirect Impact of Spoil Disposal

Limited spoil volumes are expected at sub-station and during the excavation of tower foundations. The unmanged side casting of the excavated materials might impact on the water quality and are potential to enhance erosion in the mountaneous slopes and sedimentation in the valley lands. Since the scale of excavation is limited to small site specific areas, the envisaged impacts though of direct nature are of low significance to cause widespread problems.

V. Direct/Indirect Impacts of Solid and Liquid Waste Disposal

Soild and liquid waste are potential at the construction sites and in the make shift camps. The volume of the expected waste is small, however, when disposed haphazardly could cause water quality, land quality, and ecological problems. The envisaged impacts are direct, site specific, short term and of low magnitude.

VI. Direct/Indirect Impact on Air Quality

The construction activities, and activities at the make shift camps, particularly loading and unloading of materials (Direct), cooking activities (indirect) etc have a potential of degrading ambient air quality. The nature of the activities are potential to generate fugitive dust emissions at higher level. Since the extent of the construction activities are of limited nautre, confined to small areas, the expected impact is of low magnitude.

VII. Direct/Indirect Impact on Water Quality

Disposal of construction spoils, construction solid and liquid wastes, camp solid and liquid wastes etc. on the water bodies or on the water ways have potential to impact on the water quality of the receiving water bodies. Since the amount of waste gneration estimated from the construction sites is small at any specific site, the envisaged impacts is of low magnitude.

7.2.1.2 Operation Phase

I. Direct Noise Levels Impacts

Noise from the energized overhead line is produced by a phenomenon known as "corona discharge" (a limited electrical breakdown of the air). Normally, the conductors are designed to minimize the corona. But surface irregularities caused by damage, insects, raindrops or pollution locally enhances the electrical field strength for corona discharge to occur. This can be audible in certain conditions as a cracking sound occasionally accompanied by low frequency hum. The noise generated by high voltage overhead line is weather related with higher noise levels occurring during damp conditions. Overhead lines are normally quite during dry weather. Considering the location of the alignment and its position from the noise sensitive amenities of the local area, the effects of noise from the high voltage overhead line is considered of low magnitude only.

Transformer located in the substations is potential source of low hum noises. Since the sub-station is located far away from the settlements and noise sensitive amenities, the effects though long term is considered of low magnitude to the communities.

II. Direct/Indirect Electro-magnetic fields Impacts

As elaborated above, the electric and magnetic fields (EMS) are associated with the high voltage transmission lines. The electro-magnetic field associated with the high voltage overhead line diminishes with distance from the source. The electrical fields are associated with voltage which can cause small micro-shocks in certain instances (such as touching metals placed under the ROW). Effects of the associated electro-magnetic fields could potentially disturb the conductive services such as pipe lines or telecommunication cable running close and parallel to power line. Disturbance is potential in the electric wiring of the house, television screen, computer screen, hydro-carbon dispensing pumps etc. Similarly electromagnetic compatibility (EMC) issues may occur in the radio communication and electronic equipments close to the high voltage lines. Since the transmission line alignment is mostly located away from the human settlement area, and has provisions of 18 m ROW

and sufficient line clearance across the structures, the probability of electromagnetic field effects, though long term, site specific and have low magnitude.

III. Direct/Indirect Soil Erosion and Land Instability Impacts

The maintainance of right of the way, particularly the vegetation clearance in the Siwalik sections, if involve complete clearance of the ground vegetation is potential to enhance erosion. Surface protecting cover of the vegettion is very crucial in minimising the erosion in the fragile Siwalik terrian. Invisaged impact is of moderate magnitude.

IV. Direct/Indirect Impact on Water Quality (Oil Spillage)

The substation site generates lot of spent oils used as coolent in the transfermer. Handling of oil in the substation sites is of crucial nature. Oil leakage from transformers and haphazard disposal of spent oil has potential to impart both water and land pollution. The envisaged impacts are of moderate nature.

7.2.1.3 Summary of the Physical Environmental Impacts

Table 7.1 summarises the impacts of the KCTLP on the physical environment discussed in section above.

Table 7.1: Adverse Physical Environmental Impacts, KCTLP

SN	Cultural and Physical Environmental Impact	Direct / Indirect Impact	Extent	Duration	Magnitude
A	**Construction Phase**				
A.1	▪ Direct/Indirect Soil Erosion and Land Instability Impact	D/ID	S	ST	Lo
	▪ Direct/Indirect Impact on Land use	D/ID	L	LT	M
	▪ Direct/Indirect Impacts on Noise Levels	D/ID	S	ST	Lo
	▪ Direct/Indirect Impacts of Spoil Disposal	D/ID	S	ST	Lo
	▪ Direct/Indirect Impacts of Solid and Liquid Waste Disposal	D/ID	S	ST	Lo
	▪ Direct/Indirect Impact on Air Quality	D/ID	S	ST	Lo
	▪ Direct/Indirect Impact on Water Quality	D/ID	S	ST	Lo
B	**Operation Phase**				
	▪ Direct Noise Levels Impacts	D	S	LT	Lo
	▪ Direct/Indirect Electro-magnetic fields Impacts	D/ID	S	LT	Lo
	▪ Direct/Indirect Soil erosion and land instability impacts	D/ID	S	LT	M
	▪ Direct/Indirect Impact on Water Quality (oil spillage)	D/ID	S	LT	M

Note: D= Direct; ID = Indirect, S= Site specific; L = Local, R = Regional; ST= short term, N = No impact
MT = Medium Term, LT = Long Term; Lo = Low, M = Moderate, H = High

7.2.2 Biological Environment

The biological environmental issues of the project were studied in an exhaustive manner during IEE study. The issues identified in the TOR were found to be the issues of concerns for the project construction and operation

7.2.2.1 Construction Phase

I. Direct Impacts of Fragmentation of Forest Land

The KCTLP will fragment the existing forest areas for a distance of 32.918 km. A total of 59.26ha of forest area will require clearance along the ROW. Table 7.2 presents the the land use impacted by the KCTLP including the forested areas.

Table 7.2: **Land Requirement for KCTLP including Forestland**

Land Type	Land Requirement (ha)				Project Component
	Permanent	Restriction	Temporary	Total	
Agricultural	6.685	73.752	6.98	**87.417**	Substation, tower foundation, camps and land use restriction
Government Forest	0.622	18.850	0	**19.472**	Substation, tower foundation, camps and land use restriction
Community Forest	0.761	23.040	0	**23.801**	Substation, tower foundation, camps and land use restriction
Private Forest	0.510	15.471	0	**15.981**	Substation, tower foundation, camps and land use restriction
Others	0.169	15.197	0	**15.366**	Substation, tower foundation, camps and land use restriction
Total	**8.747**	**146.310**	**6.98**	**155.057**	Substation, tower foundation, camps and land use restriction

Source: Field Survey 2010

The Permanent land acquisition and restriction on land use will impact the national forest (government managed forest), community forest and the private forest. Of the total forest area impacted, the share of the impact is 32.86%, 40.16% and 26.97% on the natinal forest, community forest and private forest respectively.

Clearnace of tall trees on the ROW for the protection and operation of the cable and pylon structures will fragment the forest into differnt compartments. The land clearance and maintenance of a vegetation zone of one and half meter high vegetation along the ROW in the forested areas, is envisaged to increase the biodiversity of the ROW area. The monoculture type of the existing forest due to restriction imposed by the high growing trees will be eliminated by felling of the high growing trees to limited height. This will provide opportunities to other floral species to colonies in the T/L ROW as there will not be competition for solar radiation, moisture and other abiotic ecological factors. Such fragmentation has two prominent impacts. First it breaks a contineous ecological unit into three compartments which at times is beneficial from vegetation biodiversity perspective; a new ecological zone is introduced providing ground for the other plant species and vegetation communities which otherwise could not compete in the dense tall plant communities of vegetation. Secondly, it reduces the ground area of the thriving ecology and plant communties with a negative implication on the thriving plant diversity.

Provided total ground clearance is acheived along the KCTLP right of way, invasive weeds may have grounds for their proliferation. Various types of Banmara may occupy such grounds hindering the growth of the other local species in these open grounds. Benifit of the total ground clearance of ROW is the creation of fire line, which could inhibit expansion of the forest fires as a fire breaker in the event of the forest fires.

II. Direct/Indirect Impacts on forest vegetation/biodiversity specifically of Protected, Rare and Endangered species

The direct impacts of the ROW clearance is the loss of 59.26 ha of forest. Table 7.3 presents the loss of different forest (national forest, community forest, and private forest) and the loss of seedling, sapling, and pole and trees above 10cm dBH per ha, crown coverage, basal area percentage and the vegetation types.

The basal area percentage of the forest shows that the forest is degraded and the field obeservtion also indicated that the forests of the KCTLP influence areas are highly interfered by the surrounding human popualtion is considerably modified from its natural state.

Table 7.3: KCTLP Impacted Different Forest Areas and Characteristics of of Impacted Forest

S.N.	Project component*	Type of forest (as per forest Act)	Forest Area (ha.)	Loss of vegetation			Crown cover (%)	Basal Area (%)	Vegetation Type (Sal, Pine, shrubs, barren etc.)
				Seedling per ha.	Saplings per ha.	No. of trees >10 cm DBH/ha			
	Transmission Line and Tower	Government managed	19.48	342	130	250	24	0.19	Mixed *Shorea*, Mixed Broadleaved, *Shorea – Schima*, *Shorea*, Teak Plantation, *Eucalyptus* Plantation, Barren
		Community	23.80	205	78	150	27	0.22	Mixed Broadleaved, Mixed *Adina*, Mixed *Shorea*, Mixed Broadleaved (Bushy), *Shorea, Schima, Shorea – Pinus*, *Pinus – Castanopsis*, *Schima – Shorea*, *Pinus* ,
		Private	15.98	459	175	336	23	0.17	*Pinus,* Mixed Broadleaved, Mixed *Alnus*, Degarded *Alnus* woods, *Alnus*, Schima,
Total			59.24	335	128	245	23	0.17	

Source: Field Survey 2010

Table 7.4 presents the total loss of specieswise plants in terms of vegetation regeneration (seedling, and sapling) trees (pole and trees), wood volume, and biomass. A toal of 73 tree species are affected by the KCTLP. The total number of seeedling, and sapling affected is 18877, and 7191 respectively. Similarly total number of pole and tree class affected by KCTLP is 10494 and 3317 respectively.

Table 7.5 presents the loss of total regeneration, trees, wood volume, and biomass in the government managed forest, community forests, and private forests. In terms of seedling, sapling, pole and tree numbers loss, it is highest in the community forest, follwed by government managed forest, and private forest.

Table 7.6 presents the valuation of the lost plant species specieswise in the KCTLP impacted forest. In monetary terms the loss is highest in the community forest followed by government managed forest and private forest.

In addition to the direct losses of forest vegetation by clearing along T/L ROW in the forested areas, indirect losses on forest vegetation is expected from the workforce involved in the construction activities. The level of impact on forest vegetation depends upon the number of workers involved and their behaviors and the mode of shelter and use of fuel for cooking and heating. Since number of workers will be limited to less than 10 in any activity sites (tower construction sites), the envisaged impacts will be short period and of low magnitudes only. However during clearance and cable stringing, a sizable number of workers will be involved for a period of not more than 5 days in any area. Their rampant behaviors could be of concern if not controlled.

Table 7.4: Specieswise Loss of Plants in the KCTLP Impacted Forests

Botanical Name	Avg. DBH/Range*(for >= 10 cm DBH)	Total Loss of vegetation**				Total Standing Wood Volume		Total Biomass (kG.)
		Loss of Regeneration		Loss of tree (number)		Timber (cft)	Fuel wood (chatta)	(Wet)
		Seedlings	Saplings	Pole class	Tree class			
Acacia catechu	0.18	50	0	71	0	158.06	0.095	12906.37
Adina cardifolia	0.27	300	100	351	165	3219.75	1.933	265086.8
Albizzia lebbeck.	0.29	0	0	44	0	267.16	0.160	21820.81
Albizzia sp.	0.23	100	50	130	46	1603.36	0.962	132836.3
Alnus nepalensis	0.18	1648	849	2502	524	13475.76	8.089	1105271
Altrocarpus lakoocha	0.20	0	0	1	3	22.60	0.014	1845.682
Bandare	0.30	0	0	0	9	52.19	0.031	4262.615
Bassia butyracea	0.28	0	0	16	9	141.97	0.085	11596.04
Bauhinia purpurea	0.17	0	0	28	2	47.04	0.028	3853.822
Bombax ceiba	0.24	0	0	43	46	1679.28	1.008	140254.7
Brassiopsis hainla	0.09	0	0	1	0	0.65	0.000	53.0047
Callicarpa arborea	0.17	0	50	85	2	175.59	0.105	14336.26
Casearia sp.	0.07	0	100	0	0	21.47	0.013	1737.583
Cassia fistula	0.21	0	0	12	0	24.97	0.015	2039.863
Castanopsis indica	0.15	400	100	296	26	899.08	0.540	74077.39
Castanopsis tribuloides	0.19	50	0	14	12	303.37	0.182	25336.04
Cryptomeria japonica	0.07	0	50	41	0	27.70	0.017	2256.423
Dalbergia latifolia	0.10	100	50	44	0	33.81	0.020	2759.667
Dalbergia sissoo	0.13	0	0	11	0	21.82	0.013	1780.356
Duabanga sonerettoides	0.34	0	0	8	16	286.65	0.172	23914.66
Duabanga sp.	0.27	0	0	135	21	639.36	0.384	52221.29
Emblica officinalis	0.14	0	0	8	0	4.16	0.002	340.0646
Englehardtia spicata	0.15	50	100	167	17	606.32	0.364	49508.44
Erythrina stricta	0.35	0	0	6	12	293.16	0.176	24474.89
Eucalyptus sp.	0.10	0	1448	1442	0	2068.17	1.241	168657.1
Eugenia sp.	0.18	100	50	110	6	228.74	0.137	18725.95
Exbucklandia populnea	0.43	0	0	0	12	119.97	0.072	9935.863

Botanical Name	Avg. DBH/Range*(for >= 10 cm DBH)	Total Loss of vegetation**				Total Standing Wood Volume		Total Biomass (kG.)
		Loss of Regeneration		Loss of tree (number)		Timber (cft)	Fuel wood (chatta)	(Wet)
		Seedlings	Saplings	Pole class	Tree class			
Ficus auriculata	0.11	0	0	15	0	8.27	0.005	674.7018
Ficus cunia	0.14	100	50	22	12	93.57	0.056	7639.845
Ficus lacor	0.12	200	150	93	18	277.12	0.166	22621.16
Ficus penghalensis	0.18	0	0	3	0	4.05	0.002	330.6183
Ficus sp.	0.10	0	100	62	0	64.62	0.039	5271.014
Grewia oppositifolia	0.17	0	0	12	0	26.94	0.016	2199.696
Holarhena pubescens	0.17	0	0	17	0	28.39	0.017	2318.106
Hymenodictyon excelsum	0.18	0	0	6	0	7.54	0.005	615.9734
Kaiyu	0.11	0	0	1	0	0.42	0.000	34.28635
Kalikath	0.09	0	50	2	0	8.65	0.005	700.4674
Khankar	0.09	0	0	0	0	0.96	0.001	77.45238
Kharane	0.12	0	50	43	19	432.15	0.259	36054.78
Lagestroemia parviflora	0.18	150	100	252	42	1111.86	0.667	91049.9
Lannea coromandelica	0.17	0	0	35	3	56.74	0.034	4634.075
Leucoceptrum canum	0.13	0	0	2	0	0.62	0.000	50.37994
Litsea monopetala	0.10	0	0	11	0	8.35	0.005	680.9736
Luculia gratissima	0.11	0	0	3	0	0.89	0.001	72.79901
Macaranga denticulata	0.15	300	100	285	0	423.24	0.254	34554.17
Macaranga pustulata	0.20	499	150	436	128	2889.55	1.734	237181.9
Maesa macrophylla	0.06	0	0	0	0	0.35	0.000	27.98047
Mallotus sp.	0.15	799	100	140	4	265.20	0.159	21648.87
Mangifera indica	0.22	0	0	8	0	9.56	0.006	780.7946
Myrica esculenta	0.20	0	0	18	0	34.94	0.021	2853.423
Oroxylon indicum	0.17	0	0	6	0	11.08	0.007	905.3275
Patpate	0.14	0	50	112	2	105.36	0.063	8604.002
Pinus roxburghii	0.22	499	150	218	159	4200.13	2.521	349915.8
Pipari	0.26	0	0	2	0	9.22	0.006	752.7882
Premna. sp.	0.12	0	0	1	0	0.39	0.000	31.92828
Prunus cerasoides	0.10	50	0	15	0	45.02	0.027	3675.926

Botanical Name	Avg. DBH/Range*(for >= 10 cm DBH)	Total Loss of vegetation**				Total Standing Wood Volume		Total Biomass (kG.)
		Loss of Regeneration		Loss of tree (number)		Timber (cft)	Fuel wood (chatta)	(Wet)
		Seedlings	Saplings	Pole class	Tree class			
Rhododendron arboreum	0.18	150	50	114	16	280.22	0.168	23041.32
Rhus parviflora	0.05	100	0	0	0	0.29	0.000	23.0721
Rhus sp.	0.11	0	0	16	0	13.69	0.008	1118.285
Sapium insigne	0.22	0	50	15	8	123.27	0.074	10164.36
Satrungo	0.32	0	0	0	2	8.02	0.005	655.1911
Saurauia napaulensis	0.13	100	100	226	0	300.95	0.181	24571.01
Schima wallichii	0.23	3246	599	2158	943	25192.72	15.122	2084670
Schleichera oleosa	0.19	0	0	3	0	4.63	0.003	377.8495
Semecarpus anacardium	0.15	100	50	96	0	146.70	0.088	11979.88
Shorea robusta	0.19	9588	2147	3978	1673	33010.84	19.814	2725709
Sterculia villosa	0.19	0	0	6	0	12.95	0.008	1057.979
Sterospermum personatum	0.14	0	0	7	0	3.95	0.002	322.3529
Symplocos sp.	0.24	0	0	48	0	295.19	0.177	24110.35
Tectona grandis	0.29	0	0	81	36	540.05	0.324	44109.62
Terminalia alata	0.23	200	200	366	229	4372.53	2.625	359288
Terminalia bellirica	0.35	0	0	0	5	120.28	0.072	10057.07
Trichilia connoroides	0.11	0	0	8	0	4.91	0.003	400.7209
		18877	**7191**	**10494**	**3317**	**100978.53**	**60.61**	**8329504.18**

Source: Field Survey 2010

Note:

* Avg. DBH and Range of DBH to be given for Pole and Tree Class

** Seedling_0-4 cm DBH; Sapling_4-10 cm DBH; Pole Class_10-30 cm DBH; Tree Class_>30 cm DBH

*** Possible usages are – fire wood, fodder, etc.

Table 7.5: Loss of Plants in the National, Community and Private Forest in the KCTLP Impacted Forests

Type of Forest	Area (ha.)	Loss of vegetation				Crown	Timber		Biomass for standing tree and ground vegetation (kG.) (Wet) (Dry)	Biomass usages*
		Loss of Regeneration		Loss of tree (number)						
		Seedlings	Saplings	Pole class	Tree class	Cover (%)	Standing Wood Volume (cft)	Fuel wood (cft.) (chatta)		
Govt.	19.48	6656	2535	3700	1169	24	35602.4	21.37	2936764	Fire wood, fodder, timber
Community	23.80	4887	1862	2717	859	27	26143.1	15.69	2156487	Fire wood, fodder, timber
Private	15.98	7334	2794	4077	1289	23	39233.1	23.55	3236253	Fire wood, fodder, timber
Total	59.24	18877	7191	10494	3317	23	100978.5	60.61	8329504	Fire wood, fodder, timber

Source: Field Survey 2010

Note:

- Seedling_0-4 cm DBH; Sapling_4-10 cm DBH; Pole Class_10-30 cm DBH; Tree Class_>30 cm DBH
-* Possible usages are – fire wood, fodder, etc.

