

# Environmental Assessment Document

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## Initial Environmental Examination

Grant Number: 0093 NEP

June 2010

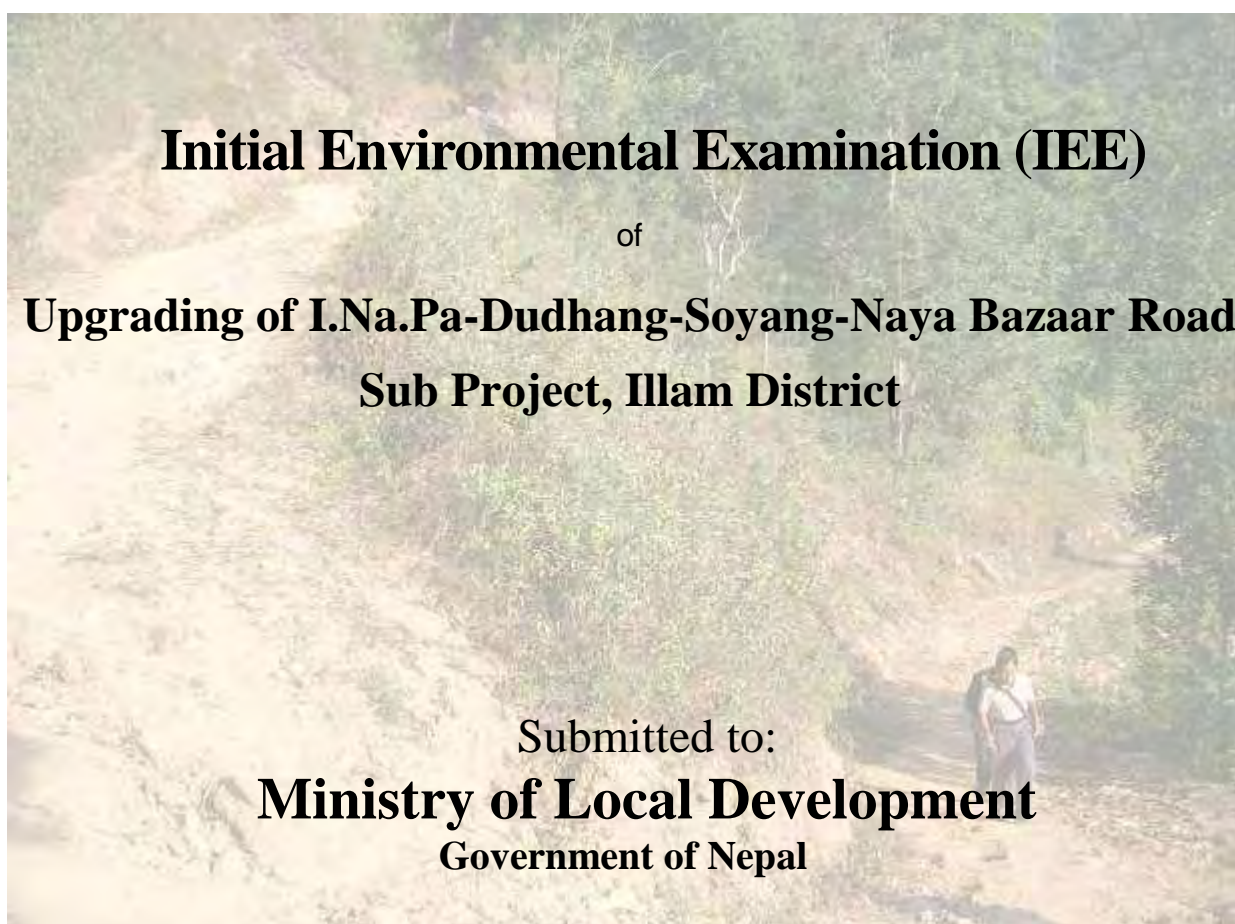
## Nepal: Rural Reconstruction and Rehabilitation Sector Development Program

## Upgrading of I.Na.Pa-Dudhang-Soyang-Naya Bazar Road Subproject, Illam District

Prepared by the Government of Nepal

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Government of Nepal  
Ministry of Local Development  
Department of Local Infrastructure Development and Agricultural Roads  
**Rural Reconstruction and Rehabilitation Sector Development Program**  
**[ADB Grant 0093 NEP]**



Proponent:  
**Office of District Development Committee/  
District Technical Office**  
Ilam District

June, 2010

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Prepared by:  
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## ABBREVIATIONS

ADB	Asian Development Bank	GIS	Geographical Information System
Amsl	Above mean sea level	Ha	Hectare
AP	Affected Person	HH	Household
BG	Building Group	IEE	Initial Environmental Examination
Ch	Chainage	IUCN	International Union for Conservation Nature
CBO	Community Based Organization	Km	Kilometer
CDC	Compensation Determination Committee	LDO	Local Development Officer
CDO	Chief District Officer	LEP	Labour based, environment friendly and participatory
CEA	Country Environmental Analysis	LEST	Livelihood Enhancement and Skill Training
CF	Community Forest	M	meter
CFUG	Community Forest Users Group	MoU	Memorandum of Understanding
CISC	Central Implementation Support Consultant	MoE	Ministry of Environment
CITES	Convention on International Trade in Endangered Species of Flora and Fauna	MoLD	Ministry of Local Development
DADO	District Agriculture Development Office	NGO	Non-Governmental Organization
DDC	District Development Committee	NRs	Nepali Rupees
DFID	Department for International Development	NTFPs	Non timber forest products
DFO	District Forest Office/Officer	OFID	OPEC Fund for International Development
DG	Director General	OP	Operational Plan
DIST	District Implementation Support Team	OPEC	Organization of Petroleum Exporting Countries
DoLIDAR	Department of Local Infrastructure Development and Agricultural Roads	PAM	Project Administrative Memorandum
DPO	District Project Office	PCC	Plain Cement Concrete
DPCC	District Project Coordination Committee	PCU	Project Coordination Unit
DRSP	District Road Support Programme	RBG	Road Building Group
DSCO	District Soil Conservation Office	RCC	Reinforced Cement Concrete
DTO	District Technical Office	REA	Rapid Environmental Assessment
DTMP	District Transport Master Plan	RES	Rapid Environmental Screening
EA	Environmental Advisor	RIE	Rural infrastructure Engineer
EARP	Environmental Assessment and Review Procedures	RP	Resettlement Plan
EIA	Environmental Impact Assessment	RRRSDP	Rural Reconstruction and Rehabilitation Sector Development Program
EMP	Environmental Management Plan	SAP	Social Action Plan
EMS	Environmental Management Section	SDC	Swiss Agency for Development and Cooperation
EPA	Environmental Protection Act	SM	Social Mobilizer
EPR	Environmental Protection Rules	TA	Technical Assistance
FGD	Focus Group Discussion	ToR	Terms of Reference
GAP	Gender Action Plan	VDC	Village Development Committee
GoN	Government of Nepal	VICCC	Village Infrastructure Construction Coordination Committee
		ZoI	Zone of Influence

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## NAME AND ADDRESS OF THE PROPONENT

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### **The Name and Address of Proponent**

The District Development Committee (DDC)/ District Technical Office (DTO), Ilam are the implementing agencies at the district level under RRRSDP and entrusted the consultant for the task of carrying out Initial Environmental Examination (IEE) study of 'I.Na.Pa-Dudhang-Soyang-Naya Bazaar Road Sub-project'.