Table 7.6: Valuation of the Lost Plants Specieswise

Botanical Name	Value of timber Loss NRs.		Value of fuel wood Loss NRs.	Value of Fodder Loss NRs.	Total NRs.
	Pole Class	Tree Class			
Acacia catechu	248500	553210	4750	6453.19	812913.19
Adina cardifolia	87750	402468.8	22229.5	132543.40	644991.65
Albizzia lebbeck.	11000	33395	1840	10910.41	57145.41
Albizzia sp.	32500	200420	11063	66418.15	310401.15
Alnus nepalensis	625500	1684470	93023.5	552635.50	2955629.00
Altrocarpus lakoocha	250	2825	161	922.84	4158.84
Bandare	0	6523.75	356.5	2131.31	9011.56
Bassia butyracea	4000	17746.25	977.5	5798.02	28521.77
Bauhinia purpurea	7000	5880	322	1926.91	15128.91
Bombax ceiba	10750	209910	11592	70127.35	302379.35
Brassiopsis hainla	250	81.25	0	26.50	357.75
Callicarpa arborea	21250	21948.75	1207.5	7168.13	51574.38
Casearia sp.	0	2683.75	149.5	868.79	3702.04
Cassia fistula	3000	3121.25	172.5	1019.93	7313.68
Castanopsis indica	74000	112385	6210	37038.70	229633.70
Castanopsis tribuloides	3500	37921.25	2093	12668.02	56182.27
Cryptomeria japonica	10250	3462.5	195.5	1128.21	15036.21
Dalbergia latifolia	11000	4226.25	230	1379.83	16836.08
Dalbergia sissoo	2750	2727.5	149.5	890.18	6517.18
Duabanga sonerettoides	2000	35831.25	1978	11957.33	51766.58
Duabanga sp.	33750	79920	4416	26110.65	144196.65
Emblica officinalis	2000	520	23	170.03	2713.03
Englehardtia spicata	41750	75790	4186	24754.22	146480.22
Erythrina stricta	1500	36645	2024	12237.45	52406.45
Eucalyptus sp.	360500	258521.3	14271.5	84328.55	717621.30
Eugenia sp.	27500	28592.5	1575.5	9362.98	67030.98
Exbucklandia populnea	0	14996.25	828	4967.93	20792.18
Ficus auriculata	3750	1033.75	57.5	337.35	5178.60
Ficus cunia	5500	11696.25	644	3819.92	21660.17
Ficus lacor	23250	34640	1909	11310.58	71109.58
Ficus penghalensis	750	506.25	23	165.31	1444.56

Botanical Name	Value of timber Loss NRs.		Value of fuel wood Loss NRs.	Value of Fodder Loss NRs.	Total NRs.
	Pole Class	Tree Class			
Ficus sp.	15500	8077.5	448.5	2635.51	26661.51
Grewia oppositifolia	3000	3367.5	184	1099.85	7651.35
Holarhena pubescens	4250	3548.75	195.5	1159.05	9153.30
Hymenodictyon excelsum	1500	942.5	57.5	307.99	2807.99
Kaiyu	250	52.5	0	17.14	319.64
Kalikath	500	1081.25	57.5	350.23	1988.98
Khankar	0	120	11.5	38.73	170.23
Kharane	10750	54018.75	2978.5	18027.39	85774.64
Lagestroemia parviflora	63000	138982.5	7670.5	45524.95	255177.95
Lannea coromandelica	8750	7092.5	391	2317.04	18550.54
Leucoceptrum canum	500	77.5	0	25.19	602.69
Litsea monopetala	2750	1043.75	57.5	340.49	4191.74
Luculia gratissima	750	111.25	11.5	36.40	909.15
Macaranga denticulata	71250	52905	2921	17277.09	144353.09
Macaranga pustulata	109000	361193.8	19941	118590.95	608725.70
Maesa macrophylla	0	43.75	0	13.99	57.74
Mallotus sp.	35000	33150	1828.5	10824.44	80802.94
Mangifera indica	2000	1195	69	390.40	3654.40
Myrica esculenta	4500	4367.5	241.5	1426.71	10535.71
Oroxylon indicum	1500	1385	80.5	452.66	3418.16
Patpate	28000	13170	724.5	4302.00	46196.50
Pinus roxburghii	54500	525016.3	28991.5	174957.90	783465.65
Pipari	500	1152.5	69	376.39	2097.89
Premna sp.	250	48.75	0	15.96	314.71
Prunus cerasoides	3750	5627.5	310.5	1837.96	11525.96
Rhododendron arboreum	28500	35027.5	1932	11520.66	76980.16
Rhus parviflora	0	36.25	0	11.54	47.79
Rhus sp.	4000	1711.25	92	559.14	6362.39
Sapium insigne	3750	15408.75	851	5082.18	25091.93
Satrungo	0	1002.5	57.5	327.60	1387.60
Saurauia napaulensis	56500	37618.75	2081.5	12285.51	108485.76
Schima wallichii	971100	8187634	173903	1042335.00	10374972.00
Schleichera oleosa	750	578.75	34.5	188.92	1552.17
Semecarpus anacardium	24000	18337.5	1012	5989.94	49339.44
Shorea robusta	1790100	10728523	227861	1362854.50	14109338.50
Sterculia villosa	1500	1618.75	92	528.99	3739.74

Botanical Name	Value of timber Loss NRs.		Value of fuel wood Loss NRs.	Value of Fodder Loss NRs.	Total NRs.
	Pole Class	Tree Class			
Sterospermum personatum	1750	493.75	23	161.18	2427.93
Symplocos sp.	12000	36898.75	2035.5	12055.18	62989.43
Tectona grandis	20250	67506.25	3726	22054.81	113537.06
Terminalia alata	91500	546566.3	30187.5	179644.00	847897.75
Terminalia bellirica	0	15035	828	5028.54	20891.54
Trichilia connoroides	2000	613.75	34.5	200.36	2848.61
Total	**5084950**	**24796481**	**700649.5**	**4164752.09**	**34746832.34**

Source: Field Survey 2010

Note:*Pole Ku Kath = NRs. 250/pole, Sukath NRs 450/pole; Timber, KuKath - NRs 125/cft, SuKath NRs 350/cft; Fuel Wood, Lumpsum NRs 11500/Chatta; Fodder loss, Lumpsum NRs 0.5/kg, Acacia catechu 3500/pole and /cft.*

The loss of endiginous species due to forest clearance is not envisaged. However, five protected tree species (3 government of Nepal Protected, 2 listed as vulnerable in IUCN red Boodk) are envisaged to be cleared on the ROW (Table 7.7). Apart from this numersous *Lichens, Orchidiaceae* attached to the lost tree species will be lost including the *Dioscorea deltoidea.*

Table 7.7: Loss of Protected Tree Species

Botanical Name	Total Loss of vegetation**				Total Standing Wood Volume		Total Biomass (kG.)
	Loss of Regeneration		Loss of tree (number)		Timber (Cft)	Fuel wood (Chatta)	(Wet)
	Seedlings	Saplings	Pole class	Tree class			
Acacia catechu	50	0	71	0	158.06	0.095	12906.37
Bombax ceiba	0	0	43	46	1679.28	1.008	140254.7
Shorea robusta	9588	2147	3978	1673	33010.84	19.814	2725709
Oroxylon indicum	0	0	6	0	11.08	0.007	905.3275
Dalbergia latifolia	100	50	44	0	33.81	0.02	2759.667
Total	**9738**	**2197**	**4142**	**1719**	**34893.07**	**20.944**	**2882535**

Source: Field Survey 2010

III. Direct/Indirect Impacts on Wildlife Habitats specifically of Protected, Rare and Endangered species

As forest is the natural habitat of the wildlife, the loss of standing forest is a direct loss of the wildlife habitat. The loss of habitat in direct terms could have implication on the diversity due to loss of habitat. Transmission line ROW vegetation particularly government managed and community forests are seen to provided very good habitat for a number of wildlife speceis of mammals, birds, reptiles. The clearance of vegetation is envisaged to severely impact the habitats of these species. As only a small strip will be cleared, the implication on the wildlife habitat due to clearance will be site specific and will have moderate magnitude impact to the wildlife habitat of the project area for a short period during construction. The implications will be similar to the protected and unprotected species, as most of the protected species are mobile and move away from the site during construction period only to return later after the construction period is over.

The workforce behavior such as illegal hunting, rampant clearing of forest areas, and their mobility within the area are of concern with regard to the wildlife habitat and biodiversity. In a normal construction conditions, the envisaged impacts are short period, indirect and of low magnitude only.

7.2.2.2 Operation Phase

I. Direct Impacts of Bird Hits particularly across the Waterways

The birds, diurnal or nocturnal, take flights in search of food and other breeding purposes. The forested areas are the prime habitats of the birds. Birds use either eyes or other sensual organs to find their flight paths. The cables stringing on the towers might pose a risk of accidents to the free flying birds which could often be fatal. The experience in other parts of the world has shown high fatality rate of the birds along the high voltage transmission line passing across the forested areas. Risk to the birds accidents is a long term, site specific, impact of high magnitude.

II. Direct/Indirect Impacts to wildlife

The energized high voltage lines are potential to exert micro-shocks to the animals if they touched the metal based tower foundation structures. Besides, some climbing animals may get high voltage shocks (particularly monkeys) as they are agile and could use the tower for climbing. Some of the animals are sensitive to small changes in the electromagnetic fields and move away from the T/L ROW corridor because the energized high voltage lines are associated with accentuated electromagnetic fields. The

envisaged implications to the wildlife, are long term, site specific (T/L, ROW) and of moderate magnitude.

III. Direct/Indirect Impacts to Forest Resources due to on site / off site Maintenance Activities

Maintenance workers, while clearing the vegetation along T/L ROW, may impinge upon the other vegetation habitats and wildlife habitats. It will be a regular yearly activity confined to T/L ROW and will impart low magnitude impact on wildlife habitat and wildlife diversity.

IV. Direct Impacts of Weeds encroachment on biodiversity

Nepalese forest are already suffering from the encraochment of weeds. Clearing of standing vegetation along ROW will provide grounds for the encraochment and is a concern of long term biodiversity loss.

7.2.2.3 Summary of Biological Environmental Impacts

Table 7.8 summarises the impacts of the KCTLP on the physical environment discussed in section above.

Table 7.8: Adverse Biological Environmental Impacts, KCTLP

SN	Biological Environmental Impact	Direct / Indirect Impact	Extent	Duration	Magnitude
A	**Construction Phase**				
A.1	▪ Direct Impacts of Fragmentation of Forest Land	D/ID	L	LT	M
A.2	▪ Direct/Indirect Impacts on forest vegetation/biodiversity specifically of Protected, Rare and Endangered species	D/ID	S	LT	M
A.3	▪ Direct/Indirect Impacts on Wildlife Habitats specifically of Protected, Rare and Endangered species	D/ID	L	ST	M
B	**Operation Phase**				
	▪ Direct Impacts of Bird Hits particularly across the Waterways	D	L	LT	H
	▪ Direct/Indirect Impacts to wildlife	D/ID	S	LT	M
	▪ Direct/Indirect Impacts to Forest Resources due to on site / off site Maintenance Activities	D/ID	S	LT	Lo
	▪ Direct Impacts of Weeds encroachment on biodiversity	D	L	LT	H

Note: D= Direct; ID = Indirect, S= Site specific; L = Local, R = Regional; ST= short term, N = No impact
MT = Medium Term, LT = Long Term; Lo = Low, M = Moderate, H = High

7.2.3 Socio-economic and Cultural Environment

7.2.3.1 Construction Phase

I. Direct Impacts of Loss of Property and Land (such as Population Displacement)

The KCTLP will affect the private land permanently and temporarily. The permanent land affects will be due to the permanent land acquisition for substation and tower foundation. The private land will be also affected permaently due to restriction on the land use along the 18 m wide corridor of KCTLP right of the way. Apart from this, the camps and storage area occupied during construction will also affect the land temporarily during construction. Table 7.9 presents the private land area to be affected by the KCTLP permanently and Temporarily.

Table 7.9: Private Land Affected by KCTLP

Locations	Permanent (ha)	Temporary (ha)
Substations	4.324	
Tower Foundations	2.821	
ROW	89.27	
Camps and Storage	0	6.98
Total	**96.415**	**6.98**

Source: Field Survey 2010
Note: The private land areas include both cultivated land and private forests

The permanent land acquistion of substation and tower foundations areas is presented in Table 7.10. along with the estimated households affected by the land use restriction.

Table 7.10: Households Affected by Permanent Land Acquisition and Land Use Restriction

Private Land	Total Land (ha)	Numbers of Owners	Average ha of Land Affected/Household
Substation	4.324	18	0.240
Tower Foundation	2.821	182	0.0155
Land Use Restriction	89.27	714	0.125
Total	**96.415**	**914**	**0.127**

Source: Field Survey 2010

The land acquistion and restriction on land use will impart direct impacts to the landowners of the private land. The envisaged impacts are on the socioeconomic status of the affected population/ households as landholding is considered to be a matter of social status in the rural areas of Nepal. The land area occupied permanently for substation and tower foundation will be lost forever. Of the total 914 households affected due to permanent land acquisition and restriction, only 23 household's built structures will be affected (Table 7.11). Of the affected built structures, 18 are paki structures while 5 are Kachi structures.

Table 7.11: Built Structures Affected by the KCTLP

House Nos.	House Type	Name of Place	Name of VDCs	House Details
1	Paki	Gadhi Dada Gau	Phidim - 4	Stone wall and Corrugated Sheet Roof
2	Paki	Jorkulo Village	Chokmagu - 8	Stone wall and Corrugated Sheet Roof
3	Paki	Maidane	Chokmagu - 5	Stone wall and Corrugated Sheet Roof
4	Paki	Maidane	Chokmagu - 5	Stone wall and Corrugated Sheet Roof
5	Paki	Maidane	Chokmagu - 5	Stone wall and Corrugated Sheet Roof
6	Paki	Siwa	Siwa - 4	Stone wall and Corrugated Sheet Roof
7	Paki	Patle Bhanjyang	Nawamidanda - 4	Stone wall and Corrugated Sheet Roof
8	Paki	Patle Bhanjyang	Nawamidanda - 4	Stone wall and Corrugated Sheet Roof
9	Paki	Hanyok	Imbung - 7	Stone wall and Corrugated Sheet Roof
10	Paki	Sartap	Pauwasartap - 2	Stone wall and Corrugated Sheet Roof
11	Paki	Sartap	Pauwasartap - 2	Stone wall and Corrugated Sheet Roof
12	Paki	Lukuwa	Chilingden - 2	Stone wall and Corrugated Sheet

House Nos.	House Type	Name of Place	Name of VDCs	House Details
				Roof
13	Paki	Lukuwa	Chilingden - 2	Stone wall and Corrugated Sheet Roof
14	Paki	Simsara	Chamaita - 9	Stone wall and Corrugated Sheet Roof
15	Paki	Dadagau	Mangalbare - 2	Stone wall and Corrugated Sheet Roof
16	Paki	Panchami	Siddhithumka - 4	Stone wall and Corrugated Sheet Roof
17	Paki	Tegya	Siddhithumka - 3	Stone wall and Corrugated Sheet Roof
18	Paki	Soyak	Soyak - 6	Stone wall and Corrugated Sheet Roof
19	Kachi	Maidane	Chokmagu - 5	Wall stone, post-wood and roof thatched
20	Kachi	Maidane	Chokmagu - 5	Wall stone, post-wood and roof thatched
21	Kachi	Siwa	Siwa - 4	Wall stone, post-wood and roof thatched
22	Kachi	Lukuwa	Chilingden - 2	Wall stone, post-wood and roof thatched
23	Kachi	Sabjun	Mangalbare - 8	Wall stone, post-wood and roof thatched

Source: Field Survey 2010

Though 914 households are affected by permanent land take or restriction, the impacts of land take and restriction is not similar to all the project affected households. None of the affected households will be physically displaced from the project sites as all of the households have either some parcels of remaining land and residential structures in the project area or have parcels of remaining land.

The households who loose both land and built structures at the ROW (23) and the households affected by land take at substation (18) totalling 41 in number have been termed as Seriously Project Affected Families (SPAF), while the other households (873) who loose their part of the land permanently for tower foundation and part of the land for land use restriction are termed as Project Affected Families (PAF).

Apart from the above, about 55 households will be affected temporarily by the temporary land occupancy for camps and stroage areas during construction in different locations of KCTLP corridor. The impacts of the KCTLP to these households is envisaged to be less significant compared to the impacts of the households affected by permanent land take or restriction.

Envisaged overall impacts of loss of property and land is direct, site specific, long term and of high magnitude.

II. Direct Impacts of Loss of Agricultural Crops and Other Fodder and Fruit Trees (such as Loss of Livelihood /Loss of Quality of Life)

Permanent loss of land has a direct relationship with the agricultural production or means of livelihood in the rural economy. The estimated annual agricultural production loss from the permanently acquired land is presented in Table 7.12. Though the estimated loss is insignificant when compared to the agricultural production of the project district and project VDCs, it has a significant meaning to the households who incur the direct agricultural production losses, particularly the 18 households owning land of the sub-station areas (***Annex 7.1***). The overall impact of the loss of agricultural crops and other trees is direct, site specific, long term and of high magnitude.

Table 7.12: Annual Agricultural Production in Nepali Rupees from the KCTLP Occupied areas

Crops	Crops Within Permanently Acquired land (In Metric Tons)
Maize	1.26
Millet	0.80
Wheat	0.35
Mustard	0.28
Legume	0.71
Paddy	1.20
Potato	5.11
Others	2.20
Total	11.91

Source: Field Survey 2010

The land area to be restricted along ROW, though will not lose the agricultural production forever, however is envisaged to loose one season production of the standing crops during cable stringing (Table 7.13). The envisaged loss is small, and it could be of significance to the households who actually incur the loss as most of the households of the project area vicinity have serious food deficinecy problems.

Table 7.13: Estimated Agricultural Production Losses in Nepali Rupees from the KCTLP ROW Restricted Areas during Cable Stringing

Crops	Crops which falls within ROW-Restricted Land (In Metric Tons)
Maize	39.33
Millet	24.98
Wheat	10.83
Mustard	8.76
Legume	22.28
Others	34.47
Total	140.65

Source: Field Survey 2010

The areas occupied temporarily for camps and storage are also envisaged to incurr agricultural production losses for the period of the land occupancy. The 55 households whose land will be affected by temporary land take will have to bear the burden of agricultural production losses. The estimated production losses from the areas temporarily occupied for camps and storage areas during construction is presented in Table 7.14 for the period of four years of land occupancy.

Table 7.14: Estimated Agricultural Production Losses in Nepali Rupees from the Camps and Storage Areas

Crops	Temporarily Acquired Land (Metric Tons)
Maize	15.75
Millet	16.25
Mustard	3.24
Legume	7.40
Potato	61.59
Others	18.37
Total	122.60

Source: Field Survey 2010

III. Direct and Iindirect Impacts on Gender, Indigenous, Tribal and Vulnerable Groups

Household survey of the project area vicinity people reveals that the area is dominated by the indigenous households ammounting to about 62.44% of the households. The vulnerable groups accounts nearly 11.71 percent of the households. Permanent and temporary landtake by the KCTLP, thus is going to impact the indigenous and vulnerable people in higher numbers than the other groups. As these groups are considered to be the most marginallised groups politically and economically, the

envisaged impacts of the project direct and indirect actions will be higher compared to the other groups.

Though the literacy rate in the project affected vicinity is higher compared to the national average, the female members has higher percentile of illeteracy compared to the male. Besides, the percentile of female members at higher education is poor. Hence, there is potential of the exploitation of the female members by the construction workforce mostly the outside workforce during the construction period. Girl trafficking could be one of the potential problems during construction period relating to the construction workforce.

IV. Direct Impacts on Community Forest/ Leasehold Forest Resources

In an rural economy, forest is a source of livelihood. Forest products are used for various agro-economic uses such as timber, fodder, furit and medicine. The KCTLP is envisaged to affect the forest areas. Table 7.15 presents the estimated loss of the forest area.

Table 7.15: Estimated Loss of Forest Stretch and Area, KCTLP

Forest Type	Length (km)	Area (ha)
Government Forest	10.82	19.48
Community Forest	13.22	23.80
Private Forest	8.878	15.98
Total	32.918	59.25

Source: Field Survey 2010

Since KCTLP is a linear project affecting land use linearly is not envisaged to incurr losses to be significant to the user communities. However, nearly 23.80 ha of community forest belonging to 17 Community Forest User Groups (CFUG), 15.98 ha of the private forest belonging to 66 owners and 19.48 ha of government managed forest will be affected by the KCTLP.

V. Direct Impacts to the Telephone, Electricity Lines

The KCTLP crosses 33 kV transmission line once, 11 kV transmission line 5 times, major highways 4 times and other rural motorable roads 10 times, major rivers (Chaju Khola, Hewa Khola, Karphok Khola, Mai Khola, Tamakhe Khola, and Tamor) in 12 places and other tributaries above third order at 20 places.

The crossings above the transmission lines are of importance particularly during the cable stringing as it might disrupt the electricity transmission. The clearance as per design does not impact these lines during operation phase. Provisioned clearance height along the motorable roads is as per the accepted international standards, however, will disrupt the traffic for some hours during cable stringing. Along the major river crrossings, positioning of suspension towers pads is of concern as some of the tower pads has potentials of lacating on the river active flood plain. The envisaged impacts are of low magnitudes.

VI. Direct Impacts on Occupational Health

Construction works involves a variety of works with different degree of occupational health risks depending on the nature and place of works. Lack of proper attention might lead to the fatal consequences even involving loss of life of the construction workers. Inadequate personnel protective equipments increase the number of small injuries with implication on the work time losses as well as to the health of the workforce. The envisaged impacts of the occupational health are direct, site specific, short term, and of moderate magnitude.

VII. Indirect Impacts on Community Health and Hygiene

The issue of community health is related to the outside workforce. The outside workforce may introduce transmissible disease of unknown nature to the communities. The mixing of the outside workforce sexually with the local community individuals may also increase the risks of STD and AIDS/HIV in the community. Poor sanitation practice of the outside workforce in the make shift camps and construction sites is also potential to generate pollution issues with implications on community health. The envisaged risk is site specific, short duration, and of low magnitude nature.

VIII. Indirect Impacts to Local Infrastructure Services (Schools, Health, Water Supply, Markets, Transportation, Communication etc. Services)

The Transmission line corridor is away from settlements, disturbance to the social infrastructures such as schools, health posts, telephone booths, post office water supply, transortation and communication is not expected. As the expected numbers of the outside workforce will be low and for a small period, the stress to these facilities by the outside force is also expected to be minimum. However, at the sub-station sites, the expected impacts will be comparativey higher than in the KCTLP corridor due to the nature of the construction activities and number of wrokforce involved for construction in localised envionment. The envisaged impacts are site specific, short period impacts of low magnitudes.

IX. Direct/Indirect Impacts on the Communal Resources (Grassland, Recreational Areas, other Public Lands, etc.)

The outside workforce might use the community resources such as water, forest products, and may use other resources used by the communities. Their use of the resources may increase competition with the local communities and in the degradation of the resource base particularly the water and forest resources. The impact could be on the women community by increasing hardship, as they are mostly associated with the resource use and management at the existing community level. Since the number of workforce at any place along KCTLP right of the way except for substation sites will be small, the envisaged impacts are sub-station specific, short duration and of low magnitude nature.

X. Indirect Impacts on Law and Order situation

Law and order issue relates with the outside workforce activities. Theft and burglary is an uncommon event in the local area settlements. Similarly, quarrel among the local residents is very rare. With the inflow of the outside construction workforce, there is a likely potential in the increase in theft and burglary as well as quarrel between the local and outsiders. The overall law and order situation of the key project construction sites might degrade and the existing police and other security arrangements may not be sufficient to cater the new situation.

Conflict with the local communities on resource use, tradition and culture, obstruction on social service facilities may arise. In the existing circumstances, lawlessness conditions could further aggravate the situation, The envisaged impact is further degradation of law and order situation of the local area. Since the number of workforce involved except for the substation along the KCTLP right of the way will be small and limited to few weeks and months, the envisaged impacts will be of low magnitude.

XI. Indirect Aesthetic Impacts of Stockpiling of the Construction Materials

The stockpiling of materials, construction excavation at tower foundation and clearance of vegetation are some of the issues related to the general aesthetics. Except for the vegetation clearance, rest of the other is site specific, short term impacts of low magnitude. The vegetation clearance is an impact of long term moderate magnitude impact along ROW corridor.

XII. Indirect Impacts to Local Tradition and Culture

The issue of local culture and tradition relates to the activities of the outside workforce in the local area. The outside construction workforce from different parts of Nepal of different cultural and traditional values is envisaged to influence the local cultural and traditional values. The extent of such influence is difficult to predict. Nepal is a co-existing ground of different ethnic groups with diverse sets of traditions and values since ages, it is envisaged that the outside workforce and the local community will mingle with each other without any cultural and traditional conflicts. Further, as the number of the workers involved is small, the envisaged impacts on local culture and tradition is short period, site specific and of low magnitude nature.

7.2.3.2 Operation Phase

I. Direct Impacts on Property Value

Restriction on land which falls within TL-ROW does not effect productivity of agricultural land and the current land use practices and land ownership. However, due to restriction on the land use for the consturion of buildings and structures will affect the market land prices. The restricted lands under ROW will be devaluated. The impacts will be on the households ownining these lands as these lands will fetch low market prices and difficult to dispose in time of need. The envisaged impacts will be high to the landowners.

II. Direct Impacts of Electric and Electromagnetic Fields and Stray Voltage on Public Health

The energized high voltage cable can cause small micro-shocks in certain instances (such as touching metals placed under the ROW). Similarly the electromagnetic Field (EMF) has been discussed to cause health effects to communities located close to the ROW. But the issue is still debatable; as such issues are also associated with the electrical lines at home. There is no aceptable guideline for the protection against EMF internationally. Considering that the EMF effect lessens away from the energised cable, some countires have adopted wider ROW as a safety measure to EMF. In the case of KCTLP, as the line passes mostly through the rural areas away from the dense settlments, the envisaged impacts of the KCTLP electromagnetic field to the community health is considered negligible.

Besides, accidents associated with the installations are the other issues of concern with the high voltage energized lines. The envisage impacts are long term, site specific and of moderate magnitude nature.

III. Direct Impacts on Radio, Television, Telephone, Mobile Reception and Implementable Medical Devices

Electric and magnetic fields (EMS) are associated with the high voltage transmission lines. The electro-magnetic field associated with the high voltage overhead line diminishes with distance from the source. The electrical fields are associated with voltage which can cause small micro-shocks in certain instances (such as touching metals placed under the ROW). Effects of the associated electro-magnetic fields could potentially disturb the conductive services such as pipe lines or telecommunication cable running close and parallel to power line. Disturbance is potential in the electric wiring of the house, television screen, computer screen, hydro-carbon dispensing pumps etc. Similarly, electromagnetic compatibility (EMC) issues may occur in the radio communication and electronic equipments close to the high voltage lines. Since the transmission line alignment is mostly located away from the human settlement area, and has provisions of 18 m ROW and sufficient line clearance across the structures, the probability of electromagnetic field effects, though long term, site specific ones have a low impact magnitudes.

IV. Direct Impacts to Occupation health

Operation and maintenance workforce are exposed to occupational health risks both along T/L ROW and sub-station. Major risk lies with the electric shocks while working in the energized high voltage system. The envisaged risk is of low magnitude and of long term nature.

V. Impacts to the Local Area Aesthetics and Tourism

The pylon structures and strung cables of the T/L corridor and the cleared ROW of the Forested areas are issues of natural aesthetics. Since the area does not represent a site of high visual aesthetics to the tourist population, the envisaged impact is considered to be of low magnitude nature.

VI. Direct Impacts on Aesthetic Values

The pylon structures and strung cable across a landscape gives an ugly look to the natural landscape and is a concern of the aesthetic value to the nature lovers. This is an unavoidable aspect of the KCTLP. To minimise the impacts, particulaly to the tourism industry, efforts have been made to avoide the corridor alignment away from the sites of tourism importance.

7.2.1.3 Summary of the Socio-economic and Cultural Environmental Impacts

The environmental impacts of KCTLP on the the Socio-economic and cultural environments were described in details in without mitigation scenerio. Table 7.16 presents the impacts of KCTLP on socio-economic and cultural environment in summarised matrix in terms of nature of impact, extent of impacts, duration of impacts and magnitude of the impacts.

Table 7.16: Adverse Social and Socio-economic and Cultural Environmental Impacts, KCTLP

SN	Social and Socio-economic Environment	Direct / Indirect Impact	Extent	Duration	Magnitude
A	**Construction Phase**				

SN	Social and Socio-economic Environment	Direct / Indirect Impact	Extent	Duration	Magnitude
A.1	▪ Direct Impacts of Loss of property and land (such as population displacement)	D	S	LT	H
A.2	▪ Direct Impacts of Loss of agricultural crops and other fodder and fruit trees (such as loss of livelihood /loss of quality of life)	D	S	LT/ST	H
A.3	▪ Direct and indirect impacts on gender, indigenous, tribal and vulnerable groups	D/ID	L	ST	H
A.4	▪ Direct Impacts on Community Forest/ Leasehold Forest Resources	D	S	LT	M
A.5	▪ Direct Impacts to the telephone, electricity lines	D	S	ST	Lo
A.6	▪ Direct Impacts on Occupational health	D	S	ST	M
A.7	▪ Indirect Impacts on Community Health and Hygiene	ID	L	ST	Lo
A.8	▪ Indirect Impacts to Local Infrastructure Services (schools, health, water supply, markets, transportation, communication etc. services)	ID	S	ST	Lo
A.9	▪ Direct/Indirect Impacts on the Communal Resources (Grassland, Recreational Areas, other Public Lands etc.)	D/ID	S	ST	Lo
A.10	▪ Indirect Impacts on law and order situation	ID	S	ST	Lo
A.11	▪ Indirect Aesthetic Impacts of Stockpiling of the Construction Materials	ID	S	ST	Lo
A.12	▪ Indirect Impacts to local tradition and culture	ID	L	ST	Lo
B	**Operation Phase**				
B.1	▪ Direct Impacts on Property Value	D	S	LT	H
B.2	▪ Direct Impacts of Electric and Electromagnetic Fields and Stray Voltage on Public Health	D	S	LT	M
B.3	▪ Direct Impacts on Radio, Television, Telephone, Mobile Reception and Implementable Medical Devices	D	S	LT	Lo
B.4	▪ Direct Impacts to Occupation health	D	S	LT	Lo
B.5	▪ Impacts to the local area aesthetics and tourism	D	L	LT	Lo
B.6	▪ Direct impacts on aesthetic values	D	L	LT	Lo

Note: D= Direct; ID = Indirect, S= Site specific; L = Local, R = Regional; ST= short term, N = No impact
MT = Medium Term, LT = Long Term; Lo = Low, M = Moderate, H = High

Chapter 8: ALTERNATIVE ANALYSIS

The project alternatives have been analysis on the following key headings as identified during the TOR Stage.

8.1 Design

Most of the transmission line projects of the nature have a similar type of design with some variation in tower structure, tower arms, cable types, substation types etc. Environmentally significant in the design is the clearance distance of the cables and right of the way. Proposed clearance and right of the way complies with the norms stipulated in the Electricity Regulations. It is therefore the selected design option is environmentally sound and take care all safety aspects required for the design.

8.2 Project Sites

Connectivity Requirement

Transmission line projects are guided by the requirement of the powerhouse and the power supply centers. Hence, the transmission line alignments connecting the powerhouse and supply centers take an approach of connecting the two points at the shortest possible routes in more or less straingt line. Since the KCTLP development has the objective of providing transmission facilities to the potential hydropower projects to be developed in the region vis a vis connecting power supply centers at Panchthar, Ilam, and Damak, the alignment has been selected based on the locations of the future hydropower development sites and the defined supply centers. The proposed alignment, thus, is the best alternative to connect the powerhouse and supply centers envisaged.

No Forest Alignment

To avoid the forest stretches and dense settlment areas, some deflection from the desirable straight alinment is made at number of places (refer ***Figure 2.2 and Table 8.1***). In the given topographic and land use of the alignment corridor, the selected option (Alternative 1) is the best option which minimises both forest stretches and dense settlment areas. It is therfore the selected alignment is minimum damaging option for the natural environment.

Table 8.1: Comparison of the Alternatives in terms of Land Use change within 18m wide ROW

Alternatives	**Agricultural Land (ha)**	**Forest Land (ha)**	**Other lands (ha)**	**Total Land (ha)**	**Total Length*** **
Alternative 1*	76.11	59.24	15.366	150.72	8374
Alternative1**	67.17	79.90	6.76	153.83	8546

*Note: * Selected Alternative for development after fine tuning*
*** Alternative initially considered*
**** Line Length of Transmission Line rounded*

8.3 *Technology, Procedures of Operation, Time Schedules and Raw Materials to be used*

To provide maximum job opportunity, selected construction technology alternative is a mix of labor and machine based. The machine only or maximum machine based construction technology is rejected because of its potential environmental management difficulties and minimum job opportunities to the local area people.

A period of four years has been allocated for the construction of the T/L. Large sections of the KCTLP alignment pass through the agricultural land. Construction of the KCTLP particularly stringing of the wires could have severe implications on the standing agricultural crops if the stringing operations were carried out in seasons of standing crops. To avoid large crop damage during stringing of the wires on tower structures, the best season in the proposed development area is November to March. However, construction of tower pads and tower structure could be carried out with limited damage to the standing crops even during the cropping seasons.

Consideration is given to the environmental requirement of minimum clearance of the cables from the ground surface and powerlines, and roads. As far as possible, raw materials required for the project will be sourced from the local area except for the timber and fuel wood.

8.4 *Environment Management System*

The project is very sensitive on the out coming environmental impacts. The project planning has analyzed various alternatives of material transport and storage, location of camps, and use of existing trails to transport the materials from camps to the tower foundation construction sites. Various options of cable stringing from tower to tower has been analysed to minimise the damage to the cable and to minimise the loss of standing agricultural crops in agricultural areas and minimise the clear felling of the ground vegetation in the forested areas. While selecting sites for different activities, due consideration is given in the outcoming environmental impacts and their environmental management. The project has developed an environmental management plan for the construction and operation periods giving due recognition to the environmental aspects of the area.

8.5 *Whether or Not the Risks resulting from the Implementation of the Proposal can be accepted*

The KCTLP alignment has avoided the geologically vulnerable area for its various structures and support facilities. Apart from this, the alignment has also avoided forest areas and dense settlement areas. The cabel stringing has given due consideration for risk minimization. Fencing provisions of vulnerable structural sites (tower foundation and substation), etc. are the result of the various alternative analyses to minimize the risk to acceptable level during project implementation and operation.

Chapter 9: MITIGATION AND ENHANCEMENT MEASURES

Chapter 7 details the beneficial and adverse environmental impacts of the KCTLP in without mitigation scenario. This chapter details the environmental enhancement measures to maximize the benefit of the beneficial impacts and environmental mitigation measures to avoid, minimize, or compensate the adverse environmental impacts of the project. The project developer ensures to implement the enhancement and mitigation measures detailed in the section below as its primary responsibility as emphasized in Chapter 10.

9.1 Beneficial Impacts

The environmental enhancement measures designed for implementation by the project has an objective to enhance the overall socio-economic and natural enhvironmental status of the project affected VDCs. The programs, in the long term, are envisaged to facilitate the project operation activities vis a vis maintain the relationship with the communities of the project affected areas.

The Proponent will implement the following environmental enhancement programs in the Project ROI areas with an objective to maximize the environmental benefits and to minimize the envisaged impacts on the community resources including the forestry, in addition to the mitigation measures. The rural electrification, though it is demanded by many of the project affected area people is not included as the enhancement program for the following reasons. First 14 out of 25 project VDCs have electricity connection as of the date. Further expansion of these connections to the electrified and not electrified VDCs is a regular program of NEA under rural electrification program and hopefully will be accomplished by the time of KCTLP construction. Besides, some of the VDCs of the corridor are also impacted by the hydropower projects proposed for development and will be electrified by the upcoming hydropower projects/.

9.1.1 Training Program for Skill Development

There is a general feeling among the communities of the project development area that the job opportunities availed by the project should be given to the people of the local area as much as possible. However, due to the lack of required skills among the local communities, chances of local employment except for the unskilled jobs is minimum. It is therefore, the project has a plan to enable the local communities by provisioning required skill training programs to the local area people. The training programs envisaged for implementation are welding, electrical fittings and maintenance of the electrical instalation of transmission and substation. Such trainings will be given to about 300 persons of the project VDCs. Preference to such trainings will be prioritised for the Seriously project affected families, and project affected families. Second priority shall be given to the Dalits and vulnerable persons from among the Janajati ethnic groups of the project VDCs.

9.1.2 Training Programs for Biodiversity Awareness

The proponent will organize biodiversity awareness programs for the project VDCs people, particularly school children. Awareness programs will focus the school teachers of the project VDC area. The objective is to make the Lower secondary schools teachers capable to to teach/raise awarness for biodiversity conservation related subjects to students. The trained teachers are envisaged to disseminate knowledge on the local environment and biodiversity to the school children and prepare them for the protection of environment and biodiversity.

9.1.3 Support for NTFP Enhancement Programs

The project VDCs are endowned with a number of NTFP species which could be commercially used for the benefit of the local communities by ex-situe plantation. Lack of knowledge among the project VDC communities is a limitation in the plantation of available NTFP species at commercial scale. To fulfil this gap, the project will implement an NTFP commerical development program in the affected project VDCs. The program will be launched at the project district level and will comprise two components. The first component will provide training in the commercial plantation of the NTFP species suitable to the affected project VDCs, the second component will encourage the local communities to plant such NTFP species along the ROW cleared forested areas particularly the government forest in agreement with the district forest office, community forest areas in agreement with the Community Forest User Groups and in private forests in agreement with the private forest owners. This program is envisaged to minimise the risk of week invasion in the cleared ROW areas of the forests and also help in the minimisation of erosion of the cleared forest land.

9.1.4 Support to Community Forest Establishment

There are potential forest areas for community forest or lease hold forest development in the project VDCs. The project will assit the local communities of such potential area with the assistance of the District Forest Office in the formation of the community forest user groups and in preparation of constitutions and forest operational plans for official registration of the Community Forest in the District Forest Office.

9.1.5 Environmental Enhancement Costs

Table 9.1 present the costs of designed environmental enhancement programs.

Table 9.1: Environmental Enhancement Costs

Program Particulars	Implementation Period	Cost of the Program (NRs.)
Training Program for Skill Development	Six months before the start of the project construction	NRs. 35,00,000.00
Training Programs for Biodiversity Awareness	First Year of Project construction	NRs 20,00,000.00
Support for NTFP Enhancement Programs	Second Year of Project Construction	NRs. 25,00,000.00
Support to Community Forest Establishment	Third year of the project construction	NRs. 15,00,000.00
	Total	**NRs 95,00,000.00/-**

9.2 Adverse Impacts

9.2.1 Physical Environment

9.2.1.1 Construction Phase

I. Direct/Indirect Soil Erosion and Land Instability Impact

To minimise the impacts of soil erosion and land instabilities following measures will be implemented.

- Ground clearance activities prarticularly in the forested areas of the Siwaliks and steep slopes of the Mahabharat and Midlands will be limited to trimmings of the tall standing trees as required for the safety of the cables.
- The cleared areas of the Terai, and gentler slopes of the Mahabharat and Midlands will be managed by NTFP plantation with consideration of soil erosion and land stability impacts
- The spoil generated in the tower foundation wil be properly managed. Sidecasting of the spoil on the side slopes will be controlled.

- Headward progressing gullies in the Siwaliks, Mahabharat and Midlands close to the tower foundation sites will be controlled by application of bio-engineering.
- The tower foundation sites will be protected by the application of bio-engineering measures.
- Tower foundations sites will be further re-examined from the stability point of view and those sites which are stable will only be used for tower foundations by adjusting the span between the towers.
- Excavations along tower foundations will be minimized to the required depth only without altering the ground drainage conditions.
- As far as possible, existing trails will be used for transportation of materials to ROW and Tower foundation sites. Incase new trail need opening will utilize the most stable part of the terrain to avoid erosion, gully formation and landslides.

II. Direct/Indirect Impact on Land Use

The land use change in sub-station and tower foundation sites will be the residual impact of the KCTLP. Following measures will be implemented to manage the land use change.

- The loss of forest land use due to clearance of tall trees along ROW wil be compensated by the compensatory afforestation programs in consultation with the district forest office in the near by areas of the ROW.
- The standing trees and vegetation along ROW particularly in the hilly terrian will not be cleared untill and unless the clearance is neccecciated for the safety of the cables and pylon structures.
- Vegetation clearance areas of the ROW will be planted by NTFP species of lower heights
- The agricultural land use will be allowed for agricultural purpose except for the clearance of built structures and tall trees.

III. Direct/Indirect Impacts on Noise Levels

To minimise the impacts of noise levels, following measures will be implimented:

- Except in the sub-station heavy machinery will not be used for construction.
- Noise producing construction activities at the tower foundation and substation will be carried out in the day time zone only.
- Anthropogenic noises at the camp sites will be minimised through special instruction to the workforce.

IV. Direct/Indirect Impact on Land Use

To minise the indirect land use changes following measures will be implemented.

- The spoil generated in the tower foundation wil be properly managed. Sidecasting of the spoil on the side slopes will be controlled.
- Headward progressing gullies in the Siwaliks, Mahabharat and Midlands close to the tower foundation sites will be controlled by application of bio-engineering.
- The tower foundation sites will be protected by the application of bio-engineering measures.

V. Direct/Indirect Impacts of Solid and Liquid Waste Disposal

Following measures will be implemented to minimise the impacts of solid and liqud waste disposal.

- The construction solid waste will be collected in safe area and will be disposed safely in consultation with the engineers.
- Spent oils, mobils, and other chemicals generated will be safely collected in drums and disposed as per the advice of the engineers.
- The toilets in the camps and active construction sites will be constructed as per the requirement of the construction workforce. Haphazard defecation will be prohibited.
- Other liqud and solid waste of the camp sites will be collected in safe sites and disposed as to the instruction of the engineers.

VI. Indirect Impact on Air Quality

To minimise the impacts on air quality in and around construction sites following measures will be implemented.

- Fugitive dust emissions in the foundation and substation construction sites will be minimised through regular sprinkling of water.
- Fuel wood at the camp sites will be replaced by the subsidised kerosene or LPG.

VII. Direct/Indirect Impact on Water Quality

Following measures will be implemented to minimise the impacts on water quality.

- Haphazard disposal of the solid and liquid wastes will be controlled.
- Toilets with sanitary earth pits will be provisioned in the camps and active construction sites.
- Final disposal of the spoil and solid or liquid waste will be carried out in areas away from the water path ways and water bodies.
- All the spent oils, mobiles and chemicals and the containers will be collected and managed as per the instruction of the engineers.

9.2.1.2 Operation Phase

I. Direct Noise Levels Impacts

The selection of substation sites, conductor cables, provision of ROW, etc on the selected alignment itself is the mitigation measures attached with design. No further mitigation measures are envisaged and will be residual impact of the project throughout the project life.

II. Direct/Indirect Electro-magnetic fields Impacts

Alignment route selection, provision of 18 m wide ROW, ground clearance level, selection of the sub-station site and above all provision of good earthing in all the pylon structures are the measures for the reduction of electromagnetic fields and its effects. To further avoid and minimize the impacts, a program of awareness building will be implemented on the safety issues to the communities along the ROI of transmission corridor.

III. Direct/Indirect Soil Erosion and Land Instability Impacts

To minimize the erosion due to maintainance activities, only lopping topping of the grown up vegetation will be carried out, such that the growth of vegetation next year does not reach the cables.Besides, NTFP planation along the cleared forest areas will be promoted.

IV. Direct/Indirect Impact on Water Quality (oil spillage)

To minimise the impact follwoing measures will be implemented.

- The spent oils of the transformer will be collected in drums and disposed safely as per the instruction of the environmental regulations.
- Higher safety measures will be employed to minimise the oil leaks
- Oil trapping equipments will be installed in the outlets of runoff from the transformer areas and substation areas.
- Camp wastes will be managed to control water pollution of the surrounding receiving water bodies.