### **Name of Proposal**

(Upgrading of) I.Na.Pa-Dudhang-Soyang-Naya Bazaar District Road, Ilam District, Nepal

### **Name and Address of Proponent**

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– Pabitra Pande	Social Mobilizer

## EXECUTIVE SUMMARY IN NEPALI

### ई.न.पा-दुधाङ्ग-सोयाङ्ग-नयां बजार सडकको प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन कार्यकारी सारांश

#### पृष्ठभूमि :

नेपाल सरकारले लामो दून्दले गर्दा क्षति भएका ग्रामीण पूर्वाधारहरूको पुनःनिर्माण र पुनःस्थापना को कार्य एशियाली विकास बैंक (ADB), स्विस सरकार (SDC), ब्रिटिस सरकार (DFID) तथा ओपेक फण्ड (OFID) को आर्थिक सहयोगमा ग्रामीण पूर्वाधार पुनःनिर्माण र पुनःस्थापना आयोजना नेपालको विसवटा जिल्लाहरूमा संचालन गरिरहेको छ । ईलाम जिल्लामा अवस्थित प्रस्तावित ई.न.पा-दुधाङ्ग-सोयाङ्ग-नयां बजार ग्रामीण सडकको पुनःस्थापना सोही कार्यक्रम अन्तर्गत संचालन गर्न लागिएको एक उप-आयोजना हो । उप-आयोजना (प्रस्ताव) अन्तर्गत २१.०९ कि.मी. लामो ई.न.पा-दुधाङ्ग-सोयाङ्ग-नयां बजार कच्ची सडकको ग्राभेल स्तरमा पुनःस्थापना गर्न प्रस्ताव गरिएको छ । उक्त कच्ची सडकमा हाल सुख्खा मौसममा गाडीहरू चल्दछन् ।

#### प्रस्तावक :

प्रस्ताव (प्रस्तावित सडक उप-आयोजना) को प्रारम्भिक वातावरणीय परीक्षणको प्रस्तावक 'जिल्ला विकास समिति र जिल्ला प्राविधिक कार्यालय, ईलाम' हुन् । प्रस्तावकको प्रारम्भिक वातावरणीय परीक्षण स्विकृत गर्ने सम्बन्धित निकाय 'स्थानिय विकास मन्त्रालय' हो ।

#### उद्देश्य :

प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन अध्ययनको मुख्य उद्देश्य प्रस्तावित उप-आयोजना निर्माण तथा संचालन बाट उक्त क्षेत्रको भौतिक, जैविक, सामाजिक, आर्थिक तथा सांस्कृतिक वातावरणमा पर्ने प्रभावहरू पत्ता लगाई नकारात्मक प्रभावको न्यूनिकरण र सकारात्मक प्रभाव बढाउने उपायहरू बारे सुझाव दिनु, वातावरणीय अनुगमन योजना बनाई कार्यान्वयन गराउनु, तथा प्रस्तावित सडक आयोजनाको लागि प्रारम्भिक वातावरणीय परीक्षण गरे पुग्छ भन्ने कुराको यकिन गर्नु हो ।

#### प्रस्तावको सान्दर्भिकता र अध्ययन प्रकृया :

प्रस्तावित सडकले ईलाम जिल्लाको सुदुर दुर्गम भेगका वासिन्दाहरूलाई सदरमुकाम संगको पहुँच बढाउनेछ भने स्थानिय स्तरमा उत्पादन हुने अदुवा, चिया, आलु, दुध, अकबारे खुसानि, अलाईची, अमलिसो खेतिलाइ बजार संग जोडी स्थानिय आय आर्जनमा अभिवृद्धि गर्नेछ ।

नोभेम्बर, २००९ मा फिल्ड सर्वेक्षणबाट लिइएका तथ्याङ्क तथा अन्य उपलब्ध तथ्याङ्कहरूको साथै सामाजिक तथा प्राविधिक टोलीबाट पुनर्वास कार्यको सर्भेक्षणको लागि संकलन गरेका तथ्याङ्कहरू केलाएर प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन तयार गरी निष्कर्ष तथा सुझावहरू दिइएका छन् । यो प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन नेपाल सरकारको वातावरण संरक्षण ऐन २०५३, वातावरण संरक्षण नियामावली २०५४ अनुसार तथा स्थानिय विकास मन्त्रालयबाट मिति २०६६/०३/२४ मा स्विकृत गरिएको यसै प्रस्तावकको कार्यसूचीमा उल्लेख गरिएको अध्ययन प्रकृया अनुसार तयार गरिएको छ । साथै, एशियाली विकास बैंकको इन्भाईरोमेन्टल एसिसमेन्ट गाइड लाइन, २००३ ए.डी. र सेफगार्ड पोलिसी स्टेटेमेन्ट २००९ ए.डी. को समेत अनुसरण गरिएको छ ।

#### आयोजनाको विवरण :

प्रस्तावित सडकले ईलाम जिल्लाको सुदुर उत्तर-पूर्वी दुर्गम भेगका वस्तीहरूलाई जिल्लाको सदरमुकाम संग जोड्दछ । यसको कूल लम्बाइ २१.०९ कि.मि. छ । हाल उक्त ग्रामीण सडकको पुरै सडक खण्डमा गाडी चल्छ । यो सडक ई.न.पा र ३ वटा गाउँ विकास समितिहरू क्रमशः वरवोटे, सोयाङ्ग र नयां बजार भएर जान्छ । सडकको कूल चौडाइ ५.० मि. हुनेछ भने मोडहरूमा आवश्यकता अनुसारको चौडाइ हुनेछ । यो आयोजनाको कूल अनुमानित लागत (पहिलो चरण ७.१२ कि.मि. सम्म) नेरु. ५.४ करोड रहेको र प्रति कि.मी अनुमानित लागत नेरु. ७.६२ लाख लाग्ने देखिन्छ ।