9.2.1.3 Summary of the Physical Environmental Impacts and Mitigation Costs

Table 9.**1** presents the summarised matrix of Physical impacts, mitigation measures and mitigation costs.

Table 9.*1* : Physical Impacts, Mitigation Measures and Mitigation Cost Matrix

S.N	Environmental Impacts	Mitigation Measure	Mitigation costs
A.Construction Phase			
A.1.1	Direct/Indirect Soil Erosion and Land Instability Impact	Ground clearance activities prarticularly in the forested areas of the Siwaliks and steep slopes of the Mahabharat and Midlands will be limited to trimmings of the tall standing trees as required for the safety of the cables.	No direct costs
A.1.2		The cleared areas of the Terai, and gentler slopes of the Mahabharat and Midlands will be managed by NTFP plantation with consideration of soil erosion and land stability impacts	Included in enhancement program
A.1.3		The spoil generated in the tower foundation will be properly managed. Sidecasting of the spoil on the side slopes will be controlled.	Included in civil costs
A.1.4		Headward progressing gullies in the Siwaliks, Mahabharat and Midlands close to the tower foundation sites will be controlled by application of bio-engineering.	Included in civil costs
A.1.5		The tower foundation sites will be protected by the application of bio-engineering measures.	Included in civil costs
A.1.6		Tower foundations sites will be further re-examined from the stability point of view and sites which are stable will only be used for tower foundations by adjusting the span between the towers.	Included in civil costs
A.1.7		Excavations along tower foundations will be minimized to the required depth only without altering the ground drainage conditions.	No direct costs
A.1.8		As far as possible, existing trails will be used for transportation of materials to ROW and Tower foundation sites. Incase new trail need opening will utilize the most stable part of the terrain to avoid erosion, gully formation and landslides.	No direct costs
A.2.1	Direct/Indirect Impact on Land Use	The loss of forest land use due to clearance of tall trees along ROW wil be compensated by the compensatory afforestation programs in consultation with the district forest office in the near by areas of the ROW	Included in Biological mitigation
A.2.2		The standing trees and vegetation along ROW particularly in the hilly terrian will not be cleared untill and unless the clearance is	No direct costs

S.N	Environmental Impacts	Mitigation Measure	Mitigation costs
		Necessitated for the safety of the cables and pylon structures	
A.2.3		Vegetation clearance areas of the ROW will be planted by NTFP species of lower heights	Included in environmental enhancement
A.2.4		The agricultural land use will be allowed for agricultural purpose except for the clearance of built structures and tall trees	No direct costs
A.3.1	Direct/Indirect Impacts on Noise Levels	Except in the sub-station, heavy machinery will not be used for construction	No direct costs
A.3.2		Noise producing construction activities at the tower foundation and substation will be carried out in the day time zone only	No direct costs
A.3.3		Anthropogenic noises at the camp sites will be minimised through special instruction to the workforce	No direct costs
A.4.1	Direct/Indirect Impact on Land Use	The spoil generated in the tower foundation wil be properly managed. Sidecasting of the spoil on the side slopes will be controlled	Included in civil costs
A.4.2		Headward progressing gullies in the Siwaliks, Mahabharat and Midlands close to the tower foundation sites will be controlled by application of bio-engineering	Included in civil costs
A.4.3		The tower foundation sites will be protected by the application of bio-engineering measures	Included in civil costs
A.5.1	Direct/Indirect Impacts of Solid and Liquid Waste Disposal	The construction solid waste will be collected in safe area and will be disposed safely in consultation with the engineers	Included in civil costs
A.5.2		Spent oils, mobils, and other chemicals generated will be safely collected in drums and disposed as per the advice of the engineers	Included in civil costs
A.5.3		The toilets in the camps and active construction sites will be constructed as per the requirement of the construction workforce. Haphazard defecation will be prohibited	Included in civil costs
A.5.4		Other liqud and solid waste of the camp sites will be collected in safe sites and disposed as to the instruction of the engineers	Included in civil costs
A.6.1	Indirect Impact on Air Quality	Fugitive dust emissions in the floundatin and substation construction sites will be minimised through regular sprinkling of water	Included in civil costs
A.6.2		Fuel wood at the camp sites will be replaced by the subsidised kerosine or LPG	Included in civil costs
A.7.1	Direct/Indirect Impact on Water Quality	Haphazard disposal of the solid and liquid wastes will be controlled	No direct costs

S.N	Environmental Impacts	Mitigation Measure	Mitigation costs
A.7.2		Toilets with sanitary earth pits will be provisioned in the camps and active construction sites	Included in civil costs
A.7.3		Final disposal of the spoil and solid or liquid waste will be carried out in areas away from the water path ways and water bodies	Included in civil costs
A.7.4		All the spent oils, mobiles and chemicals and the containers will be collected and managed as per the instruction of the engineers.	Included in civil costs
B. Operation Phase			
B.1.1	Direct Noise Levels Impacts	Selection of substation sites, conductor cables, provision of ROW	Already accomplished
B.2.1	Direct/Indirect Electro-magnetic fields Impacts	Alignment route selection, provision of 18 m wide ROW, ground clearance level, selection of the sub-station site	Already accomplished
B.2.2		A program of awareness building implemented on the safety issues to the communities along the ROI	Included environmental enhancement
B.3.1	Direct/Indirect Soil Erosion and Land Instability Impacts	Only lopping topping of the grown up vegetation will be carried out	Included in operation costs
B.3.2		NTFP planation along the cleared forest areas	Included in environmental enhancement
B.4.1	Direct/Indirect Impact on Water Quality (oil spillage)	The spent oils of the transformer will be collected in drums and disposedsafely as per the instruction of the environmental regulations	Included in operation costs
B.4.2		Higher safety measures will be employed to minimise the oil leaks	Included in operation costs
B.4.3		Oil trapping equipments will be installed in the outlets of runoff from the transformer areas and substation areas	Included in operation costs
B.4.4		Camp wastes will be managed to control water pollution of the surrounding receiving water bodies	Included in operation costs
	Total mitigation cost construction phase		NRs. 0.00
	Total mitigation cost operation phase		NRs. 0.00
	Grand total mitigation costs socio-economic and cultural environment		NRs. 0.00

Note: ***No direct costs in this report means the measures could be implemented by simple management guideline, no extra personnel, machinery, or equipment is needed to implement the measures***

Cost included in civil or operation means the cost of mitigation is already included in the civil or operational costs. No extra cost is required to implement the mitigation measures and the proponent ensures to implement these measures from the costs of the civil, and operation

9.2.2 Biological Environment

9.2.2.1 Construction Phase

I. Direct Impacts of Fragmentation of Forest Land

During the alignment survey, maximum efforts were made to minimize the area across the forested land to avoid damage on forest structure and vegetation. The damage to the forest structure of the selected alignment is unavoidable given the four end points. Similarly, clear felling on the tower foundation site is also unavoidable. This will remain as the residual impact of the project.

With regard to the loss of vegetation, standing stock, trees and poles above one and half meter height or to the height less than 5 meter below the stringing cable along ROW need felling, whereas the shrubs, herbs and seedling at a height of one and half meter above the ground does not require felling. However, during cable stringing, some width of the ROW (say less than 5 meter) may require clear felling to provide damage safety to the cable to be strung. The above practice will be implemented to minimize the loss of standing vegetation and biodiversity during the construction phase. The above practice is envisaged to minimize the loss of standing wood stock and there will be negligible impact on the floral biodiversity. Apart from the above, following measures will be implimented to minimise the indirect impacts on the forest resources.

- Restricting the felling to only lopping and topping of the high growing or potentially high growing trees and poles.
- No ground clearing of herbs and shrubs up to a height of one and half meter.
- Employ the local area people for all the unskilled jobs
- Restrict outside workforce in the make-shift camps only where the construction materials are stored
- Provide alternative fuel arrangements other than the fuel wood in the make shift camps
- Instruct and control the workforce regarding the damage on the vegetation structure and vegetation regularly and punish those who indulge on such activities other than specified.

II. Direct/Indirect Impacts on forest vegetation/biodiversity specifically of Protected, Rare and Endangered species

To compensate the loss of standing vegetation, an afforestation program of the lost tree speceis will be launched as per the Guidelines to permit forest land for other purpose (2006) to afforest 25 saplings for the loss of one tree species (common as well as protected species) above 10 cm DBH in coordination with the District Forest Offices of Jhapa, Ilam, Panchthar, and Terhathum, and the Community Forest User groups along the adjoining areas of the ROW. The afforestation program will seek to minimize the visual impacts of the transmission line as far as possible. Besides compensation to the land will be given to the occupied forest areas as per the forest rules.

III. Direct/Indirect Impacts on Wildlife Habitats specifically of Protected, Rare and Endangered species

To minimize the indirect losses of the wildlife and wildlife habitats due to work forces, following will be implemented.

- Restricting the felling to only lopping and topping of the high growing or potentially high growing trees and poles.
- No ground clearing of herbs and shrubs up to a height of one and half meter.
- Employ the local area people for all the unskilled jobs
- Restrict outside workforce in the make-shift camps only where the construction materials are stored
- Prohibit on the use of the wildlife meat in the make shift camp
- Instruct and control the workforce regularly on the damage on the wildlife and vegetation and punish those who indulge on activities that damages wildlife and wildlife habitats.

9.2.2.2 Operation Phase

I. Direct Impacts of Bird Hits particularly across the Waterways

To minimize the impacts on birds following will be implemented.

- Use of bird flight diverters (squiggles) where the conductors are standing high to the adjoining trees outside ROW to increase the visibility of the conductors particularly across the water ways and along the ridge summits
- Conductors will be placed lower than the standing trees located outside ROW

II. Direct/Indirect Impacts to wildlife

The effects of electromagnetic fields are unavoidable and will remain as the residual impact. To avoid climbing of wildlife on the pylon structures,

- Barricade to divert wild animals will be erected around the tower foundations and substation sites.
- Tower structures will be equipped with thorny protuberances in the lower half to restrict wild animal climbing along the pylon

Apart from the above, the maintenance workers will be strictly instructed not to damage wildlife habitat or hunt the wildlife during maintenance works along ROW.

III. Direct/Indirect Impacts to Forest Resources due to on site / off site Maintenance Activities

The maintenance workers will be strictly instructed to controlled safety felling activities along ROW for:

- Restricting the felling to only lopping and topping of the high growing or potentially high growing trees and poles.
- No ground clearing of herbs and shrubs up to a height of one and half meter.

IV. Direct Impacts of Weeds encroachment on biodiversity

To minimise the impacts of weed envasion following measures will be implemented.

- No ground clearance of herbs and shrubs up to height of one and hallf meter
- NTFP plantation program along the ROW cleared areas.

9.2.2.3 Summary of the Biological Environmental Impacts and Mitigation Costs

Table 9.**2** presents the summarised matrix of Physical impacts, mitigation measures and mitigation costs**.**

Table 9.*2* : Biological Impacts, Mitigation Measures and Mitigation Cost Matrix

SN	Environmental Impacts	Mitigation Measure	Mitigation costs
A.Construction Phase			
A.1.1	Direct Impacts of Fragmentation of Forest Land	Restricting the felling to only lopping and topping of the high growing or potentially high growing trees and poles upto height of 1.5m only	No direct costs, ROW clearance cost is included in the civil contract
A.1.2		No ground clearing of herbs and shrubs up to a height of one and half meter	No direct cost
A.1.3		Employ the local area people for all the unskilled jobs	No direct cost
A.1.4		Restrict outside workforce in the make-shift camps only where the construction materials are stored	No direct cost
A.1.5		Provide alternative fuel arrangements other than the fuel wood in the make shift camps	Inlcuded in civil cost
A.1.6		Instruct and control the workforce on the damage on the vegetation structure and vegetation regularly and punish those who indulge on such activities other than specified	No direct cost
A.2.1	Direct/Indirect Impacts on forest vegetation/biodiversity specifically of Protected, Rare and Endangered species	Afforestation program of the lost tree speceis will be launched as per the Guidelines to permit forest land for other purpose (2006) to afforest 25 saplings for the loss of one tree species (common as well as protected species) above 10 cm DBH in coordination with the District Forest Offices of Jhapa, Ilam, Panchthar, and Terhathum, and the Community Forest User groups along the adjoining areas of the ROW	NRs. 1,03,58,250.00 @ NRs. 30 / plant for 3,45,275 trees
A.2.2		Compensation to the land will be given to the occupied forest areas as per the forest rules	NRs 1,05,27,606.00 for 30 years @ Nrs. 1500/ha/yr with annual increment of 10% for 20 years and thereafter the rate of 20th year
A.3.1	Direct/Indirect Impacts on Wildlife Habitats specifically of Protected, Rare and Endangered species	Restricting the felling to only lopping and topping of the high growing or potentially high growing trees and poles	No direct costs, ROW clearance cost is included in the civil contract
A.3.2		No ground clearing of herbs and shrubs up to a height of one and half meter	No direct costs
A.3.3		Employ the local area people for all the unskilled jobs	No direct costs
A.3.4		Restrict outside workforce in the make-shift camps only where the	No direct costs

SN	Environmental Impacts	Mitigation Measure	Mitigation costs
		construction materials are stored	
A.3.5		Prohibit the use of the wildlife meat in the make shift camp	No direct costs
A.3.6		Instruct and control the workforce regularly on the damage on the wildlife and vegetation and punish those who indulge on activities that damages wildlife and wildlife habitats	No direct costs
B. Operation Phase			
B.1.1	Direct Impacts of Bird Hits particularly across the Waterways Direct/Indirect Impacts to wildlife	Use of bird flight diverters (squiggles) where the conductors are standing high the adjoining trees outside ROW to increase the visibility of the conductors particularly across the water ways and along the ridge summits	Included in civil costs
B.1.2		Conductors will be placed lower than the standing trees located outside ROW	No direct costs
B.1.3		Barricade to divert wild animals will be erected around the tower foundations and substation sites.	Included in civil cost
B.1.4		Tower structures will be equipped with thorny protuberances in the lower half to restrict wild animal climbing along the pylon	Included in civil cost
B.1.5		maintenance workers will be strictly instructed not to damage wildlife habitat or hunt the wildlife during maintenance works along ROW	No direct costs
B.2.1	Direct/Indirect Impacts to Forest Resources due to on site / off site Maintenance Activities	Restricting the felling to only lopping and topping of the high growing or potentially high growing trees and poles	No direct costs
B.2.2		No ground clearing of herbs and shrubs up to a height of one and half meter	No direct costs
B.2.3	Direct Impacts of Weeds encroachment on biodiversity	No ground clearance of herbs and shrubs up to height of one and hallf meter	No direct costs
B.2.4		NTFP plantation program along the ROW cleared areas	Included in environmental enhancement
	Total mitigation cost construction phase		**NRs. 2,08,85,856.25**
	Total mitigation cost operation phase		NRs. the programs of construction will continue

Note: ***No direct costs in this report means the measures could be implemented by simple management guideline, no extra personnel, machinery, or equipment is needed to implement the measures***

Cost included in civil or operation means the cost of mitigation is already included in the civil or operational costs. No extra cost is required to implement the mitigation measures and the proponent ensures to implement these measures from the costs of the civil, and operation

9.2.3 Socio-economic and Cultural Environment

9.2.3.1 Construction Phase

I. Direct Impacts of Loss of Property and Land (such as Population Displacement)

Permanent land take and restriction on certain land uses along the ROW could not be avaoided due to the nature of the project. In the context of Nepal, land to land replacement is also not possible because of the limited availability of the usable lands. The only option to mitigate the impacts of the permanent land is to compensate the affected people in monetary terms. The affected private land owners will be compensated as per the Land Aquisition Act. However, following policy measures will be employed for the compensation to the permanent land and property aquistion of the affected households.

- Identification of the impacted landowners of the transmission line ROW and census socio-economic survey of the impacted households of ROW and substation sites.
- Compensation to the permanently acquired lands will be made at the market price value at the time of land aquisition
- Compensation to the property (built structures and other facilities) will be made at the market value and no depreciation will be made to the market value at the time of demolition
- The households will be allowed for the salvation of the demolished materials and the project will provide transportation costs to transport the salvaged materials.
- The residential housholds whose house is demolished will be provided discomfort allowances for 6 months rentals, and livelihood subsistence apart from the compensation of the demolished property.
- Rehabilitation programs to the seriously affected households such that the household should at least maintain their livelihood as of the present.

The ROW land not required for structural placement will be restricted for land use such that built structures and plantation of big trees will be not allowed in the ROW. In most of the developed countires, the entire land of ROW is permanently acquired. In the context of Nepal, as there is limited availability of arable land, such a practice will have long term serious food security implications. It is therefore, the restriction in land use is the most appropriate solution by partly compensating the affected households for land use restricion, while land title is still given to the affected households. This is envisaged to maximise the agricultural production vis a vis avoid land encroachment by the outsiders and minimise the burden of ROW land management by the proponent. In practice, flat 10 percent of the land market price value is compensated by the proponent in other similar projects for land use restriction. Such a flat compensation may not be pragmatic in different settings such as open rural land, settlement area land and land of urban potential. It is therfore, 15 percent of land value compensation in rural open land area, 25% in settlement areas and 35% in the urban area will be employed by the proponent to compensate for the land value depreciation impacts along ROW to the land owners.

The areas required temporarily during construction period for camps and storage facilities will be provisioned for land rentals for the period of occupancy. Since such lands will be taken by the contractors as to their ease, the contract document will ensure that the rentals to such lands will be paid not less than the annual agricultural production of the lands. Besides, the contractor will have to rehabilitate such lands like previous conditions during the time of handover to the landowners.

II. Direct Impacts of Loss of Agricultural Crops and Other Fodder and Fruit Trees (such as Loss of Livelihood /Loss of Quality of Life)

To minimise the impacts of the loss of standing crops at the time of construction following measures will be implemented.

- The standing crops, fodder and fruit trees in the lands aquired permanently will be compensated at the market price, if these lands have standing crops at the time of land aquisition.
- The standing trees in the agricultural lands as well as private forest areas will be compensated at the market price. The felled trees will be given to the respective owners of the land
- The stringing of cables will be carried out in the dry season as far as possible. If any loss or damage of the standing crops occured, such crops will be compensated as per the market price.

III. Direct and Iindirect Impacts on Gender, Indigenous, Tribal and Vulnerable Groups

The direct and indirect impacts on gender, endiginous, tribal and vulnerable people will be minimises by the following measures.

- Gender discrimination in the job opportunities will be prohibited
- All the construction workforce will be instructed to give respect to the female members of the society
- The female members, members of the indiginous, tribal and vulnerable groups among the directly impacted housholds will be given priority in the skill training programs, and NTFP enhancement programs and in the project related job opportunities during construction and operation phase

IV. Direct Impacts on Community Forest/ Leasehold Forest Resources

Following measures will be implemented to minimise the impacts on community forest and leasehold forest.

- The standing trees of the community and leasehold forests will be compensated as per the norms of Forest guidelines for the aqusition of the forest land (2006).
- The community forest user groups will be given NTFP enhancement training programs and will be encouraged for the NTFP plantation in the transmission line ROW.
- The interested community forest user group memebers and leasehold forest memebers will be given job opportunity in the compensatory afforestation programs as per the Forest guidelines (2006)

V. Direct Impacts to the Telephone, Electricity Lines

Following measures will be implemented to minimise the impacts to telephone and electric lines underneath the transmission line.

- The telephone and electricity user communities will be given prior information regard to disruption of services
- The services will be re-established as soon as the completion of the cable stringing.
- Clearance above the telephone and electrical distribution lines will be maintained in all the areas.

VI. Direct Impacts on Occupational Health

To minimise the impacts on occupational health following measures will be implemented.

- The construction workforce will be instructed with regard to the occupational health risk of the construction works in a regular basis
- The construction workforce will be provided with protective equipments such as helmets, boots, gloves, and other gears required for the protection of occupational health safety.
- First aid kits will be provisioned in all the working sites with instructions of use.
- Health and safety plans will be prepared and operationalised for the entire period of construction to safeguard the health and safety of the construction workforce with provisions of rescue in case of accidents.

VII. Indirect Impacts on Community Health and Hygiene

The measures enlisted as under will be implemented to minimise the impacts.

- The construction workforce will be provisioned for the free condoms
- Only healthy members will be employed in the construction workforce

- As far as possible, job opportunities will be given to the local area communities
- Sanitary conditions of the camps such as toilets, water supply, solid and liquid wastes will be managed by launching special sanitary programs.
- Information to the local people through FM radios on the related construction hazards on the health and hygiene of the community

VIII. Indirect Impacts to Local Infrastructure Services (Schools, Health, Water Supply, Markets, Transportation, Communication etc. Services)

To minimise the impacts, following measures will be implemented.

- Local employment be maximized such that impacts to local infrastructure services will be minimised.
- The camps will be provisioned with separate fair price shop to the outside workforce for consumer products which are imported to the local area.
- The vegetables and other daily consumer products grown locally will be given priority for camp consumption
- The camps will be provisioned with separate communication services and transport services.
- The camps will not use the local water supply facilities and establish its own water supply at the camps.
- Health services will be provided for the workforce of the camps by the project and shall not depend upon the local health services.
- The outside workforce will be discouraged to bring their family memebers in the local area

IX. Direct/Indirect Impacts on the Communal Resources (Grassland, Recreational Areas, other Public Lands etc.)

Following measures will be implemented for the impact minimization by the project.

- The transmission line alignment has avoided as far as possible the community resources under the ROW.
- The camps will not use fuelwood for its daily food cooking. LPG or kerosene will be provisioned for the cooking by the project in subsidised rates.
- The camps sites will be located as far as possible outside the public lands or community lands.
- Any loss to the communial resources by the project will be compensated to the communities at the market price.

X. Indirect Impacts on Law and Order Situation

Following measures will be implemented to minimise the impacts on law and order.

- The local law and order authorities will be regularly informed about the construction planning and sites of construction works and ativities.
- The construction workforce will be regularly instructed to respect local people and their traditions and culture and not to endulge in any conflict with the local people.
- The construction workforce will be regularly instructed to remain within the camps in between 19.00 hrs to 6.00 AM hours of the day unless required for construction works.
- Avoid entering into private premises without informing and without the permission of the property owners.

XI. Indirect Aesthetic Impacts of Stockpiling of the Construction Materials

To minimize the impacts on the aesthetics during construction, following measures will be implemented.

- Placement of material stockpile in closed areas not obstructing the general visual aesthetics of the stockpile area
- Foundation excavation works be limited to the required amount and placement of the material and spoil in environmentally friendly manner not disturbing the local visual aesthetics.
- Stockpile the cleared vegetation (timber and biomass) in specific areas not disturbing the local visual aesthetics.

XII. Indirect Impacts to Local Tradition and Culture

Following measures will be implemented to minimize the impacts on culture and traditions.

- Maximizations of local employment
- Instruct contractors and outside workforce to honor local culture and tradition and behave decently with the local people

9.2.3.2 Operation Phase

I. Direct Impacts on Property Value

The land values of the ROW and adjoing areas of ROW and substation will be depreciated once the project is developed. The ROW land will be compensated to some extent for depriciation according to the location of land for land use restriction. However, the areas close to the substation and ROW will not be compensated. This will remain as the residual impact of the project throughout the life of the transmission line.

II. Direct Impacts of Electric and Electromagnetic Field and Stray Voltage on Public Health

The impacts of electric and electromagnetic fields and stray voltage along the ROW could not be avoided or minimised and will remain as the residual impact of the project. It is for this purpose only the land along ROW is compensated partially. However, to minimise the impacts following measures will be implemented.

- Awareness programs will be launched at the begining of the project operation to the local communities close to the ROW land on the potential impacts and precautionary measures to be employed to protect onself from the electrical and electomagnetic fields and stray voltage.
- Hoarding boards will be placed in critical places along ROW with instructions to safeguard from the electrical, electromagnetic and stray voltage impacts.
- Barricade the Pylon structures from easy access to the people

III. Direct Impacts on Radio, Television, Telephone, Mobile Reception and Implementable Medical Devices

This is an unavoidable impacts of the KCTLP operation and will remain as the residual impact of the project throughout the project life. Restriction for land use on built structures is envisaged to minimise the impacts to some degree. However, the people with implementable medical devices will be informaed to avoid living close to the high voltage transmission line.

IV. Direct Impacts to Occupation health

To minimize the impacts due to occupation health to the maintenance workforce, following will be implemented.

- Provide regular training to the maintenance workforce about the risk and safety measures that need to be taken while maintaining the line and sub-station.
- Provide safety gears to the maintenance workforce and instruct their compulsory use during the maintenance work.

V. Impacts to the Local Area Aesthetics and Tourism

Aesthetics impacts due to high standing pylon structures on the natural backdrop are unavoidable impact. However, the selection of the alignment route has taken this issue and selected the alignment with minimum implications on visual aesthetics (the proposed route lies away from the transportation corridors of the area). To minimize the impacts on visual aesthetics, followings will be implemented.

- Plantation of high growing local tree species on either side of the ROW to hide the pylons and the cables at a safe distance from the cable and pylon structure outside the ROW.

VI. Direct Impacts on Aesthetic Values

Aesthetics impacts due to high standing pylon structures on the natural backdrop are an unavoidable impact. The selection of the KCTLP alignment has given maximum consideration, however, will be a residual impact of the project through out the project life.

9.2.3.3 Summary of the Socio-economic and Cultural Environmental Impacts and Mitigation Costs

Table 9.3 presents the summarised matrix of socio-economic and cultural impacts, mitigation measures and mitigation costs.

Table 9.3 : Socio-economic and Cultural Impacts, Mitigation Measures and Mitigation Cost Matrix

SN	Environmental Impacts	Mitigation Measure	Mitigation costs
A.Construction Phase			
A.1.1	Direct Impacts of Loss of property and land (such as population displacement)	Identification and census socio-economic survey of the impacted households	NRs. 25,00,000.00
A.1.2		Compensation to the permanently occupied lands 4.324 ha at substation and Comensation the the permanently occupied lands at transmission right of way (2.821 ha)	NRs. 2,62,71,658 (substation and tower foundation Jhapha @ 90,43,600/ha for 2.905 ha) NRs. 61,19,175 (substation and tower foundation @ 75000/ropani for 4.15 ha in hills)
A.1.3		Compensation to ROW restriction (89.27 ha)	NRs. 1,53,74,120.00 for Jhapa @ of 90,43,600/ha (Total 9% land of TLCP corridor, 2% of for 35% urban land compensation, 1% of land for 25% settlment land compensation and 6 % of land for 15% open land compensation) NRs. 1,48,78,442.00 for hill @ of 75000/ropani (Total 81.2% land of KTLCP corridor, 2% of for 35% urban land compensation, 121% of land for 25% settlment land compensation and 67.276 % of land for 15% open land compensation)
A.1.4		Compensation to built structures (23 structures)	NRs. 80,50,000.00 @ Nrs. 3,50,000.00 lumpsum per structure
A.1.5		Discomfort allowance to affected residential households (discomfort and rentals)	NRs. 20,70,000.00 (lumpsum)
A.1.6		Transporttion allowances for the salvaged materials	NRs. 1,38,000.00 lumpsum
A.1.7		Rehabilitation programs to the seriously affected households (the programs shall be defined after the census socio-economic survey of the households whose land and property will be	NRs. 15,00,000.00 (lumpsum)

SN	Environmental Impacts	Mitigation Measure	Mitigation costs
		affected permanently by the project.)	
A.2.1	Direct Impacts of Loss of Agricultural Crops and Other Fodder and Fruit Trees (such as Loss of Livelihood /Loss of Quality of Life)	Compensation for the loss of standing crops in the permanently occupied areas	NRs. 5,46,072.00 annual production cost of the occupied land
A.2.2		Compensation for the loss of standing crops in the land use restriction areas	NRs. 80,86,315.00 one crop production in the dry season
A.2.3		Compensation as rentals to the temporarily occupied areas	NRs. 54,09,779.00 production loss of 4 years construction period
A.3.1	Direct and Iindirect Impacts on Gender, Indigenous, Tribal and Vulnerable Groups	Gender discrimination in the job opportunities will be prohibited	No direct costs
A.3.2		All the construction workforce will be instructed to give respect to the female members of the society	No direct costs
A.3.3		The female members, and members of the indiginous, tribal and vulnerable groups among the directly impacted housholds will be given priority in the skill training programs, and NTFP enhancement programs and in the project related job opportunities during construction and operation phase	No direct costs
A.4.1	Direct Impacts on Community Forest/ Leasehold Forest Resources	The standing trees of the community and leasehold forests will be compensated as per the norms of Forest guidelines for the aqusition of the forest land (2006).	Included in Biological environment
A.4.2		The community forest user groups will be given NTFP enhancement training programs and will be encouraged for the NTFP plantation in the transmission line ROW.	Included in environmental enhancement costs
A.4.3		The interested community forest user group memebers and leasehold forest memebers will be given job opportunities in the compensatory afforestation programs as per the Forest guidelines (2006)	No direct costs
A.4.4	Following measures will be implemented to minimise the impacts to telephone and electric lines underneath the transmission line.	The telephone and electricity user communities will be given prior information regard to disruption of services	No direct costs
A.4.5		The services will be re-established as soon as the completion of the cable stringing.	No direct costs
A.4.6		Clearance above the telephone and electrical distribution lines will be maintained in all the areas.	No direct costs
A.5.1	Direct Impacts on Occupational Health	The construction workforce will be instructed with regard to the occupational health risk of the construction works regularly	No direct costs
A.5.2		The construction workforce will be	Included in the civil

SN	Environmental Impacts	Mitigation Measure	Mitigation costs
		provided with protective equipments such as helmets, boots, gloves, and other gears required for the protection of occupational health safety.	contract of the contractors
A.5.3		First aid kits will be provisioned in all the working sites with instructions of use.	Included in the civil contract of the contractors
A.5.4		Health and safety plans will be prepared and operationalised for the entire period of construction to safeguard the health and safety of the construction workforce with provisions of rescue in case of accidents.	Included in the civil contract of the contractors
A.6.1	Indirect Impacts on Community Health and Hygiene	The construction workforce will be provisioned for the free condomes	Included in the civil contract of the contractors
A.6.2		Only healthy members will be employed in the construction workforce	No direct costs
A.6.3		As far as possible job opportunities will be given to the local area communities	No direct costs
A.6.4		Sanitary conditions of the camps, such as toilets, water supply, solid and liquid wastes will be managed by launching special sanitary programs.	Included in the civil contract of the contractors
A.7.1	Indirect Impacts to Local Infrastructure Services (Schools, Health, Water Supply, Markets, Transportation, Communication etc. Services)	Local employment be maximized such that impacts to local infrastruree services will be minimised	No direct costs
A.7.2		The camps will be provisioned with separate consumer good shops to the outside workforce for consumer products which are imported to the local area.	Included in the civil contract of the contractors
A.7.3		The vegetables and other daily consumer products grown locally will be given priority for camp consumption	No direct costs
A.7.4		The camps will be provisioned with separate communication services and transport services.	Included in the civil contract of the contractors
A.7.5		The camps will not use the local water supply facilities and establish its own water supply at the camps.	Included in the civil contract of the contractors
A.7.6		Health services will be provided for the workforce of the camps by the project and shall not depend upon the local health services.	Included in the civil contract of the contractors
A.7.7		The outside workforce will be discuraged to bring their family memebers in the local area	No direct costs
A.8.1	Direct/Indirect Impacts on the Communal Resources (Grassland, Recreational Areas, other Public Lands etc.)	The transmission line alignment has avoided as far as possible the community resources under the ROW	Already accomplished
A.8.2		The camps will not use fuelwood for its daily food cooking. LPG or kerosiene will be provisioned for the cooking by the project in subsidised rates.	Included in the civil contract of the contractors
A.8.3		The camps sites will be located as far as possible outside the public lands or	Included in the civil contract of the

SN	Environmental Impacts	Mitigation Measure	Mitigation costs
		community lands.	contractors
A.8.4		Any loss to the communial resources by the project will be compensated to the communities at the market price.	Included in the civil contract of the contractors
A.9.1	Indirect Impacts on Law and Order Situation	The local law and order authorities will be regularly informed about the construction planning and sites of construction works and ativities.	No direct costs
A.9.2		The construction workforce will be regularly instructed to respect local people and their traditions and culture and not to endulge in any conflict with the local people.	No direct costs
A.9.3		The construction workforce will be regularly instructed to remain within the camps in between 19.00 hr to 6.00 AM hours of the day unless required for construction works.	No direct costs
A.9.4		Avoid entering into private premises without informing and without the permission of the property owners.	No direct costs
A.9.5	Indirect Aesthetic Impacts of Stockpiling of the Construction Materials	Placement of material stockpile in closed areas not obstructing the general visual aesthetics of the stockpile area	No direct costs
A.9.6		Foundation excavation works be limited to the required amount and placement of the material and spoil in environmentally friendly manner not disturbing the local visual aesthetics	No direct costs
A.9.7		Stockpile the cleared vegetation (timber and biomass) in specific areas not disturbing the local visual aesthetics.	No direct costs
A.10.1	Indirect Impacts to Local Tradition and Culture	Maximizations of local employment	No direct costs
A.10.2		Instruct contractors and outside workforce to honor local culture and tradition and behave decently with the local people	No direct costs
B. Operation Phase			
B.1.1	Direct Impacts on Property Value	Partial compensation to ROW lands restricted for land use	
B.2.1	Direct Impacts of Electric and Electromagnetic Fields and Stray Voltage on Public Health	Awareness programs will be launched at the begining of the project operation to the local communities close to the ROW land on the potential impacts and precautionary measures to be employed to protect onself from the electrical and electomagnetic fields and stray voltage.	NRs. 10,00,000.00
B.2.2		Hoarding boards will be placed in critical places along ROW with instructions to safeguard from the electrical, electromagnetic and stray voltage impacts.	NRs. 15,00,000.00
B.2.3		Barricade the Pylon structures from	Included in civil costs

SN	Environmental Impacts	Mitigation Measure	Mitigation costs
		easy access to the people	construction phase
B.3.1	Direct Impacts on Radio, Television, Telephone, Mobile Reception and Implementable Medical Devices	Hoarding boards will be placed in critical places along ROW with instructions to safeguard from the electrical, electromagnetic	Already included above
B.3.2	Direct Impacts to Occupation health	Provide regular training to the maintenance workforce about the risk and safety measures that need to be taken while maintaining the line and sub-station.	Included in operational costs
B.3.3		Provide safety gears to the maintenance workforce and instruct their compulsory use during the maintenance work.	Included in operational costs
B.4.1	Impacts to the Local Area Aesthetics and Tourism	Plantation of high growing local tree species on either side of the ROW to hide the pylons and the cables at a safe distance from the cable and pylon structure outside the ROW	Included in compensator afforestation programs in biological environment
	Total mitigation cost construction phase		**8,84,43,561.00**
	Total mitigation cost operation phase		**25,00,000.00**
	Grand total mitigation costs socio-economic and cultural environment		**90,94,43,561.00**

Note: ***No direct costs in this report means the measures could be implemented by simple management guideline, no extra personnel, machinery, or equipment is needed to implement the measures***

Cost included in civil or operation means the cost of mitigation is already included in the civil or operational costs. No extra cost is required to implement the mitigation measures and the proponent ensures to implement these measures from the costs of the civil, and operation

Chapter 10: ENVIRONMENTAL MANAGEMENT PLAN

This Environmental Management Plan (EMP) has been prepared for the KCTLP to set out environmental management requirements and to develop procedures to ensure that all mitigation measures and monitoring requirements will be carried out in subsequent stages of project development. This plan covers structures of the Environmental Management Office (EMO) of the Project Management Office (PMO) and main roles and responsibilities of the parties involved in all phases of project viz., pre construction, construction, post construction or operation.

10.1 Statutory Requirements

10.1.1 Environmental Legislation

The Environmental Protection Act and Environmental Protection Rules is the main umbrella Act and Rules in Nepal, which covers environmental aspects of the project. The MoEv is the lead agency, however, for IEE the Ministry of Eergy is the lead agency which administers the environmental matters emphasizing on environmental conservation and management through internalizing environmental assessment, pollution control and prevention, conservation of natural heritage sites, compensation for environmental damages etc. However, there are several other policies, guidelines, acts and rules which relate to construction and operation of KCTLP and should comply with the provisions by the involved parties during the period. The relevant Government of Nepal legislation and government policies and guidelines affecting and applicable to the project are listed below:

Policies:

- Three Years Interim Plan, (2008)
- Nepal Biodiversity Strategy (2002)
- National Water Plan; Water Resources Strategy, (2002)
- Hydropower Development Policy, (2001)
- Forestry Sector Policy, (2000)

Laws and Rules

- Ancient Monument Protection Act, (1956),
- Land Acquisition Act, 2034 (1977),
- Soil and water conservation Act, 2039 (1982),
- Electricity Act 2049 (1992),
- Electricity Regulations 2050 (1993),
- Water Resource Act, 2049 (1992),
- Forest Act, 2050 (1993), and amendments (1995),
- Water Resource Regulations 2050 (1993),
- Forest Rules (1995),
- Local Self-Governance Act (1998)
- Local Self Governance Rules (1999)
- Interim Constitution of Nepal, (2007)
- Land Reform Act, 2021

Directives/Guidelines

- Forest Produce, Collection, Sale and Distribution Guideline, (2000)
- Community Forest Guidelines, 2058;

- Community Forest Inventory Guidelines, 2062; and
- Forest Guidelines to permit Forestland for other Purpose (2006)

International Conventions and Treaties

- Convention on Biological Diversity, 1992
- Convention (No.169) Concerning Indigenous and Tribal Peoples in Independent Countries (1991)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1983)

10.1.2 Environmental Standards

There are very few environmental standards endorsed by MOEv and other GON line agencies. Except for vehicular emissions standards and tolerance limits for inland effluent discharge, most of the environmental pollution standards, are in the formulation process. Considering the above situation following environmental standards are proposed for KCTLP construction and operation. These environmental standards shall be treated as other acts and regulations until GON enforces standards in the specified sector for the project environmental compliance propose.

Table 10.1: Standards for Effluents Discharged into Inland Waters from the Construction Sites and Camps

SN	Parameters	Tolerance Limits
1.	Total Suspended solids, mg/L, Max	30-200
2.	Particle size of total suspended particles	Shall pass 850-micron Sieve.
3.	pH	5.5 to 9.0
4.	Temperature	Shall not exceed 40 degree C in any section of the stream within 15 meters down-stream from the effluent outlet
5.	Biochemical oxygen demand (BOD) for 5 days at 20 degree C, mg/L, Max	30-100
6.	Oils and grease, mg/L, Max	10
7.	Phenolic compounds, mg/L, Max	1
8.	Cynides (as CN), mg/L, Max	0.2
9.	Sulphides (as S), mg/L, Max	2
10.	Radioactive materials:	
11.	a. Alpha emitters, c/ml, Max	7 OCT
12.	b. Beta emitters, c/ml, Max	8 OCT
13.	Insecticides	Absent
14.	Total residual chlorine, mg/L	1
15.	Fluorides (as F), mg/L, Max	2
16.	Arsenic (as As), mg/L, Max	0.2
17.	Cadmium (as, Cd), mg/L, Max	2
18.	Hexavalent chromium (as Cr), mg/L, Max	0.1
19.	Copper (as Cu), mg/L, Max	3
20.	Lead (as Pb), mg/L, Max	0.1
21.	Mercury (as Hg), mg/L, Max	.01
22.	Nickel (as Ni), mg/L, Max	3
23.	Selenium (as Se), mg/L, Max	0.05
24.	Zinc (as Zn), mg/L, Max	5
25.	Ammonical nitrogen, mg/L, Max	50
26.	Chemical Oxygen Demand, mg/L, Max	250
27.	Silver, mg/L, Max	0.1

Source: Standards adopted from MOEST

Table 10.2: Drinking Water Quality Standards for Construction Camps and Construction Sites

SN	Parameters	Desirable Limits	Maximum Tolerable Limit
1.	Colour, Hazen units, Max	10	15
2.	Odour	Unobjectionable	
3.	Taste	Agreeable	
4.	Turbidity, NTU, Max	5	10
5.	Total Dissolved Solids, mg/l , Max	500	1500
6.			
7.	$_3$) mg/l, Max	250	
8.			
9.			
10.			may be extended upto 1.5
11.	Iron (as Fe), mg/l, Max	0.3	
12.			
13.			
14.	$_4$), mg/l, Max	150	
15.	$_3$), mg/l, Max	45	No relaxation
16.	Fluoride (as F), mg/l, Max	1.5	
17.	$_6H_5OH$), mg/l, Max	0.001	May be relaxed upto 0.002
18.	Mercury (as Hg), mg/l, Max	0.001	No relaxation
19.	Cadmium (as Cd), mg/l, Max	0.01	No relaxation
20.	Selenium (as Se), mg/l, Max	0.01	No relaxation
21.	Lead (as Pb), mg/l, Max	0.01	No relaxation
22.	Arsenic (as As), mg/l, Max	0.05	No relaxation
23.	Cyanide (as CN), mg/l, Max	0.05	No relaxation
24.	Chromium (as Cr^{6+}), mg/l, Max	0.05	No relaxation
25.	Residual free Chlorine, (as Cl), mg/l, Min	0.2	
26.	Ammonia, mg/l, Max	1.5	
27.	Aluminium, mg/l, max	0.2	
28.	Boron mg/l, max	0.3	
29.	Nickel, mg/l, max	0.02	
30.	Hydrogen sulphide, mg/l, max	0.1	
31.	Zinc, mg/l, max	3	

Source: Standards adopted from Department of Water Supply & Sewerage

Table 10.3: Ambient Air Quality Standards in the Project Area

Parameters	Units	Averaging Time	Concentration in Ambient Air, maximum
TSP (Total Suspended Particulates)	$\mu g/m^3$	Annual	-
		24-hours*	230
PM_{10}	$\mu g/m^3$	Annual	-
		24-hours*	120
Sulphur Dioxide	$\mu g/m^3$	Annual	50
		24-hours**	70
Nitrogen Dioxide	$\mu g/m^3$	Annual	40
		24-hours**	80
Carbon Monoxide	$\mu g/m^3$	8 hours**	10,000
		15 minute	100,000
Lead	$\mu g/m^3$	Annual	0.5
		24-hours	-
Benzene	$\mu g/m^3$	Annual	20****
		24-hours	-

Source: National Ambient Air Quality Standards adopted from MOEST

**Note: 24 hourly values shall be met 95% of the time in a year. 18 days per calendar year the standard may be exceeded but not on two consecutive days.*

***Note: 24 hourly standards for NO_2 and SO_2 and 8 hours standard for CO are not to be controlled before MOPE has recommended appropriate test methodologies. This will be done before 2005.*

****Note: If representativeness can be proven, yearly averages can be calculated from PM10 samples from selected weekdays from each month of the year.*

*****Note: To be re-evaluated by 2005.*

Table 10.4: Emissions Standards for 'in-use' Vehicles

Fuel	*Wheelers Type*	*Manufacturing Date*	*Emissions*
Petrol	Four-Wheelers	Up to 1980	4.5% CO 1,000 ppm HC*
	Four-Wheelers	After 1981	3.0% CO 1,000 ppm HC*
	Three-Wheelers	Up to 1991	4.5% CO 7,800 ppm HC*
	Three-Wheelers	After 1991	3.0% Co 7,800 ppm HC*
	Two-Wheelers		4.5% CO 7,800 ppm HC*
Diesel		Up to 1994	75 HSU
		After 1994	65 HSU
LPG/CNG	All categories		3.0% CO* 1,000 ppm HC*

Source

Nepal Gazette, BS 2054-9-8, Ministry of Works and Transport

* *Nepal Gazette, BS 2057-7-7, Ministry of Population and Environment*

CO – carbon monoxide; HC – Hydrocarbon; HSU – Hertridge Smoke Unit

Table 10.5: Proposed Noise Exposure Limits for the Work Environment

(Adopted from Occupational Safety and Health Administration (OSHA).