#### विद्यमान वातावरणीय स्थिति :

यो सडक ई.न.पा को सिमफिङ्ग समुद्री सतहदेखि १३७४ मी. उचाई बाट शुरु भएर माई खोलाको समुद्री सतहदेखि ६०० मी. अधिकतम समुद्री सतह भएर २२०३ मी. उचाईको नयां बजार सम्म जान्छ । यस सडक खण्डमा विभिन्न प्रकारका क्वार्टजाइट तथा सिष्ट चट्टानहरू पाईन्छन् । प्रायः पाँगो माटो, बालुवा मिसिएको नरम तथा कडा माटो र रेजीड्यूल प्रकारका माटोहरू सडक खण्डमा पाईन्छन् । सडक खण्डमा पर्ने पानीका मुख्य श्रोतहरूमा भोर्लेनी खोला, मान्दे खोला, माई खोला, तिनपाने खोल्सी तथा थोतनी खोल्सी पर्दछन् । प्रस्तावित सडक क्षेत्रको वायु तथा पानीको स्तर सफा रहेको देखिन्छ साथै ध्वनि प्रदुषणको समस्या छैन । यो सडक प्रायः खेती गरिएको जमीन, खाली जमीन तथा वन र वस्तीहरू भएर जान्छ ।

यस सडक खण्डमा पाइने मुख्य रुखहरूको प्रजातिहरूमा उत्तिस, चिलाउने, गोगन आदी पर्दछन् । मृग, दुम्सी, बँदेल, स्याल, वनविरालो, बाँदर, फ्याउरो, खरायो, मालसापो, लोखर्के आदि वन्य जन्तुका साथै काग, भँगेरा, कालिज, परेवा आदि पंक्षीहरू यस सडक खण्डमा पाईन्छन् । यो सडक खण्ड संरक्षित क्षेत्र वा मध्यवर्ती क्षेत्रमा पर्दैन ।

यो सडक खण्डको प्रभावित क्षेत्र भित्र घोश, दुधाङ्ग, हिमदल, लोप्साङ्ग, सोयाङ्ग, साठीमूडे र माने डांडा प्रमुख वस्तीहरू पर्दछन् । यस सडक खण्डमा जम्मा घरधुरी संख्या ११०९ र जनसंख्या ५७९६ रहेको छ र सरदर परिवार संख्या ५.२३ छ । यहाँ वसोवास गर्ने विभिन्न जात जातिका मानिसहरूमा मुख्य गरी राई, लिम्बु, क्षेत्री, ब्राहमण, तामाङ तथा दलित पर्दछन् । दलितहरू सबै वस्तीहरूमा छरिएर बसेका छन् ।

यहाँका बासिन्दाहरूको मुख्य पेशा कृषि र पशुपालन हो । यातायातको राम्रो सुविधा नभएको तथा पहाडी क्षेत्र भएकोले कृषि उब्जनीले मात्र पर्याप्त नहुने हुदा यहाँका अधिकांश मानिसहरू श्रम रोजगारीका अन्य पेशामा काम गर्ने तथा केही मानिसहरू सरकारी तथा अन्य संस्थामा काम गर्ने, थोरै मानिसहरूले व्यापार व्यवसाय गर्ने गर्दछन् । साथै जनसंख्याको उल्लेखनीय प्रतिशत मानिसहरू जीविकोपार्जनको सिलसिलामा काठमाडौँ तथा भारत लगायत विदेशका विभिन्न ठाउँमा रोजगारीको लागि जाने गर्दछन् ।

### प्रमुख वातावरणीय प्रभावहरू

#### सकारात्मक प्रभाव:

आयोजना बाट तत्कालै हुने लाभमा स्थानीय स्तरमा रोजगारीको सिर्जना हुनेछ । आयोजना संचालनको लागि जम्मा २०६,११४ मानव दिन तथा करिब १७६,६६९ वरावरको अदक्ष र २९,४४५ मानव दिन वरावरको दक्ष श्रमशक्तीको आवश्यकता पर्नेछ । आयोजना संग सम्बन्धित कार्यमा (रोजगारीमा) गरीब, तथा पिछ्छिडिएका स्थानीय जनताले प्राथमिकता पाउनेछन् । यस चरण मा हुने अन्य लाभहरूमा बन्द व्यापारको बृद्धि हुने अवसर, आयोजनाले प्रदान गरेको शीपमुलक तथा जनचेतनामुलक तालिममा तथा आयोजना निर्माण कार्यमा सहभागी भई स्थानीय जनताको शीप बृद्धि हुने अवसर पर्दछन् ।

सडक सञ्चालनका चरणमा सडकले प्रभावित क्षेत्रका बासिन्दालाई बजार, सामाजिक सेवा प्रदायक स्थान तथा देशका अन्य भागहरूसम्म पुग्न छिटो, छरितो तथा सुविधाजनक पहुँचको अवसर प्रदान गर्नेछ । सडक सुविधाको कारण मल तथा किटनाशक औषधीहरूको सस्तो तथा सुलभ आपूर्तिले कृषिको उत्पादकत्वमा अभिवृद्धि हुनेछ । यसले स्थानीय जनताको आय तथा खाद्य सुरक्षामा अभिवृद्धि हुनेछ साथै स्थानीय श्रोत साधनको उपयोग गर्ने साना कृषि उद्योगहरूको प्रवर्द्धन हुनेछ । पहुँच तथा यातायातको अवसर संगै शिक्षा, स्वास्थ्य, संचार, बजार, बैकिङ तथा अन्य आर्थिक तथा सामाजिक क्षेत्रहरूको विकास हुनेछ । यसले यस क्षेत्रका मानिसहरूको समग्र जीवनस्तर उकास्न मद्दत पुर्‍याउनेछ । सडकको सञ्चालनले स्थानीय जग्गा जमिनको मुल्य बृद्धि गर्न सहयोग पुर्‍याइ स्थानीय जग्गाधनीलाई लाभ पुर्‍याउनेछ ।

#### आयोजना कार्यन्वयनबाट पर्न सक्ने नकारात्मक प्रभावहरू:

सडक निर्माणको क्रममा भिरहरू काट्दा, खन्दा निस्किएको माटो तथा गेगर थुपार्दा, निर्माण सामग्री भिक्नलाई खानी सञ्चालन गर्दा त्यस क्षेत्रको भिरालो ठाउँहरूमा असर पर्न गई पहिरो तथा भु-क्षय हुन सक्ने सम्भावना रहन्छ । फोहर तथा खन्दा निस्किएका माटो, गेगर को उचित व्यवस्थापन हुन सकेन भने यसले भ-क्षय बढाउन तथा जल प्रदुषण गराउन सक्छ । सडक निर्माणको दौरानमा बाटो चौडाई ५.०० मी. कायम गर्नको लागि ३.४१ हेक्टर जंगल क्षेत्र प्रयोग हुनेछ, तथा विभिन्न जातका गरी करिब ४३१ वटा रुख विरुवाहरू काटिनेछन् । सडक निर्माण क्रियाकलापबाट जीवजन्तुलाई असर पर्ने तथा सडक निर्माण कार्यमा खटिएका कामदारहरूले वनका जीवजन्तुलाई जिस्क्याउने तथा तिनको शिकार गर्नसक्ने सम्भावना रहेता पनि ति न्युन हुनेछ । सडक निर्माण कार्यको दौरौन २ वटा खानेपानीको पाईपलाइन (Ch: 1+100 km , 1+960 km ) र मुहान (Ch: 12+200 km) मा क्षति हुनेदेखिन्छ ।

सडक सञ्चालनको चरणमा सवारी साधनको आवगमनबाट, वर्षायामको पानीबाट तथा स्थानीय भिरपहराहरूमा गाईवस्तु चराउदा वा रुख विरुवा काट्दा भिरपहराहरूमा अस्थिरता बढ्न गई पहिरो जान सक्छ । सडक किनाराका नाला बाट वगेको अनियन्त्रित पानीले सडक मुनिका खेतवारीमा भु-क्षय हुन सक्छ । सवारी साधनको बृद्धिले धुलो तथा ध्वनी प्रदुषण बढ्नेछ । त्यसैगरी सडकको सुधार संगै वन क्षेत्रसम्म भएको पहुँचको बृद्धिले वन सम्पदा तथा अन्य जन्तुमा चाप बढ्न गई वन सम्पदाको क्षय र जीवजन्तुलाई असर पर्न सक्छ । सडकको सुधार संगै बस्ती र बजारको अव्यवस्थित विस्तार हुने सम्भावना र सडक क्षेत्र मिच्ने प्रवृत्ति देखिन सक्छ ।



**प्रभाव न्यूनिकरणका उपायहरू :**

यस आयोजनाहरूलाई वातावरण मैत्री बनाउनका लागि सकारात्मक प्रभावलाई बढावा गर्ने तथा नकारात्मक प्रभावहरूलाई नियन्त्रण या न्यूनिकरण गर्ने थुप्रै उपायहरू यस प्रतिवेदनमा प्रस्तावित गरिएको छ । जनताले राजी खुशीले बाटोको लागि दिएको वाहेक आयोजनाले गरिवीका रेखामुनि परेका परिवारहरूको अधिग्रहण गर्ने सबै जग्गाको प्रचलित मुल्य अनुसार क्षतिपूर्ति दिनेछ । सडक LEP (श्रम मुलक वातावरण मैत्री सहभागीता मुलक) तथा निर्माण मेसीन तथा औजार प्रयोग गरी निर्माण गरिने छ । आयोजनाले प्रभावित जनतालाई निर्माण कार्यमा रोजगारीमा तथा शिपमुलक तालिममा प्राथमिकता दिनेछ । आयोजना निर्माणको क्रममा जग्गा फँडानी गर्दा, जमिन काट्दा, खानी सञ्चालन गर्दा, खन्दा निस्किएका माटो, गेगर थुपार्दा तथा अन्य संवेदनशील कार्य गर्दा त्यस क्षेत्रको वातावरणलाई सुरक्षित राख्न विशेष ध्यान दिनेछ । निर्माण कार्यको क्रममा श्रमिकहरूको बिमा गरिने छ तथा सुरक्षाका सम्पूर्ण सामग्री श्रमिकहरूलाई प्रयोगमा ल्याउन दिइने छ । वन, जीवजन्तुको संरक्षण गर्न तथा सामाजिक अक्षुण्णतालाई कायम राख्न यस चरणमा जनचेतनामुलक कार्यक्रमहरू तथा तालिमहरू सञ्चालन गरिनेछ । निर्माण कार्यको क्रममा श्रमिकहरूको बिमा गरिने छ तथा सुरक्षाका सम्पूर्ण सामग्री श्रमिकहरूलाई प्रयोगमा ल्याउन दिइने छ । निर्माण स्थलहरूमा प्राथमिक उपचारको सामग्रीहरूको व्यवस्था गरिने छ । काटिएका निजि रुख विरुवाहरूको क्षतिपूर्ति वापत १:१ अनुपातमा वृक्षारोपण गरिनेछ । वृक्षारोपणमा संरक्षित प्रजातिकाहरूलाई प्राथमिकता दिइनेछ । सडक सञ्चालनका क्रममा सडकमा देखिएका अस्थिरताहरूलाई नियमित रूपमा मर्मत संभार गरिनेछ । सडकमा तथा सडकको कारण नजिकैको खेतवारीमा पानी जम्मा हुन नदिन उचित निकासको व्यवस्थापन गरिनेछ । सडक दुर्घटनाबाट बचाव गर्ने उपायहरू अवलम्बन गरिनेछ । निर्माण गर्दा प्रभावित सामुदायिक संरचनाको पुनर्निर्माण गरिनेछ ।

**वातावरण व्यवस्थापन योजना :**

यस प्रतिवेदनमा वातावरण व्यवस्थापन योजना अन्तर्गत आयोजनाबाट पर्ने संभावित असरहरू, असरहरूको प्रभाव, न्यूनिकरण विधि, अनुगमन विधि तथा कार्यतालिका प्रस्तावित गरिएको छ । यसका साथै न्यूनिकरणका उपायहरूको तथा अनुगमन कार्यको कार्यन्वयन गर्ने जिम्मेवार निकायहरूको पनि पहिचान गरिएको छ । अनुगमनका लागि आवश्यक भौतिक, जैविक, सामाजिक-आर्थिक तथा साँस्कृतिक वातावरणका विभिन्न अनुगमन सुचाङ्कहरूको पनि पहिचान गरिएको छ । वातावरण अनुगमन तथा व्यवस्थापन योजना कार्यन्वयन गर्न निम्नानुसार खर्च हुने अनुमान गरिएको छ ।