SN	Noise Exposure (dBA)	Permissible exposure (Hours and Minutes)
1.	85	16 hrs.
2.	87	12 hrs. –18 min.
3.	90	8 hrs.
4.	93	5 hrs – 18 min.
5.	96	3 hrs.-30 min.
6.	99	2 hrs. – 18 min.
7.	102	1 hr. – 30 min.
8.	105	1 hr.
9.	108	40 min.
10.	111	26 min.
11.	114	17 min.
12.	115	15 min.
13.	118	10 min.
14.	121	6.6 min.
15.	124	4 min.
16.	127	3 min.
17.	130	1 min.

Source: Marsh, 1991.

Table 10.6: Proposed Average Equivalent Sound Levels Recommended to Protect the Public Health and Welfare of the Project Site Communities

S.N.	Land Use	Measure	To Protect Against Activity Interference and Hearing Loss Effects (dBA)
1.	Residential including farm residences	Leq (24)	55
2.	Commercial	Leq (24)	70
3.	Hospitals	Leq (24)	55
4.	Industrial	Leq (24)	70
5.	Educational	Leq (24)	55
6.	Recreational Areas	Leq (24)	70
7.	Farmland and general unpopulated land	Leq (24)	70

Source: U.S, Environmental Protection Agency, 1974

Note: Leq (24)= Equivalent Sound Level in decibels for 24 hours.

10.1.3 Environmental Permits and Approvals

Permits and Approvals relevant to the KCTLP are presented in table 10.7 below.

Table 10.7: Permits and Approvals Required

Issues	Authority	Approval and permits
IEE Approval and Construction License	Ministry of Energy and Department of Electricity Development	Approval and License
Tree clearing and Government owned land	Ministry of Forests and Soil Conservation District Forest Office,	Approval and permits
Tree clearing in Community Forest	Forest User Groups	Approval
Works on private land and property	Landowner	Approval
Relocation or disturbance to infrastructures such as electricity lines, telephone lines, motorable roads, foot trails and tracks, etc	Respective user committees/Village Development Committee and Ward Office	Approval

10.2 Project Environmental Management Framework

10.2.1 Project Environmental Management Plan Structure and Stakeholders Responsibility

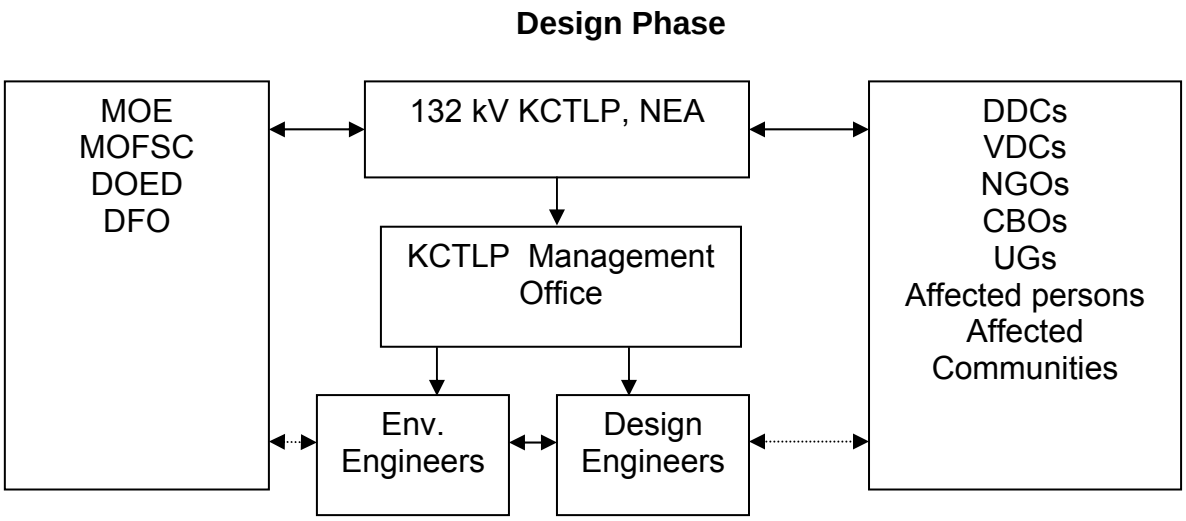
The Project Environmental Management Framework of KCTLP is prepared to shows linkages with different parties to be involved directly or indirectly during the different phases of project development and operation in compliance with the existing Act and Rules.

Overall project environmental management is the responsibility of KCTLP Management Office (PMO). Key stakeholders including KCTLP, to be involved for project environmental management in the hierarchy orders are:

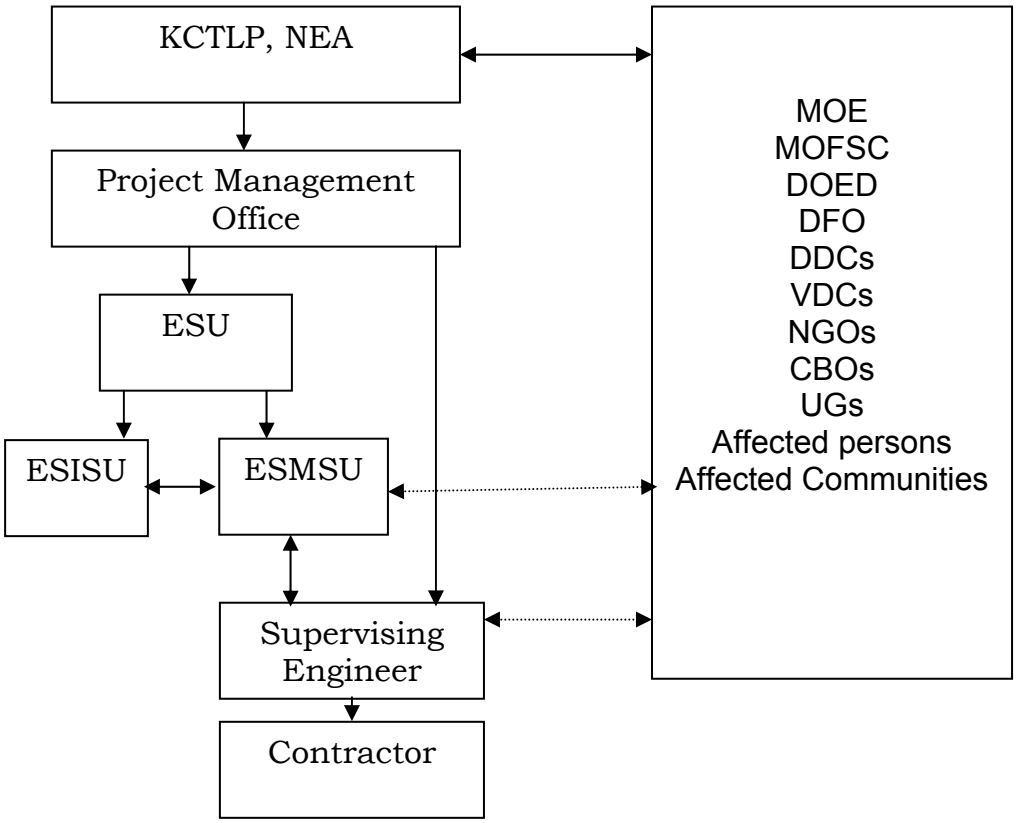
1 Ministry of Energy (MOE);
2 Ministry of Forest and Soil Conservation (MOFSC)
3 Department of Electricity Development (DOED);
4 Department of Forest and its line District Office
5 The Proponent (NEA) and its line offices
6 Environmental Engineers (EE)
7 Supervising Engineers (SE);
8 Construction Contractor (CC);
9 Affected Village Development Committees and District Development Committee etc
10 Non-government Organizations, Community Based Organizations (Community Forest User Groups, and other user groups etc.).

Environmental Management Plan structure for different phases of project development and implementation are depicted in Figure 10.3.1

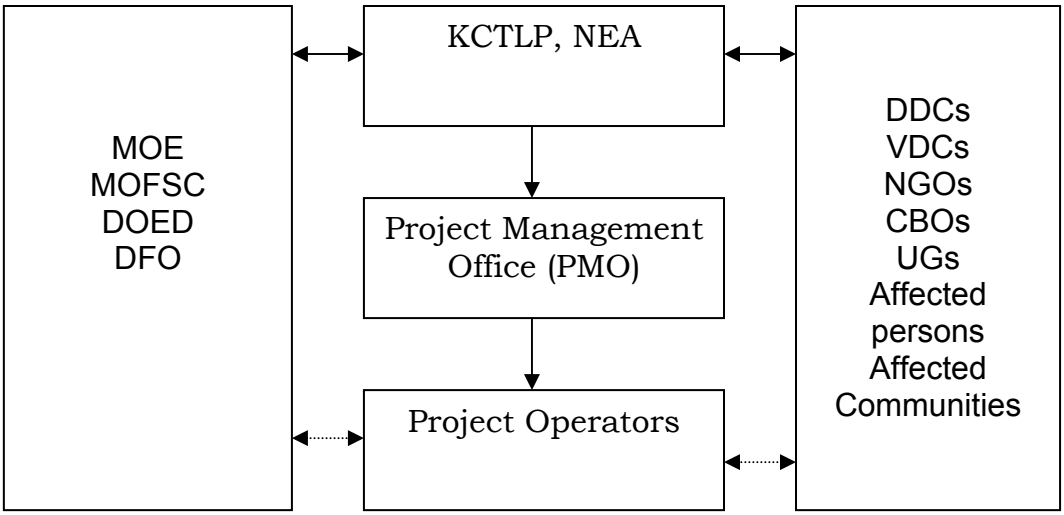
Figure 10.3.1: Project Management Plan Structure



Construction Phase



Project Operation Phase



The main roles and responsibilities of different parties in the various phases of project development are briefly presented in Table 10.8.

Table 10.8: Roles and Responsibilities of the Stakeholders

SN	Stakeholder	Roles and Responsibilities	Time Schedule
1	MOE/ DOED	▪ Final approval of IRR	IEE approval
		▪ Licensing and give permission for Project Implementation	After approval of IEE
		▪ Review project design and contract documents , against approved EIA measures and national environmental standards and give comments for corrective actions	Before contract bidding
		▪ Review of monitoring reports of project construction and operation and give comments for corrective actions	As and when required construction and operation phases
2	MOFSC DFO	▪ Review and comments on IEE for Final approval of IEE	Prior to IEE approval
		▪ Give approval and permission for forest clearance of the national forest land	After approval of IEE Pre-construction phase
		▪ Assist proponent in pegging, measuring and evaluation of the forest resources of the affected forest stretch	Before construction starts
		▪ Review of monitoring reports of project construction and operation and give comments for corrective actions related to forest and ecology	As and when required construction and operation phases
		▪ Assist the proponent in identification of compensatory afforestation areas as per the plans of the district and reserve areas so that Landscape Approach to Biodiversity Conservation	As and when required construction and operation phases
		▪ Advise and assist the proponent in the forestry awareness programs	As and when required construction and operation phases
3	Proponent and its institutional line offices	▪ Ensure that the IEE mitigation measures are incorporated in the final project design and tender documents of project construction and operation	Prior to contract award
		▪ Acquire necessary permits and approval for project construction and operation	Before construction
		▪ Ensure that the project construction and operation activities are in accordance with EIA and other GON legislative requirements.	During construction, and operation phase
		▪ Monitoring and record keeping regarding environmental measures and impacts.	During construction, and operation
		▪ Ensure public participation and involvement in project implementation and operation.	During construction, and operation.
		▪ Compilation of environmental monitoring and performance report and dispatch for review through proponent to stakeholders	Every 2 month during construction
		▪ Compilation of Environmental monitoring and performance report of construction activity and dispatch for review through proponent to stakeholders	Once within 3 months of construction completion
		▪ Compilation of Environmental monitoring and performance report of operation activity and dispatch for review to stakeholders	Once in three months for the first two years of operation
4	Environmental Engineers	▪ Supervision, baseline, compliance and impact monitoring of construction contractor's activities as per responsibilities in the contract document and advise the proponent and Supervising engineers for needed actions at the site in regular environmental management meetings.	Daily, weekly, monthly, three monthly
		▪ Monitoring of implementation of the socio-economic physical, cultural, chemical and biological environmental	Regularly during construction phase

SN	Stakeholder	Roles and Responsibilities	Time Schedule
		responsibilities of the proponent not included in the contract document and advise the proponent for needed actions	
		▪ Provide needed corrective action as per the field requirements to minimize the impacts	Regularly during construction phase
		▪ Prepare environmental monitoring report of the project construction and forward to the proponent for review to the stakeholder	Bi-monthly during construction and after three months of the project construction completion.
5	Construction Supervising Engineers	▪ Supervise the construction works as per the provisions of EIA and direct construction contractor in consultation with the environmental engineers for the environmental improvement	Regularly during construction phase
		▪ Preside monthly Environmental Management and Health and Safety Meetings of the supervising engineers, contractors and Environmental Engineers and maintain the records for implementation status and needed corrective actions	Monthly during construction
6	Construction Contractor	▪ Implement mitigation measures as specified in EIA or as instructed by supervising engineer	Daily during construction phase
		▪ First hand monitoring and record keeping of environmental mitigation measures implemented and their performance	Regularly during construction phase.
		▪ Implement any corrective actions specified by supervising engineers within specified time	Regularly during construction phase
		▪ Provide training to operator	First 1 years of operation phase
7	District Development Committees	▪ Provide recommendations to the proponent with comments and suggestions and assist proponent in the project implementation	Prior to proposal implementation
		▪ Assist in public consultation awareness building organized by the proponent	During construction and operation
		▪ Assist and provide suggestions to the proponent in the matters related to community mobilization	During construction and operation
		▪ Review of monitoring reports of project construction and operation and give comments for corrective actions	As and when required construction and operation phases
		▪ Ensure that transparency in the project activities are maintained by all the concerned stakeholders as per □□□ report and commitments	Regularly during construction and operation
8	Affected Village Development Committees	▪ Provide recommendations to the proponent with comments and suggestions and assist proponent in the project implementation	Prior to proposal implementation
		▪ Assist in public consultation awareness building organized by the proponent	During construction and operation
		▪ Assist and provide suggestions to the proponent in the matters related to community mobilization	During construction and operation
		▪ Review of monitoring reports of project construction and operation and give comments for corrective actions	As and when required construction and operation phases
		▪ Form Environmental Enhancement committees in each of the project affected VDCs and a central committee of EEC of the affected VDCs through a public franchise process to select and assist to implement the programs of Environmental Enhancement	Pre-construction and as and when required during construction and operation

SN	Stakeholder	Roles and Responsibilities	Time Schedule
		▪ Ensure that transparency in the project activities are maintained by all the concerned stakeholders as per □□□ report and commitments	Regularly during construction and operation
9	NGOs ,CBOs, WUG, CFUG	▪ Provide recommendations to the proponent with comments and suggestions and assist proponent in the project implementation	Prior to proposal implementation
		▪ Assist in public consultation awareness building organized by the proponent	During construction and operation
		▪ Assist and provide suggestions to the proponent in the matters related to community mobilization	During construction and operation
		▪ Review of monitoring reports of project construction and operation and give comments for corrective actions	As and when required construction and operation phases
		▪ Assist project affected VDCs to form Environmental Enhancement committees in each of the project affected VDCs and a central committee of EEC of the affected VDCs through a public franchise process to select and assist to implement the programs of Environmental Enhancement	Pre-construction and as and when required during construction and operation
		▪ Ensure that transparency in the project activities are maintained by all the concerned stakeholders as per IEE report and commitments	Regularly during construction and operation

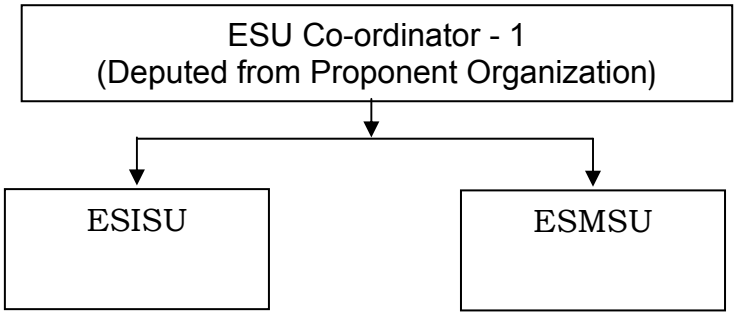
10.2.2 Project's Environmental Management Office

As per the Nepalese Environmental Protection Rules, environmental management of the project is the responsibility of the proponent. For KCTLP, NEA, the proponent's Project Management Office (PMO) has the responsibility of Project's Environmental Management.

To ensure that the recommended mitigation and monitoring actions are duly implemented, monitored, assessed, evaluated and disseminated to the stakeholders for feedback and improvement, the KCTLP, PMO should establish a separate Environmental and Social Unit (ESU) of its own. The proposed ESU has four major roles to play. First it will implement and administer land and property acquisition, compensation of affected parties. Second it will implement and administer the program in the project-affected areas. Third it will disseminate information to the project's stakeholders and co-ordinate with the different line agencies. Fourth it will monitor the environmental and social measures and its performance as per EMP.

The ESU will comprise of two sub-units, namely Environmental and Social Implementation Sub-unit (ESISU) and Environmental and Social Monitoring Sub-unit (ESMSU) ***Figure 10.3.2***. The former sub-unit will have the responsibility to implement environmental provisions not included in the contract documents of the contractor and liaison with the other governmental and non-governmental organizations. As these works require official responsibilities, the members of this sub-unit will be the regular members of the proponent organization with past experience in the implementation of environmental provisions and also in the operation of Public Information Center (PIC) and grievance handling.

Figure 10.3.2: Organization Framework of ESU



The ESMSU, on the other hand will be managed by the consultants with experience in environmental monitoring of the transmission line projects in the past. As the project envisages a third party monitoring during construction, the experienced consultants will be contracted to fulfill this requirement. They will work in close co-ordination with project ESU coordinator and ESISU and will report directly to Project ESU coordinator.

The project ESU shall be established at least six months before the project's civil construction award. The ESU shall function directly under the Project Manager but the ESMSU will have a responsibility to co-ordinate with the project's Supervising Consultant, Whereas ESISU will coordinate with ESU coordinator and stakeholders of the project such as Local VDCs, DDCs, NGOs, CBOs, affected parties, DOED, and MOE.

The organizational framework of the ESISU for project pre-construction and construction phase and its staffing is presented in ***Figure No.10.3.3 and 10.3.4***

Figure10.3.3: Organization Chart for RSISU

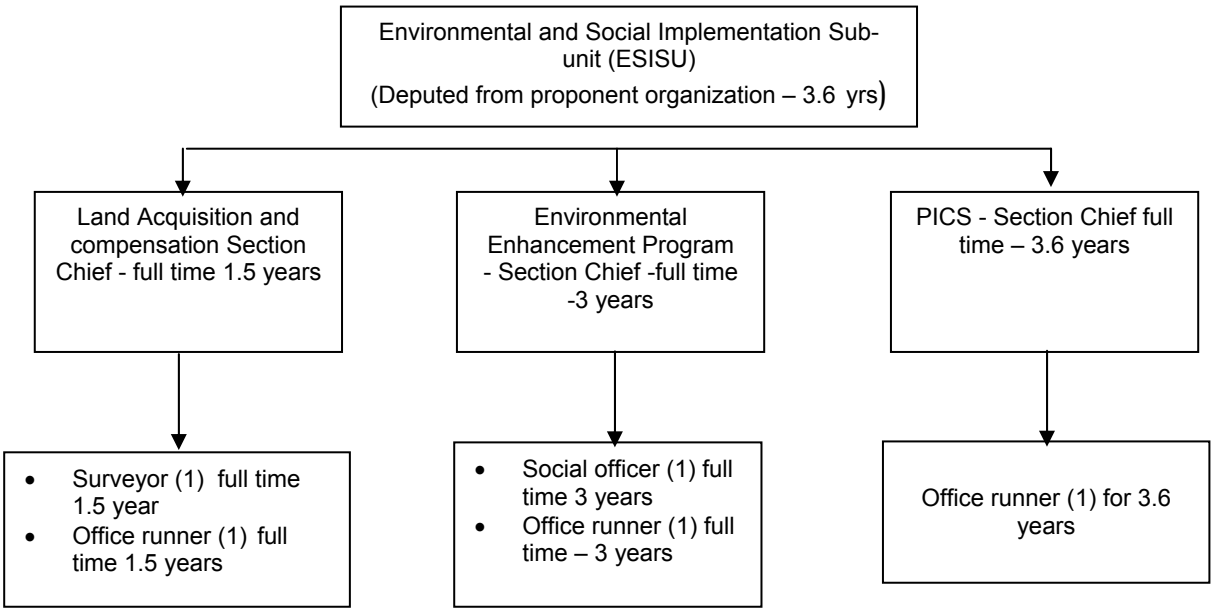
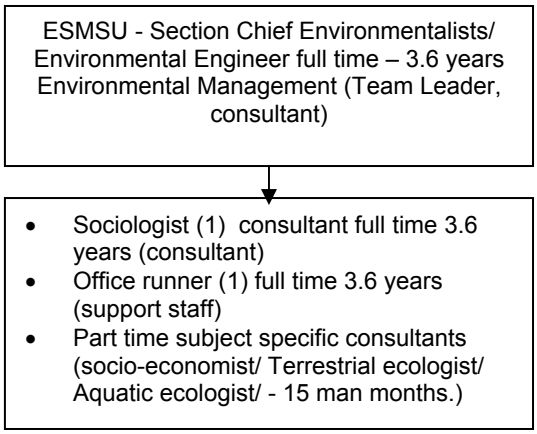


Figure 10.3.4: Organization Chart for ESMSU



10.2.3 Administrative and Management Cost for ESU

Office for the ESU shall be established in the engineer's camp as a part of the civil construction workforce. Administrative and management cost is estimated based on the assumption that most of the persons shall be hired by the project as project regular staff in case of ESISU and as consultants for ESMSU. The above costs are included in the project management costs.

10.3 Environmental Enhancement and Mitigation Management Plan

Environmental management actions to be undertaken and to be adopted for the realization of environmental enhancement and environmental mitigation for construction and operation phases are presented in the Table 10.9 and 10.10. The Environmental Enhancement and Mitigation Management Plan briefly describes impacts, description of enhancement/mitigation action required, individual or agency responsible, national standards and guidelines, timing of actions, responsible authority, and tentative financial requirements.

10.4 Environmental Monitoring Management Plan

Two types of monitoring are envisaged in the plan, namely: Compliance Monitoring and Impact Monitoring. Since the required databases for the environmental baseline are already collected by the IEE study, the project is not envisaged to require Baseline Monitoring. The compliance monitoring comprises three parts, the first is the compliance to the post construction (Table 10.11) and second compliance to mitigation actions construction phase (Table 10.12) and third compliance monitoring operation phase (Table 10.13) including the corrective actions issued and enhnacement measures (Table 10.12).

The impact monitoring in the plan relates to only those measurable indicators in the socio-economic, Cultural, Physical, and Biological environments for construction (Table 1.14) and Operation Phase (Table 10.15). For each of the monitoring indicators, monitoring methods, frequency of monitoring, responsible parties along with the required cost estimates have been estimated.

10.5 Records, Reporting and Corrective Actions

To demonstrate compliance with the environmental management, the proponent will instruct the construction contractors through supervising engineer to maintain daily records of his mitigation implementation and monitoring works in retrievable forms at its office during the construction phase.

Contractors will keep records of the employment of the project PAF, local area people, Nepali and foreigner and will submit such records to the Supervising Engineers every month. Similarly records of occupational health will also be documented in retrievable forms and submitted to Supervising Engineer every month. Besides, records of instructions, trainings, and land area rented with agreements will also be submitted to the Supervising Engineers regularly.

The ESMSU under ESU section will carryout monitoring works of the construction contractors and prepare monitoring reports bimonthly during construction phase. On behalf of project proponent ESISU will maintain all the records of tree felled, land area acquired, and expenses of land acquisition and other environmental enhancement programs implemented. These records will be provided to ESMSU as and when demanded for the monitoring facilitation. ESMSU will provide any corrective action required through ESU section Chief to Project Proponent for implementation to ESISU and Civil Supervising Engineers and maintain the records of any corrective actions recommended. The bi-monthly reports produced by the environmental monitoring consultants will be distributed to the concerned stakeholders through the ESU section chief for their comments and suggestions. Any comments and suggestions of the stakeholders will be taken into account in the subsequent environmental management to enhance the project performance during construction by ESMSU. The ESMSU consultants will compile the Environmental monitoring report of the construction phase within 3 months of the construction completion and submit to proponent. Proponent shall pass the report to stakeholders to get feedback and provide database of environmental management works of the Proposal for future use.

In the operation phase, the operation Management Office, will keep records of the mitigation and monitoring as required in the retrievable forms. Once a year, the operation Management Office will prepare a compiled report of the project operation. The report will be passed to the concerned stakeholders for comments and suggestions. The operation management office will carry out any recommendations and suggestion of the concerned stakeholders.

Table 10.9: Environmental Mitigation Management Plan Construction Phase

SN	Impact	Mitigation Measures	Individuals responsible	National Standards or Guidelines/ Approved Documents	Timing of Actions	Competent Authority/agency	Environmental mitigation cost Costs (NRs)
1.1	**Physical Environment**						
A.1.1	Direct/Indirect Soil Erosion and Land Instability Impact	Ground clearance activities particularly in the forested areas of the Siwaliks and steep slopes of the Mahabharat and Midlands will be limited to trimmings of the tall standing trees as required for the safety of the cables.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.1.2		The cleared areas of the Terai, and gentler slopes of the Mahabharat and Midlands will be managed by NTFP plantation with consideration of soil erosion and land stability impacts	ESISU	IEE	Throughout construction	Supervising engineer and ESMSU	Included in enhancement program
A.1.3		The spoil generated in the tower foundation wil be properly managed. Sidecasting of the spoil on the side slopes will be controlled.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
A.1.4		Headward progressing gullies in the Siwaliks, Mahabharat and Midlands close to the tower foundation sites will be controlled by application of bio-engineering.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
A.1.5		The tower foundation sites will be protected by the application of bio-engineering measures.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
A.1.6		Tower foundations sites will be further re-examined from the stability point of view and sites which are stable will only be used for tower foundations by adjusting the span between the towers.	Supervising engineer	IEE	Throughout construction	and ESMSU	Included in civil costs
A.1.7		Excavations along tower foundations will be minimized to the required depth only without altering the ground drainage conditions.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.1.8		As far as possible, existing trails will be used for transportation of materials to ROW and Tower foundation sites. Incase new trail need opening will utilize the most stable part of the terrain to avoid erosion, gully formation and landslides.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.2.1	Direct/Indirect Impact on Land Use	The loss of forest land use due to clearance of tall trees along ROW wil be comensated by the compensatory afforestation programs in consultation with the district forest office in the near by areas of the ROW	ESISU	IEE	progressively during construction and in operation phase	Supervising engineer and ESMSU	Included in Biological mitigation
A.2.2		The standing trees and vegetation along ROW particularly in the hilly terrian will not be cleared untill and unless the clearance is neccitated for the safety of the cables and	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs

SN	Impact	Mitigation Measures	Individuals responsible	National Standards or Guidelines/ Approved Documents	Timing of Actions	Competent Authority/agency	Environmental mitigation cost Costs (NRs)
		pylon structures					
A.2.3		Vegetation clearance areas of the ROW will be planted by NTFP species of lower heights	ESISU	IEE	Progressively during operation phase	Supervising engineer and ESMSU	Included in environmental enhancement
A.2.4		The agricultural land use will be allowed for agricultural purpose except for the clearance of built structures and tall trees	Proponent	IEE	During construction and operation	ESMSU and Operation Manager	No direct costs
A.3.1	Direct/Indirect Impacts on Noise Levels	Except in the sub-station heavy machinery will not be used for construction	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.3.2		Noise producing construction activities at the tower foundation and substation will be carried out in the day time zone only	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.3.3		Anthropogenic noises at the camp sites will be minimised through special instruction to the workforce	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.4.1	Direct/Indirect Impact on Land Use	The spoil generated in the tower foundation wil be properly managed. Sidecasting of the spoil on the side slopes will be controlled	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
A.4.2		Headward progressing gullies in the Siwaliks, Mahabharat and Midlands close to the tower foundation sites will be controlled by application of bio-engineering	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
A.4.3		The tower foundation sites will be protected by the application of bio-engineering measures	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
A.5.1	Direct/Indirect Impacts of Solid and Liquid Waste Disposal	The construction solid waste will be collected in safe area and will be disposed safely in consultation with the engineers	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
A.5.2		Spent oils, mobils, and other chemicals generated will be safely collected in drums and disposed as per the advice of the engineers	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
A.5.3		The toilets in the camps and active construction sites will be constructed as per the requirement of the construction workforce. Haphazard defecation will be prohibited	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
A.5.4		Other liqud and solid waste of the camp sites will be collected in safe sites and disposed as to the instruction of the engineers	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
A.6.1	Indirect Impact on Air Quality	Fugitive dust emissions in the floundatin and substation construction sites will be minimised through regular sprinkling of water	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
A.6.2		Fuel wood at the camp sites will be replaced by the subsidised kerosine or LPG	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs

SN	Impact	Mitigation Measures	Individuals responsible	National Standards or Guidelines/ Approved Documents	Timing of Actions	Competent Authority/agency	Environmental mitigation cost Costs (NRs)
A.7.1	Direct/Indirect Impact on Water Quality	Haphazard disposal of the solid and liquid wastes will be controlled	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.7.2		Toilets with sanitary earth pits will be provisioned in the camps and active construction sites	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
A.7.3		Final disposal of the spoil and solid or liquid waste will be carried out in areas away from the water path ways and water bodies	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
A.7.4		All the spent oils, mobiles and chemicals and the containers will be collected and managed as per the instruction of the engineers.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in civil costs
1.2	**Biological Environment**						
A.1.1	Direct Impacts of Fragmentation of Forest Land	Restricting the felling to only lopping and topping of the high growing or potentially high growing trees and poles upto height of 1.5m only	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs,
A.1.2		No ground clearing of herbs and shrubs up to a height of one and half meter	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct cost
A.1.3		Employ the local area people for all the unskilled jobs	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct cost
A.1.4		Restrict outside workforce in the make-shift camps only where the construction materials are stored	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct cost
A.1.5		Provide alternative fuel arrangements other than the fuel wood in the make shift camps	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Inlcuded in civil cost
A.1.6		Instruct and control the workforce on the damage on the vegetation structure and vegetation regularly and punish those who indulge on such activities other than specified	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct cost
A.2.1	Direct/Indirect Impacts on forest vegetation/biodiversity specifically of Protected, Rare and Endangered species Direct/Indirect Impacts on Wildlife Habitats specifically of Protected, Rare and Endangered species	Afforestation program of the lost tree speceis will be launched as per the Guidelines to permit forest land for other purpose (2006) to afforest 25 saplings for the loss of one tree species (common as well as protected species) above 10 cm DBH in coordination with the District Forest Offices of Jhapa, Ilam, Panchthar, and Terhathum, and the Community Forest User groups along the adjoining areas of the ROW	ESISU	IEE	progressively during construction and operation phases	ESMSU, Operation Manager, Distirct forest Offices	Nrs. 10358250.00 @
A.2.2		Compensation to the land will be given to the occupied forest areas as per the forest rules	ESISU	IEE	progressively during construction and operation phases	ESMSU, Operation Manager, Distirct forest Offices	Nrs 10527606.00

SN	Impact	Mitigation Measures	Individuals responsible	National Standards or Guidelines/ Approved Documents	Timing of Actions	Competent Authority/agency	Environmental mitigation cost Costs (NRs)
A.3.1		Restricting the felling to only lopping and topping of the high growing or potentially high growing trees and poles	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs,
A.3.2		No ground clearing of herbs and shrubs up to a height of one and half meter	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.3.3		Employ the local area people for all the unskilled jobs	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.3.4		Restrict outside workforce in the make-shift camps only where the construction materials are stored	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.3.5		Prohibit on the use of the wildlife meat in the make shift camp	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.3.6		Instruct and control the workforce regularly on the damage on the wildlife and vegetation and punish those who indulge on activities that damages wildlife and wildlife habitats	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
I.3	**Social and Socio-economic Construction phase**						
A.1.1	Direct Impacts of Loss of property and land (such as population displacement)	Identification and census socio-economic survey of the impacted households	Proponent	IEE	6 months before construction	MOE	Nrs. 2500000.00
A.1.2		Compensation to the permanently occupied lands 4.324 ha at substation and Comensation the the permanently occupied lands at transmission right of way (2.821 ha)	ESISU	IEE	3 months before land occupation	ESMSU/MOE	Nrs. 26271658 Nrs. 6119175
A.1.3		Compensation to ROW restriction (89.27 ha)	ESISU	IEE	3 months before land occupation	ESMSU/MOE	Nrs. 15374120.00 Nrs. 14878442.00
A.1.4		Comensation to built structures (23 structures)	ESISU	IEE	3 months before land occupation	ESMSU/MOE	Nrs. 8050000.00
A.1.5		Discomfort allowence to affected residential households (discomfort and rentals)	ESISU	IEE	3 months before land occupation	ESMSU/MOE	Nrs. 2070000.00
A.1.6		Transporttion allowences for the salvaged materials	ESISU	IEE	3 months before land occupation	ESMSU/MOE	Nrs. 138000.00
A.1.7		Rehabilitation programs to the seriously affected households (the programs shall be defined after the census socio-economic survey of the households whose land and property will be affected permanently by the	ESISU	IEE	During project construction	ESMSU/MOE	Nrs. 1500000.00

SN	Impact	Mitigation Measures	Individuals responsible	National Standards or Guidelines/ Approved Documents	Timing of Actions	Competent Authority/agency	Environmental mitigation cost Costs (NRs)
		project.)					
A.2.1	Direct Impacts of Loss of Agricultural Crops and Other Fodder and Fruit Trees (such as Loss of Livelihood /Loss of Quality of Life)	Compensation for the loss of standing crops in the permanently occupied areas	ESISU	IEE	At the time of land occupancy	ESMSU/MOE	Nrs. 546072.00
A.2.2		Compensation for the loss of standing crops in the land use restriction areas	ESISU	IEE	At the time of land occupancy	ESMSU/MOE	Nrs. 8086315.00
A.2.3		Comensation as rentals to the temporarily occupied areas	ESISU	IEE	Every six months	ESMSU/MOE	Nrs. 5409779.00
A.3.1	Direct and Iindirect Impacts on Gender, Indigenous, Tribal and Vulnerable Groups	Gender descrimination in the job oppertunities will be prohibited	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.3.2		All the construction workforce will be instructed to give respect to the female memebers of the society	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.3.3		The female members, and members of the indiginous, tribal and vulnerable groups among the directly impacted housholds will be given priority in the skill training programs, and NTFP enhancement programs and in the project related job oppertunities during construction and operation phase	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.4.1	Direct Impacts on Community Forest/ Leasehold Forest Resources	The standing trees of the community and leasehold forests will be compensated as per the norms of Forest guidelines for the aqusition of the forest land (2006).	ESISU	IEE	At the time of land occupancy	ESMSU/MOE	Included in Biological environment
A.4.2		The coomunity forest user groups will be given NTFP enhancement training programs and will be encouraged for the NTFP plantation in the transmission line ROW.	ESISU	IEE	Before the start of construction	ESMSU/MOE	Included in environmental enhancement costs
A.4.3		The interested community forest user group memebers and leasehold forest memebers will be given job oppertunities in the compensatory afforestation programs as per the Forest guidelines (2006)	ESISU	IEE	at the time of afforestation	ESMSU/MOE	No direct costs
A.4.4	Following measures will be impleneted to minimise the impacts to telephone and electric lines underneath the transmission line.	The telephone and electricity user communities will be given prior information regard to disruption of services	Contractor	IEE	Prior to disturbance	Supervising engineer and ESMSU	No direct costs
A.4.5		The services will be re-established as soon as the completion of the cable stringing.	Contractor	IEE	Soon after construction	Supervising engineer and ESMSU	No direct costs
A.4.6		Clearance above the telephone and electrical distribution lines will be maintained in all the areas.	Contractor	IEE	Throughout construction	Supervising engineer	No direct costs
A.5.1	Direct Impacts on Occupational Health	The construction workforce will be instructed with regard to the occupational health risk of the construction works regularly	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs

SN	Impact	Mitigation Measures	Individuals responsible	National Standards or Guidelines/ Approved Documents	Timing of Actions	Competent Authority/agency	Environmental mitigation cost Costs (NRs)
A.5.2		The construction workforce will be provided with protective equipments such as helmets, boots, gloves, and other gears required for the protection of occupational health safety.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in the civil contract of the contractors
A.5.3		First aid kits will be provisioned in all the working sites with instructions of use.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in the civil contract of the contractors
A.5.4		Health and safety plans will be prepared and operationalised for the entire period of construction to safeguard the health and safety of the construction workforce with provisions of rescue in case of accidents.	Contractor	IEE	Before the start of construction	Supervising engineer and ESMSU	Included in the civil contract of the contractors
A.6.1	Indirect Impacts on Community Health and Hygiene	The construction workforce will be provisioned for the free condomes	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in the civil contract of the contractors
A.6.2		Only healthy members will be employed in the construction workforce	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.6.3		As far as possible job oppertunities will be given to the local area communities	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.6.4		Sanitary conditions of the camps, such as toilets, water supply, solid and liquid wastes will be managed by launching special sanitary programs.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in the civil contract of the contractors
		Information to the local people through FM radios on the related construction hazards on the health and hygiene of the community	Contractor	IEE	At the start of construction	Supervising engineer and ESMSU	Included in the civil contract of the contractors
A.7.1	Indirect Impacts to Local Infrastructure Services (Schools, Health, Water Supply, Markets, Transportation, Communication etc. Services)	Local employment be maximized such that impacts to local infrastruree services will be minimised	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.7.2		The camps will be provisioned with separate consumer good shops to the outside workforce for consumer products which are imported to the local area.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in the civil contract of the contractors
A.7.3		The vegetables and other daily consumer products grown locally will be given priority for camp consumption	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.7.4		The camps will be provisioned with separate communication services and transport services.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in the civil contract of the contractors
A.7.5		The camps will not use the local water supply facilities and establish its own water supply at the camps.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in the civil contract of the contractors
A.7.6		Health services will be provided for the workforce of the camps	Contractor	IEE	Throughout	Supervising engineer and	Included in the civil

SN	Impact	Mitigation Measures	Individuals responsible	National Standards or Guidelines/ Approved Documents	Timing of Actions	Competent Authority/agency	Environmental mitigation cost Costs (NRs)
		by the project and shall not depend upon the local health services.			construction	ESMSU	contract of the contractors
A.7.7		The outside workforce will be discuraged to bring their family memebers in the local area	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.8.1	Direct/Indirect Impacts on the Communal Resources (Grassland, Recreational Areas, other Public Lands etc.)	The transmission line alignment has avoided as far as possible the community resources under the ROW	Design engineer	IEE	Prior to construction	Proponent/MOE	Already accomplished
A.8.2		The camps will not use fuelwood for its daily food cooking. LPG or kerosiene will be provisioned for the cooking by the project in subsidised rates.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in the civil contract of the contractors
A.8.3		The camps sites will be located as far as possible outside the public lands or community lands.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in the civil contract of the contractors
A.8.4		Any loss to the communial resources by the project will be compensated to the communities at the market price.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	Included in the civil contract of the contractors
A.9.1	Indirect Impacts on Law and Order Situation	The local law and order authorities will be regularly informed about the construction planning and sites of construction works and ativities.	ESISU	IEE	Throughout construction	ESMSU	No direct costs
A.9.2		The construction workforce will be regularly instructed to respect local people and their traditions and culture and not to endulge in any conflict with the local people.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.9.3		The construction workforce will be regularly instructed to remain within the camps in between 19 to 6 hours of the day unless required for construction works.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.9.4		Avoid entering into private premises without informing and without the permission of the property owners.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.9.5	Indirect Aesthetic Impacts of Stockpiling of the Construction Materials	Placement of material stockpile in closed areas not obstructing the general visual aesthetics of the stockpile area	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.9.6		Foundation excavation works be limited to the required amount and placement of the material and spoil in environmentally friendly manner not disturbing the local visual aesthetics	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.9.7		Stockpile the cleared vegetation (timber and biomass) in specific areas not disturbing the local visual aesthetics.	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.10.1	Indirect Impacts to Local Tradition and Culture	Maximizations of local employment	Contractor	IEE	Throughout construction	Supervising engineer and ESMSU	No direct costs
A.10.2		Instruct contractors and outside workforce to honor local culture	Supervising	IEE	Throughout	Supervising engineer and	No direct costs

SN	Impact	Mitigation Measures	Individuals responsible	National Standards or Guidelines/ Approved Documents	Timing of Actions	Competent Authority/agency	Environmental mitigation cost Costs (NRs)
		and tradition and behave decently with the local people	Engineer		construction	ESMSU	