क्र. सं.	विवरण	रकम (ने.रु.)	कैफियत
१.	वातावरण सम्बन्धी जनचेतनामूलक तालिम, नाईके को तालिम (RBG) तथा अन्य अभिमुखीकरण तालिम	२००,०००/-	आयोजनाको बजेटमा समावेश गरिने ।
२.	श्रमिकहरूको बिमा	५०,०००/-	BoQ मा समावेश गरिने ।
३.	बायो-इन्जिनियरिङ्ग र सडक छेउछाउ वृक्षारोपण	७,५१,५३०/-	BoQ मा समावेश गरिने ।
४.	पुनर्वास तथा जग्गा अधिग्रहण	५४९,००४/-	पुनर्वास योजनामा समावेश गरिने ।
५.	पुनर्निर्माण तथा अन्य	५००,०००/-	BoQ मा समावेश गरिने ।
६.	क्षतिपूर्ति वृक्षारोपण	७९८,४३४/-	आयोजनाको बजेटमा समावेश गरिने ।
७.	सामाजिक कार्य योजना	१७४२३० १ /-	सामाजिक योजना तथा आयोजनाको बजेटमा समावेश गरिने ।
८.	पेशागत स्वास्थ्य सुरक्षा तथा जानकारीमूलक सूचनापाटी	५५०,०००/-	BoQ मा समावेश गरिने ।
९.	अनुगमन तथा मूल्यांकन	२००,०००/-	आयोजनाको बजेटमा समावेश गरिने ।
जम्मा :		५,३४१,२६९/-	

**निष्कर्ष :**

परिचान गरिएका प्रायः वातावरणीय प्रभावहरू थोरै क्षेत्रमा तथा मुख्य गरी निर्माणकार्यका वखतमा सिमित रहेको पाइएको छ । प्रस्तावित न्यूनिकरण विधिको पालना गरिएमा पहिचान गरिएका वातावरणीय प्रभावहरूको न्यूनिकरण अथवा नियन्त्रण गर्न सकिनेछ । सडक निर्माण गर्दा प्रभावित व्यक्तिहरूको सम्पत्तिको क्षतिपूर्ति गर्न पुनर्वास योजनाको आवश्यकता पर्नेछ । वातावरण व्यवस्थापन योजना अन्तर्गत उल्लेख गरिएको उपायहरूको कार्यान्वयन गरिएमा यस आयोजनाको कार्यान्वयनले आयोजना क्षेत्रको भौतिक, जैविक, सामाजिक - आर्थिक तथा साँस्कृतिक वातावरणमा उल्लेखनीय नकारात्मक प्रभाव नपार्ने देखिन्छ । यस प्रारम्भीक वातावरणीय अध्ययनको आधारमा यस प्रतिवेदनमा उल्लेख गरिएको वातावरणीय व्यवस्थापन योजनालाई पूर्ण रूपमा लागु गरी प्रस्तावित आयोजना कार्यान्वयन गर्न सिफारिश गरिन्छ । आयोजनाको वातावरणीय प्रभाव मुल्याङ्कन स्तरमा अध्ययन गर्न आवश्यक नरहेको सिफारिश समेत गरिन्छ ।

## EXECUTIVE SUMMARY IN ENGLISH

### Background

Government of Nepal has received financial assistance from ADB, SDC, DFID and OFID for implementation of the Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP). The RRRSDP aims for reconstruction and rehabilitation of rural infrastructures damaged in the twenty conflict affected districts of the country. The Proposed 21.09 km long I.Na.Pa.- Dudhang – Soyang - Naya Bazaar Rural Road in Ilam District is one of the Sub-projects selected under the RRRSDP. It is an existing earthen road proposed for rehabilitation in Gravel standard.

### Project Proponent

The 'Proponent' of the proposed Subproject (Proposal) is District Development Committee (DDC)/ District Technical Office (DTO), Ilam. Ministry of Local Development (MoLD) is the 'Concerned Agency' for approving the IEE study of the proposed Sub-project.

### Objectives

The main objective of the IEE study is to identify the impacts from the construction and operation of the proposed Sub-project on the physical, biological, socio-economic and cultural environment of the Subproject area. The objective of IEE study is to recommend site specific environmental mitigation measures for adverse impacts, benefit augmentation measures for beneficial impacts, prepare and implement environmental monitoring plan and make sure that IEE is sufficient for the proposed road sub-project.

### Relevancy of the Proposal and Study Methodology

The proposed Subproject will provide access to district headquarter, living in rural area of Ilam district. As a result socio-economic condition of people living in that area will enhance as local products like ginger, tea, potato, milk, alainchi, chilly (Akabare) and Amliso (broom) will get access to market.

The findings and conclusions of the report are based on the analysis of the information collected from the field during November, 2009 by undertaking a walk-through environmental survey along the proposed route and secondary information supplemented by information collected by the social and technical teams working on the resettlement survey and detail survey. The IEE report has been prepared according to the Environmental Protection Act, 1997 and Environmental Protection Rules, 1997 (second amendment 2007) of the Government of Nepal and Environmental Assessment Guidelines, 2003, Safeguard Policy Statement, 2009 of ADB. This report is based on the Terms of Reference (ToR) approved on 2066/03/24 by Secretary level decision of Ministry of Local Development (MoLD).

### Project Description

The proposed road links with far north-eastern part of the remote community of Ilam district with the district headquarter. The total length of the road is 21.09 km. The road alignment is already opened and motorable. The road passes from ward no.8 of Ilam Municipality and three village development committees namely Barbote, Soyang and Naya Bazaar. The average width of the road will be 5 m and geometry will be improved as per design required. The total project cost (First Phase Upto 7.12 Km) is NRs. 54,288,179.00 and per km cost is NRs. 7,625,815.00. The detail survey, proposed cross drainage structures, proposed retaining structures, affected trees and infrastructures have been identified for overall 21.09 km in this IEE study.

### Existing Environmental Condition

The road starts from Simphring of Ilam Municipality-8 at elevation of 1374m amsl and crosses Mai River at 600m amsl and ends at Basnet Tole of Naya Bazaar VDC at 2203m amsl. The road alignment is composed of various kinds of rock such as quartzite and schist. Generally soft soil, hard soil, white clay, boulder mix soil, sandy and residual soil are found along the road alignment. Main streams and rivulets found in the road alignment are Bhorleni khola, Mai Khola, Mandre khola, Tinpane kholsi, Thotne kholsi. Ambient air and water quality of the proposed project area is observed to be good and there is no noise pollution. The road mainly passes through cultivated land, forest, barren land and settlements. The dominant tree species found in the road alignment are Uttis (*Alnus nepalensis*), Chilaune (*Schima wallichii*) and Gogun (*Sauravia nepauensis*) etc. Mirga (*Muntiacus muntjak*), Porcupine (*Hystix indica*), Ban Biralo (*Felis chaus*), Bandel (*Sus scrofa*), Jackle (*Canis aureus*), Rato bandar (*Macaca mulatta*), Malsanpro (*Martes flavigula*), Lokharke (*Ratufa* sp), Kharayo (*Lepus nigricollis*) are the wild animals reported in the nearby forest of the road alignment. Similarly, Kalij pheasant (*Lophura lencomelana*), Columba livia (Pigeon), Kag (*Corvus splendens*), Bhangero (*Passer domesticus*), Dhukur (*Streptopelia chinensis*),

Suga (*Psittacula kramen*) etc. are found in the project area. The road does not fall under any protected or buffer zone area.

The major settlements along the ZoI of the road alignment are Ghosh, Dudhang, Himdal, Lopsang, Soyang, Sathi Mure, Mane Danda, Naya Bazaar. The total household within ZoI along the road corridor is 1109, total population number is 5796 persons and average family size of 5.23. Diverse ethnic groups such as Rai, Limbu, Chettri, Brahmin, Tamang and occupational caste live along the ZoI of road alignment. Occupational caste households are distributed in almost all the settlements.

The major occupations of the people are agriculture and livestock farming. Due to limited transportation facilities and high altitude, agriculture farming is not enough for subsistence level. Therefore, people are carrying out other economic activities like majority of the people work as labour and porters while some people work in government and non government organizations and few are doing business. Moreover, significant percentage of population are migrating to various places such as Kathmandu, India and abroad during slack farming season for employment..

## MAJOR ENVIRONMENTAL IMPACTS

### Beneficial Impacts

The immediate benefit from this road Subproject is employment opportunities. The implementation of Sub-project require total 206,114 person days and about 176,669 person days of unskilled and 29,445 person days of skilled manpower. The project will give priority to the poor, ethnic minorities and disadvantaged local people for employment opportunity. Other beneficial impacts include enhancement of local business, development in skills of local people from skill developing training, awareness raising training and involvement in the construction of the project.

During operation stage of road, the people from the ZoI will get easy and fast accessibility to markets, social services and other regions of the country. The fertilizers and pesticides will become cheaper with better transportation facility hence, agricultural production will increase. This will ensure better economic condition and food security of the people living in the ZoI of the project area. Moreover this will promote the small agro based industries that uses local resources. Easy access and opportunity of better transportation system will develop other sectors like education, health, communication, market, banking and other socio-economic sectors. This will increase the overall living condition of the people living in ZoI of project area. The better land network will result in increased land price which will be beneficial for land owners.

### Adverse Impacts

During the road construction, the cutting of slopes and consequently disposal of soil and earth material, operation of quarryies might result in erosion and landslide during construction and operation. Futhermore, spoils generated during construction can create the water pollution to the nearby water sources.

During road widening and construction required 3.41 ha. of forest area and different type of tree total 431 nos will have to be cleared.. Also during construction of road there might be possible impacts on wildlife as workers might harass/ hunt the wildlife in the nearby forests, however, such effects are very minimum. Two pipelines of drinking water supply at Ch: 1+100 km and 1+960 km and spring sources at Ch: 12+200 km will be affected during the road construction. No any public structures are affected till 21.09 km.

During operation stage, vehicular movement, monsoon rain, grazing of animals and cutting of trees on the unstable slopes might result in slope instability and hence erosion and landslides might occur. The flowing water on the side drain of the road might cause erosion of soil on adjacent agricultural land. Vehicular emissions will result in air and noise pollution. Because of easy accessibility to the forest areas will deplete forest resources and wildlife. New settlement, bazaar area will be expanse and this may increase encroachment of the RoW.

## MITIGATION MEASURES

The various benefit augmentation measures and adverse impact mitigation measures have been proposed in the report to make this project environment friendly. Other than land donated by local people for the projects, adequate compensation will be provided to affected poor and marginalize household for all the lands that need to acquire. The construction of road will be based on Labour-based, Environment friendly and Participatory (LEP) Approach and Contractor Approach. Affected families will be given high priority for employment and skill development trainings. Necessary measures will be taken to reduce the adverse effects that might arise from site clearance, cutting of slopes, disposal of spoils and quarrying activities. Necessary trainings and awareness programs will be conducted. Necessary measures will be adopted for protection of flora and fauna. At construction site, the workers will be provided insurance, first aid facilities and safety equipments. Loss of trees in private land will be compensated by planting of trees in the ratio of 1:1 for the numbers of tress that need to be cut down during construction. Protected species will be given emphasis for plantation. Proper maintenance and proper drain system will be provided to prevent

accumulation of water on the nearby agricultural lands during operation. Adequate road safety measures will be provided to minimize road accident. All affected community infrastructure will be restored.

#### Environmental Management Plan

Environmental management plan is prepared to ensure the implementation and monitoring of mitigation measures for minimizing adverse impacts and maximizing the beneficial impacts. The necessary mitigation measures together with environmental monitoring process and responsible bodies for environmental monitoring have been identified. Similarly, for environmental monitoring various sections of physical, biological, socio-economic and cultural environment have been identified to generate useful information and improves the quality of implementation of mitigation measures.