Table 10.10: Environmental Mitigation Management Plan Operation Phase

SN	Impact	Mitigation Measures	Individuals responsible	National Standards or Guidelines/ Approved Documents	Timing of Actions	Competent Authority/agency	Environmental mitigation cost Costs (NRs)
1.1 Physical Environment							
B.1.1	Direct Noise Levels Impacts	Selection of substation sites, conductor cables, provision of ROW	Design Engineer	IEE	Before project construction	Proponent/MOE	Already accomplished
B.2.1	Direct/Indirect Electro-magnetic fields Impacts	Alignment route selection, provision of 18 m wide ROW, ground clearance level, selection of the sub-station site	Design Engineer	IEE	Before project construction	Proponent/MOE	Already accomplished
B.2.2		A program of awareness building implemented on the safety issues to the communities along the ROI	ESISU	IEE	Prior to operation	ESMSU	Included environmental enhancement
B.3.1	Direct/Indirect Soil Erosion and Land Instability Impacts Direct/Indirect Impact on Water Quality (oil spillage)	Only lopping topping of the grown up vegetation will be carried out	Operator	IEE	Throughout operation	Operation Manager	Included in operation costs
B.3.2		NTFP planation along the cleared forest areas	ESISU	IEE	Progressively during construction and operation	ESMSU/Proponent	Included in environmental enhancement
B.4.1		The spent oils of the transformer will be collected in drums and disposedsafely as per the instruction of the environmental regulations	Operator	IEE	Throughout operation	Operation Manager	Included in operation costs
B.4.2		Higher safety measures will be employed to minimise the oil leaks	Operator	IEE	Throughout operation	Operation Manager	Included in operation costs
B.4.3		Oil trapping equipments will be installed in the outlets of runoff from the transformer areas and substation areas	Contractors	IEE	During construction	Supervising engineer/ESMSU	Included in operation costs
B.4.4		Camp wastes will be managed to control water pollution of the surrounding receiving water bodies	Operator	IEE	Throughout operation	Operation Manager	Included in operation costs
1.2 Biological Environment							
B.1.1	Direct Impacts of Bird Hits particularly across the Waterways Direct/Indirect Impacts to wildlife	Use of bird flight diverters (squiggles) where the conductors are standing high the adjoining trees outside ROW to increase the visibility of the conductors particularly across the water ways and along the ridge summits	Contractors	IEE	During construction	Supervising engineer/ESMSU	Included in civil costs
B.1.2		Conductors will be	Contractors	IEE	During	Supervising	No direct costs

SN	Impact	Mitigation Measures	Individuals responsible	National Standards or Guidelines/ Approved Documents	Timing of Actions	Competent Authority/agency	Environmental mitigation cost Costs (NRs)
		placed lower than the standing trees located outside ROW			construction	engineer/ESMSU	
B.1.3		Barricade to divert wild animals will be erected around the tower foundations and substation sites.	Contractors	IEE	During construction	Supervising engineer/ESMSU	Included in civil cost
B.1.4		Tower structures will be equipped with thorny protuberances in the lower half to restrict wild animal climbing along the pylon	Contractors	IEE	During construction	Supervising engineer/ESMSU	Included in civil cost
B.1.5		Mmaintenance workers will be strictly instructed not to damage wildlife habitat or hunt the wildlife during maintenance works along ROW	Operator	IEE	Throughout operation	Operation Manager	No direct costs
B.2.1	Direct/Indirect Impacts to Forest Resources due to on site / off site Maintenance Activities	Restricting the felling to only lopping and topping of the high growing or potentially high growing trees and poles	Operator	IEE	Throughout operation	Operation Manager	No direct costs
B.2.2		No ground clearing of herbs and shrubs up to a height of one and half meter	Operator	IEE	Throughout operation	Operation Manager	No direct costs
B.3.1	Direct Impacts of Weeds encroachment on biodiversity	No ground clearance of herbs and shrubs up to height of one and hallf meter	Operator	IEE	Throughout operation	Operation Manager	No direct costs
B.3.2		NTFP plantation program along the ROW cleared areas	ESISU	IEE	Progressively during construction and operation	ESMSU/Proponent	Included in environmental enhancement
1.**3 Socio-economic and Cultural Environment**							
B.1.1	Direct Impacts on Property Value	Partial compensation to ROW lands restricted for land use	ESISU	IEE	Beforeland occupation	ESMSU	Included in partial compensation of ROW land
B.2.1	Direct Impacts of Electric and Electromagnetic Fields and Stray Voltage on Public Health	Awareness programs will be launched at the begining of the project operation to the local communities close to the ROW land on the potential impacts and precautionary measures to be employed to protect onself from the electrical and electomagnetic fields and stray voltage.	ESISU	IEE	Prior to operation	ESMSU	Nrs. 1000000.00

SN	Impact	Mitigation Measures	Individuals responsible	National Standards or Guidelines/ Approved Documents	Timing of Actions	Competent Authority/agency	Environmental mitigation cost Costs (NRs)
B.2.2		Hoarding boards will be placed in critical places along ROW with instructions to safeguard from the electrical, electromagnetic and stray voltage impacts.	Contractor	IEE	Prior to Operation	ESMSU	Nrs. 1500000.00
B.2.3		Barricade the Pylon structures from easy access to the people	Contractor	IEE	Prior to Operation	ESMSU	Included in civil costs construction phase
B.3.1	Direct Impacts on Radio, Television, Telephone, Mobile Reception and Implementable Medical Devices	Hoarding boards will be placed in critical places along ROW with instructions to safeguard from the electrical, electromagnetic	Contractor	IEE	Prior to Operation	ESMSU	Already included above
B.3.2	Direct Impacts to Occupation health	Provide regular training to the maintenance workforce about the risk and safety measures that need to be taken while maintaining the line and sub-station.	Operator	IEE	Throughout operation	Operation Manager	Included in operational costs
B.3.3		Provide safety gears to the maintenance workforce and instruct their compulsory use during the maintenance work.	Operator	IEE	Throughout operation	Operation Manager	Included in operational costs
B.4.1	Impacts to the Local Area Aesthetics and Tourism	Plantation of high growing local tree species on either side of the ROW to hide the pylons and the cables at a safe distance from the cable and pylon structure outside the ROW	Operator	IEE	Throughout operation	Operation Manager	Included in compensator afforestation programs in biological environment

Table 10.11: Environmental Monitoring Management Plan (Compliance Monitoring) Post Construction Phase

SN	Area	Indicator	Individuals responsible	Methods	Frequency	Place	Financial commitment (indicative)
Compliance to Permits and Approval from various Agencies							
1	Permits and approval	Approval of the IEE study report from the Ministry of Energy	Proponent	Records of proponent and local people discussion	Every month	Office of proponent	Included in Engineers costs
2	Permits and approval	Approval from the Ministry of Forest and Soil conservation and its respective line agencies for the land area in the forest and clearance of vegetation from the	Proponent	Records of proponent and local people discussion	Every month	Office of proponent	Included in Engineers costs)

SN	Area	Indicator	Individuals responsible	Methods	Frequency	Place	Financial commitment (indicative)
		Forest along ROW					
3	Permits and approval	Permits and Approval of Local Governments (District Development Committees and Village Development Committees) for proposal activities	Proponent	Records of proponent and local people discussion	Every month	Office of proponent	Included in Engineers costs)
4	Permits and approval	Approval for the acquisition and restriction on land use of the private land	Proponent	Records of proponent and local people discussion	Every month	Office of proponent	Included in Engineers costs
5	Permits and approval	Approval and permits from the local communities for make shift camps and material stockpiling	Contractors	Records of proponent and local people discussion	Every month	Office of proponent	Included in Engineers costs)
6	Permits and approval	Approval from local communities for the obstruction of the service facilities (electricity line, telephone line, roads etc.)	Contractors	Records of proponent and local people discussion	Every month	Office of proponent	Included in Engineers costs)
7	Permits and approval	Approval from the private land owners to enter the area for construction, on the event of non-finalization of land acquisition in time.	Contractors	Records of proponent and local people discussion	Every month	Office of proponent	Included in Engineers costs

Table 10.12: Environmental Monitoring Management Plan (Compliance Monitoring) Construction Phase

SN	Area	Indicator	Individuals responsible	Methods	Frequency	Place	Financial commitment (indicative)
1.	Physical Environment	As per Table 10.9, 1.2, A. 1.1 to A.7.4	ESMSU	Direct Observations, consultation with local communities, and records of ESISU, contractors and Supervising engineers	Once in two months	All construction sites	Included in the Engineering Costs
2.	Biological Environment	As per Table 10.9, 1.3, A.1.1 to A.3.6	ESMSU	Direct Observations, consultation with local communities, and records of ESISU, contractors and Supervising engineers	Once in two months	All construction sites	Included in the Engineering Costs
3.	Socio-economic and cultural Environment	As per Table 10.9, 1.1, A.1.1 to A.10.2	ESMSU	Direct Observations, consultation with local communities, and records of ESISU, contractors and Supervising engineers	Once in two months	All construction sites	Included in the Engineering Costs

Table 10.13: Environmental Monitoring Management Plan (Compliance Monitoring) Operation Phase

SN	Area	Indicator	Individuals responsible	Methods	Frequency	Places	Financial commitment (indicative)
1.	Physical Environment	As per Table 10.10, 1.2, B. 1.1 to B.4.4		Direct Observations, consultation with local communities and records	Twice a year	Along ROW and substation sites	Included in operation costs
2.	Biological Environment	As per Table 10.10, 1.3, B.1.1 to B.3.2		Direct Observations, consultation with local communities and records	Twice a year	Along ROW and substation sites	Included in operation costs
3.	Socio-economic and cultural Environment	As per Table 10.10, 1.1, B.1.1 to B.4.1	Operators	Direct Observations, consultation with local communities and records	Twice a year	Along ROW and substation sites	Included in operation costs

Table 10.14: Environmental Monitoring Management Plan (Impact Monitoring) Construction Phase

SN	Area	Indicator	Individuals responsible	Methods of Monitoring	Frequency	Places of Monitoring	Financial commitment (indicative)
1.1 Impact Physical Environment							
A.1.1	Erosion and Landslides	Incidents of erosion and landslides	Supervising engineer	Direct observation and discussions with the locals	Every month	ROW and Tower foundation sites	Included in engineer costs
A.2.1	Air, Water and Noise quality	Increase in air water, noise pollution	Supervising engineer	Direct observation and discussions with the locals	Every month	ROW and Tower foundation sites, makeshift camps	Included in engineer costs
A.3.1	Land use change	Actual land area occupied by ROW in agriculture, forest, and community area	Supervising engineer	Direct counting and records	Once	ROW and Tower foundation	Included in engineer costs
1.2 Impact Biological Environment							
A.1.1	Loss of Forest Resource	Actual numbers of tree felled with wood stock and biomass species wise	Supervising engineer	Direct counting and records	Vegetation clearance time	ROW and Tower foundation	Included in engineer costs

SN	Area	Indicator	Individuals responsible	Methods of Monitoring	Frequency	Places of Monitoring	Financial commitment (indicative)
		(National Forest, Community Forest and trees at community land)					
A.1.2		Actual numbers of protected species felled species wise ((National Forest, Community Forest and trees at community land)	Supervising engineer	Direct counting and records	Vegetation clearance time	ROW and Tower foundation	Included in engineer costs
A.1.3		Actual forest area for vegetation clearance National Forest, Community Forest and trees at community land)	Supervising engineer	Direct measurements and records	once	ROW and Tower foundation	Included in engineer costs
A.2.1	Loss of wildlife habitat	Actual number of prime habitat loss of wildlife habitat species wise National Forest, Community Forest and trees at community land)	Supervising engineer	Direct counting and records	Vegetation clearance time	ROW and Tower foundation	Included in engineer costs
1.3 Impact Socio-economic and Cultural Environment							
A.1.1	Loss of land and property	Actual land area of private owners lost permanently for tower pads	Supervising engineer	Direct measurements and records of land acquisition	Once	Tower foundation	Included in engineer costs
A.1.2		Actual land area restricted for ROW maintenance of the private owners	Supervising engineer	Direct measurements and records of land acquisition	Once	ROW	Included in engineer costs
A.1.3		Actual structures number with types	Supervising engineer	Direct counting and records	once	ROW and Tower foundation	Included in engineer costs
A.2.1	Loss of Agriculture Productivity and trees	Actual loss of crops and trees due to cable stringing and tower foundation construction activities	Supervising engineer	Direct observation and discussion with locals	once	ROW and Tower foundation	Included in engineer costs
A.2.2		Permanent loss of crops due to permanent land acquisition	Supervising engineer	Direct observation and discussion with locals	once	ROW and Tower foundation	Included in engineer costs
A.3.1	Obstruction to social service and infrastructures	Number of days of obstructions to social service and infrastructures (type wise)	Supervising engineer	Direct observation and discussion with locals	monthly	ROW and Tower foundation	Included in engineer costs
A.4.1	Accidents and injuries to community people	No of accidents and number of affected community people and types of accidents	Supervising engineer	Direct observation and records	monthly	Project ROI	Included in engineer costs
A.5.1	Disease outbreak	Type of disease and number of community people affected	Supervising engineer	Direct observation and records	monthly	Project ROI	Included in engineer costs
A.6.1	Occupational health	No of accidents and injuries to the workers	Supervising engineer	Direct observation and records	monthly	Project	Included in engineer costs
A.7.1	Conflict between locals and outsiders	No of conflict and reasons of conflict	Supervising engineer	Direct observation and records	monthly	Project ROI	Included in engineer costs
A.8.1	Law and order	No of incidents of law and order breakdown and reasons	Supervising engineer	Direct observation and records	monthly	Project ROI	Included in engineer costs
A.9.1	Gender	Incidents of girl trafficking	Supervising engineer	Direct observation and records	monthly	Project ROI	Included in engineer costs
A.9.2		No of women headed households whose land and property is acquitted or restricted by ROW	Supervising engineer	Direct observation and records	Once	ROW	Included in engineer costs

Table 10.15: Environmental Monitoring Management Plan (Impact Monitoring) Operation Phase

	Area	Indicator	Individuals responsible	Methods of Monitoring	Frequency	Places of Monitoring	Financial commitment (indicative)
1.1 Impact Physical Environment							
B.1.1	Erosion and Landslides	Incidents of erosion and landslides	operators	Direct observation and discussions with the locals	twice a year	ROW and Tower foundation sites	Included in operation management
1.2 Impacts Biological Environment							
B.1.1	Forest and vegetation	Survival of afforested trees and their status	Operators	Direct observation and counting	Twice a year	ROW and Tower foundation sites	Included in operation management
B.1.2		NTFP at the community Forest ROW and its contribution in soil erosion restriction and economic welfare of CFUGs	Operators	Direct observation and discussions with CFUGs	Twice a year	ROW and Tower foundation sites	Included in operation management
B.1.3		Status of vegetation at ROW	Operators	Direct observation	Twice a year	ROW and Tower foundation sites	Included in operation management
B.2.1	Wildlife	Restoration of lost wildlife habitat	Operators	Direct observation and discussions with locals	Twice a year	ROW and Tower foundation sites	Included in operation management
B.2.2		Incidents of bird strike	Operators	Direct observation and discussions with locals	Twice a year	ROW and Tower foundation sites	Included in operation management
B.2.3		Incidents of wild animal fatality due to electric shocks	Operators	Direct observation and discussions with locals	Twice a year	ROW and Tower foundation sites	Included in operation management
1.2 Impact Socio-economic and Cultural Environment							
B.1.1	Quality of Life	Quality of affected people life enhanced or declined	Operator	Questionnaire survey of key affected people	Every 3 years	Affected people ROW	Included in operation management
B.2.1	Community Health	Incidents of accidents (electric shocks)	operator	Direct observation and discussions with locals	once a year	ROW	Included in operation management
B.3.1	Disturbance to service facilities	Disturbance to radio, television , telephone etc facilities	operator	Direct observation and discussions with locals	once a year	ROI	Included in operation management
B.4.1	Occupational health	Accidents to occupational workers	operator	Direct observation and discussions with locals	once a year	Project	Included in operation management

Chapter 11: PROJECT COST AND BENEFIT

This chapter presents a brief summary of the economic benefits and costs of the KCTLP.

11.1 Economic Benefit

11.1.1 National Context

Nepal is a small Himalayan country, dominated by rural population. More than 60% of its population still depends on subsistent agriculture for their livelihood. With the increase of population, the traditional subsistent agriculture no longer meets the hand to mouth requirements. As land resource is finite, further encroachment of land means encroachment of marginalized land leading to further deterioration of the natural resources that maintains the production systems. It is for these reasons; the national GDP growth is not increasing as desired.

The nation needs diversification in its production systems. Water resource is one of the key natural resources of Nepal. More than 6000 rivers drain the Nepalese territory. Most of the rivers of Nepal originate in the Higher Himal Ecological zone and are feed by perpetual snow and glaciers. On their southerly abode to the Gangatic plain, these rivers descend forming rapids and have higher hydropower potential. On the other hand, Nepal's industrial and service sector industry are constrained by the energy bottleneck for a desired rapid growth to diversify its economic base which is till now reliant on agricultural sector. For the economic all round growth within the country and also for the export earning, water resource development for energy is the most feasible and sustainable option for Nepal. Development of power projects is always correlated with the power evacuation network available in the proposed power development area.

The 132 kV KCTLP is the first phase development initiative to evacuate the power from 17 projects of Ilam district (67MW), and 4 projects of Panchthar (32MW). All of the above projects from Ilam, Panchthar, and Taplejung have been licensed for development. These projects are delayed for a simple reason that the area lacks an adequate capacity high voltage transmission line to evacuate the power in the near by area.

In this context, development of hydropower is not only sufficient. What is required is to distribute the generated hydroelectricity to various areas within the country which have potentials of industrial development. Only such endeavor maximizes the benefits from the hydro-energy though production of various raw materials and value added products adding to the national revenue base. Besides, industrial development provides opportunities of jobs and employment to thousands of people directly and indirectly broadening the economic base of its people. The interim three five Year Plan policies on Poverty Reduction is also based on this principle.

11.1.2 Direct Revenue Generation

Currently, the Transmission line itself does not generate direct revenue on its own, but help for the revenue generation by distributing generated energy in powerhouse to the needed power consumption centers. With the upcomming of the private hydropower generators willing to export energy to Indian market, there is potential of direct revenue generation by the introduction of wheeling charges in future. Potential of such direct revenues is very difficult to predict at the moment. In the present context, the revenue generation from the sell of hydopower should be linked to the high voltage transmission line projects. As explained above, a number of hydropower projects in the Kabeli corridor are not being developed or are delayed for development due to the lack of the high voltage transmission line in the corridor.

11.1.3 Other Project Benefits

In addition to the promotion to revenue benefit, the project will provide a number of subsidiary benefits to the people of project districts. During construction and operation phase, the project has the potential to:

- Promote industrial growth in corridor in the operation phase,

- Provide new job opportunities to the local people of project districts and VDCs in the project during construction and operation phase,
- Enhance the working skills of the local in the big construction project like High Tension Transmission Line,
- Provide opportunities for Transmission Tower construction related training during construction phase,
- Promote the subsidiary economic activities in the project area during construction phase,
- Promote community development through NTFP promotion, and
- The above benefits from the project are expected to enhance the national development objectives of poverty alleviation, diversification of economic activities, and above all in improving the social services and quality of life of the Nepalese nationals.

11.2 Project Costs

The total investment cost for the transmission line and the Sub-station is estimated to be in the order of NRs. 2,01,19,95,844.00.

11.3 Project Loss

The total estimated project losses is NRs. 70.17 million, which is about 3.49 percent of the total project cost. The breakdwon of losses on different headings are presented in sections below.

11.3.1 Agriculture Land Resource Loss

The KCTLP development will involve the loss of private land permanently for the construction of project structures. The total value of the private land is estimated to be NRs. 32.39 million, which is based on the estimated market price of the land in the project affected areas at current rates. The loss is about 1.61 percent of the project cost.

11.3.2 Production Loss

Various types of losses have been estimated from land to be permanently acquired for project sites. Annual food grain production loss from the permanently acquired land is estimated to be NRs. 0.55 million. This amounts about 0.03% of the project cost. Similarly, the annual loss of Forest resource (timber, fuel wood and biomass) is estimated to be NRs 2.48 million, which is equal to 0.12 percent of the project cost.

11.3.3 Loss of Standing Vegetation

The forest clearance along ROW of the KCTLP is estimated to incurr a total of 34.75 million rupees equivalent of standing vegetation in direct economic terms. This is about 1.73 percent of the project cost.

11.4 Environmental Mitigation. Monitoring and Environmental Enhancement Costs

Table 11.1 summarizes the environmental mitigation; monitoring and environmental enhancement Program costs not included in the project construction costs for construction and operation periods. For details of the costs breakdowns refer Chapter VII, and IX and X.

Table 11.1: Cost Estimates of Environmental Mitigation, Monitoring and Environmental Enhancement

Particulars	**Costs In NRs**	**Costs US$**
Environmental Enhancement*	95,00,000	1,26,666.67
Mitigation		
Construction Phase		
Physical Environment**	0	0.00

Particulars	Costs In NRs	Costs US$
Biological Environment	2,08,85,856.25	2,78,478.08
Socio-economic and Cultural Environment	88,44,3561	1179247.00
Operation Phase		
Physical Environment**	0	0.00
Biological Environment**	0	0.00
Socio-economic and Cultural Environment	25,00,000	33,333.33
Monitoring		
Construction Phase		
Physical Environment**	0	0.00
Biological Environment**	0	0.00
Socio-economic and Cultural Environment**	0	0.00
Operation Phase		
Physical Environment**	0	0.00
Biological Environment**	0	0.00
Socio-economic and Cultural Environment**	0	0.00
Total	120429417.3	1617725.56
Percentage of the Total construction Costs	**5.99**	**5.99**

Note:

** The environmental enhancement costs are in fact the costs related to the Corporate Social Responsibility costs.*

*** The costs are not shown as additional cost because these costs are inbuilt within the civil cost or the project management costs (refer chapter 10, Table 10.9 to Table 10.15)*

Chapter 12: CONCLUSION

All of the identified and perceived impacts could be minimize to acceptable level by the employment of the prescribed cost effective and practical mitigation measures. The environmental enhancement measures proposed for implementation by the project targeting the affected communities will help to upgrade the quality of life of the affected communities. In view of the above considerations, it is recommended that the project is given development licensing in conditions that the proposed mitigation and enhancement measures will be implemented as per the Environmental Management Plan prescribed in this IEE report.

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