The costs for implementing environmental monitoring and management plan have been identified as follows:

S.N.	Description	Amount (NRs.)	Remarks
1.	Environmental awareness raising training, Training to Naika of RBGs and other Technical Skill Enhancement trainings	200,000.00	To be included in project cost
2.	Insurance of RBG workers	50,000.00	To be included in BoQ
3.	Bio-engineering / Road side plantation	751,530.00	To be included in BoQ
4.	Resettlement and Land Acquisition	549,004.00	To be included in Resettlement plan
5.	Restoration or relocation of affected infrastructures, Spoil management and rehabilitation, Reinstate of quarry, stockpiling etc.	500,000.00	To be included in BoQ
6.	Compensatory Plantation cost	798,434.00	To be included in project cost
7.	Social Action Plan Cost	1,742,301.00	To be included in Social plan, project cost
8.	Occupational health and safety and Information signboard	550,000.00	To be included in BoQ
9.	Environmental Monitoring and Evaluation	200,000.00	To be included in project cost
	<b>Total</b>	<b>5,341,269.00</b>	

#### Conclusion and Recommendation

The IEE study of the proposed I.Na.Pa-Dudhang-Soyang-Naya Bazaar road sub-project reveals that the identified environment impacts will be seen in limited small areas and mainly during construction period. The implementation of proposed mitigation measures for identified adverse impacts will minimize as well as mitigate the adverse impacts on environment. The Resettlement Plan and compensation to the affected households should be ensured. The implementation of measures as described in environmental management plan will mitigate the negative impacts on physical, biological, socio-economic and cultural environment. Therefore, this IEE is sufficient for approval of the proposed sub-project, and recommended for implementation with incorporation of mitigation measures and environmental monitoring plan. Therefore, the proposed Subproject does not require Environmental Impact Assessment.

# CHAPTER – 1

## 1. INTRODUCTION

### 1.1 Background

1. The Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP) covers 20 districts spread over the country, which focuses on immediate post conflict development priorities for accelerated poverty reduction and inclusive development, to improve the connectivity, enhance economic and employment opportunities, increase access to market and social services of rural communities. Ilam District is one of the project districts under RRRSDP. The project outputs include (i) improved rural roads (ii) developed and improved community based supplementary rural infrastructure (iii) enhance equity, employment and income opportunities for the poor disadvantaged (iv) strengthen intuitional capacity of Ministry of Local Development(MoLD), Department of Local Infrastructure Development and agricultural Roads(DoLIDAR), District Development Comities (DDCs), and communities and (v) improved project management. Dhankuta District is one of the project districts under RRRSDP. The RRRSDP is financed by the Government of Nepal (GoN), Asian Development Bank (ADB), Department for International Development (DFID), Swiss Development Cooperation (SDC), Nepal and OPEC Fund for International Development (OFID). Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) under the Ministry of Local Development (MoLD) is the executing agency (EA). The District Development Committees (DDCs) are the Project Implementing Agencies and DTO of each respective DDC is responsible for technical and project management. The District Technical Office (DTO)- Ilam will be supported by District Implementation Support Team (DIST) for rehabilitation of the proposed road which includes engineering design, safeguards and social mobilization.

### 1.2 Relevancy of the Proposal

2. The sub-project area has high potential for the production of cardamom, ginger, tea, potato, milk, alainchi, chilly (Akabare Khursani) and Amliso (broom) cultivation. The proposed road will enhance access of the rural people to market and social services and will significantly uplift their socio-economic status and sustainable livelihood. Better access in turn will also doors to new development opportunities. This road corridor is highly prioritized road as per DTMP in Ilam. The IEE study of rural road, is a legal requirement as per the GON provision in article 3 of Environmental Protection Act (EPA), 1997 and rule 3 of Environmental Protection Rules (EPR), 1997 (amended in 2007); Environmental Assessment Guidelines, 2003 as well as ADB guideline and Safeguard Policy Statement, 2009.

3. Although the total length of the road is 21.09 km, the Detailed Project Report (DRP) approved is of 7.12 km due to high cost involved in construction of remaining road section and bridge. As per the approved DPR the construction of the subproject will be carried out upto 7.12 Km in the first phase. The construction of remaining section of road and bridge will be completed from other funding sources. In this IEE the technical cost is included only from 0+000 to 7+120 Km. However, the IEE study has been carried out of overall 21.09 Km. The detail survey, proposed cross drainage structures, proposed retaining structures, affected trees and infrastructures have been identified for overall 21.09 km in this IEE study.

### 1.3 Objectives of Project and IEE study

4. The objectives of project are to improve connectivity, enhanced economic and employment opportunities and increased access to market and social services of rural communities. The project outputs include (i) improved rural roads (ii) developed and improved community based supplementary rural infrastructure (iii) enhance equity, employment and income opportunities for the poor disadvantaged (iv) strengthen intuitional capacity of Ministry of Local Development(MLD), Department of Local Infrastructure Development and agricultural Roads(DoLIDAR), District Development Comities (DDCs), and communities and (v) improved project management. Similarly, the main objective of the IEE study is to identify the impacts on physical, biological, socio-economic and cultural environment of the sub-project area from the implementation and operation of the Proposal. It recommends practical and site-specific environmental mitigation and enhancement measures, as well as environmental monitoring plan and make sure that IEE is sufficient for the proposed road sub-project.

## 1.4 Methodology Adopted

5. The IEE study has followed the provisions of the EPA, 1997 and EPR, 1997, the provisions of ADB and approved TOR<sup>1</sup> for IEE Study by MoLD. The IEE study has followed the provisions of the EPA, 1997 and EPR, 1997, the provisions of ADB and approved ToR<sup>1</sup> for IEE Study by MoLD. It follows methodology suggested in the approved Terms of Reference for IEE Study (please refer Annex I). The IEE study has been conducted through review of secondary information collected from relevant agencies, and primary information collected from the field survey in November 2009. Field survey, sample household survey, organization of Focus Group Discussions in the related VDCs was carried out and necessary information was collected. The DDCs officials, VDCs and Community Groups were also contacted to verify information to solicit their concerns. Based on the analysis of information the impacts have been predicted, mitigation measures prepared and monitoring plan has been developed.

6. The geographical boundary of ZoI was drawn on the topographical maps for physio-biological and socio-economic environment. The area has been identified as Direct Impact Area (within 100m from the centre of the RoW) and indirect Impact Area (within a distance of one and half hours walk). A public notice was given beforehand and local people, DDCs officials, VDCs, local politicians and different community groups were consulted to verify information to solicit their concerns. Interaction meetings and focus group discussions were also conducted. The mitigation measures along with Environmental monitoring and management plan were developed to minimize the likely adverse effects of the sub-project.

## 1.5 Description of the proposal

7. The proposed I. Na. Pa. - Dhudhang -Soyang- Naya Bazaar Road lies in the North-eastern part of Ilam district in Eastern Development Region of Nepal. It has been selected as per the decision made by the DPCC and DDC with prioritizing on District Transport Master Plan (DTMP). This proposed road starts from Singfiring, Ilam Municipality-8 (Ch: 0+000 km) and ends at Basnet Tole, Naya Bazaar VDC-8 (Ch: 21+090 km). Major settlements within ZoI of the project are Ghosh Gaun, Dudhang, Himdol Gaun, Lopsang, Sathi Mure, Mane Danda, Naya Bazaar etc. The road alignment passes through ward no.8 of Ilam Municipality and Barbote, Soyang and Naya Bazaar VDCs. The road passes through mainly agricultural land, Kudule Sepini community forest in Barbote VDC and Himdal private forest at soyang VDC with some other few CF in the vicinity with exposed hard and soft rocky area, boulder mix soil zones and settlements. The gradient of roads is quite moderate, it generally around 8-10 % and at some critical places more than 12%, it reaches two highest places at Ch; 10+900 km and 8+300 km. There are some sharp horizontal curves and a few hairpin bends. The existing average road width is 3.69 m and major portion of the road passes along the east and south-east facing slope. The road alignment passes through Kudule Community Forest in Borbote VDC. It will definitely ease the life of rural communities and add them alternative outlets for the goods and other products in easy way. The total length of this road is 21.09 km. (see **Map 1.1** and **Map 1.2**). Activities included during the road construction are: Site clearance, Pavement work, Structures (Toe wall, retaining wall etc.), Earthwork, Bioengineering, Gravelling, Cross drainage works, drilling and cutting rocks and Side drain works. The total cost of road upgrading including VAT is estimated as NRs. 196,299,357.00 and shown in **Appendix-III**.

### Salient feature of the Road Subproject

1. Name of the Project	:	Upgrading of I. Na. Pa. - Dhudhang -Soyang- Naya Bazaar Road
1.1 Project Component	:	Pavement Work, Side and Cross Drainages, Retaining Structures, Bioengineering
2. Location		
2.1 Geographical Location		
2.1.1 Start Point	:	Singfiring, Ilam Municipality-8
2.1.2 End Point	:	Basnet Tole, Naya Bazaar-8
2.2 Geographical Feature		
2.2.1 Terrain	:	Mountainous
2.2.2 Alignment	:	Ridge/upper valley: approx. 18km, River/Lower valley: approx. 8.5km
2.2.3 Altitude	:	1374 m amsl at Ilam municipality-8 to 2203m amsl at Naya Bazaar
2.2.4 Climate	:	Temperate
2.2.5 Soil	:	Hard soil
3. Classification of Road	:	District Road (Rural Road Class A)

<sup>1</sup> The TOR was approved on 24/03/2066 B.S. by the secretary level decision of the MoLD.

4. Status of road	:	Rehabilitation proposed for all Weather
5. Length of Road	:	21.09 km
6. Standard of Pavement	:	Gravelled
7. Construction Period	:	270 Days
8. ExistingTraffic	:	190 vehicles per day
9. Design speed	:	20 km/hr
10. Demographic Features		
10. 1 Major Settlement	:	Ghosh, Dudhang, Himdol, Soyang, Lopsang, Sathi Mure, Mane Danda, Naya Bazaar.
10.2 Minor settlement	:	Singfring, Kudule, Borleni, Birmane tole, Devisthan, Kathayat tole, Khadka goan, Soyang, Dhunge bazaar, Bhim Barne Bhanjyang, Boudhha Dhunga, Namgel tole, Sotang tole, Limbu Gaon, Sirise, Dharane tole, Bhandari danda. Tintale Tole, Sisne, Basnet Tole.
10.3 Municipality /VDCs along the Road	:	Ilam municipality-8, Barbote, Soyang and Naya Bazaar
10.4 Total no. of Household	:	1109 HHs
10.5 Total population	:	5796
11. Cross Section		
11.1 Right of way	:	5m each side (center line)
11.2 Formation width	:	5 m including side drain
11.3 Carriageway width	:	3 m
11.4 Lane	:	Single
12. Approximate volume of works (First Phase Upto 7.12 Km)		
12.1 Earth work in Excavation	:	45,244.40 cum
12.2 Earth work in Fill	:	9,208.30 cum
13. Stone masonry Work (First Phase Upto 7.12 Km)		
13.1 Dry stone masonry	:	1,045.34 cum
13.2 Stone Masonry Work (1:4)	:	521.29 cum
14. Gabion Works(First Phase Upto 7.12 Km):		8445.00 cum
15. Stone Soling Work(First Phase Upto 7.12 Km)		
15.1 Stone Soling for causeway	:	150.00 cum
15.2 Stone Soling	:	151.06 cum
16. Pavement Works(First Phase Upto 7.12 Km):		28433.85 cum
17. Other Structures (First Phase Upto 7.12 Km)		
17.1 60cm dia RCC Hume Pipe (NP3)	:	60.00 Rm
18. Bio-Engineering/Road side plantation	:	NRs. 751,530.37 (For entire road alignment)
19. Project cost (First Phase Upto 7.12 Km)		
19.1 Total Cost (NRs)	:	NRs. 54,288,179.00
19.2 Costs per km (NRs.)	:	NRs. 7,625,815.00 (Including Contractors' Overhead & VAT)
20. Material Availability		

- 20.1 Stone quarry : (i) Mingma Saila Kholsi (Near Devithan), (ii) Sureli Kholsi, Soyang at Ch: 8+063; (iii) Chainages: 2+400 - 2+470; 6+500: (iv) Naya Bazaar area(Ch: 20+650-20+750km)
- 20.2 Sand quarry : (i) 100m upstream of proposed Mai khola Bridge  
(ii) Sand deposit at Soyang-2
21. Total Employment generation : 206,114 (person days)
- 21.1 Skilled : 29,445 (person days)
- 21.2 Unskilled : 176,669 (person days)

### 1.6 Construction Approach and activities

8. The construction approach will be Labour-based, Environment-friendly and Participatory (LEP) approach and Community -Driven Development (CDD) approach. The important features of the LEP approach are (i) phased construction with balanced cut and fill; (ii) manual work and use of hand tools and small equipment rather than heavy machinery; (iii) bio-engineering for slope stabilization; (iv) avoid blasting; (v) use soft engineering structures; and (vi) use of contractors only in the works that cannot be done through manual labor. The contractor based Road Construction Approach will be used as construction works that cannot be done manually through road building groups. In such works, the construction will be carried by using the equipment and machineries but it will be used in such a way to ensure the minimum environmental damage. Activities included during the road construction are: Site clearance, Pavement work, Structures (Toe wall, retaining wall etc.), Earthwork, Bioengineering, Gravelling, Cross drainage works, drilling and cutting rocks and Side drain works.

### 1.7 Proposed Schedule for Implementation of Sub-project

9. Following table shows the proposed implementation schedule for I.Na.Pa-Dudhang-Soyang-Naya Bazaar road sub-project:

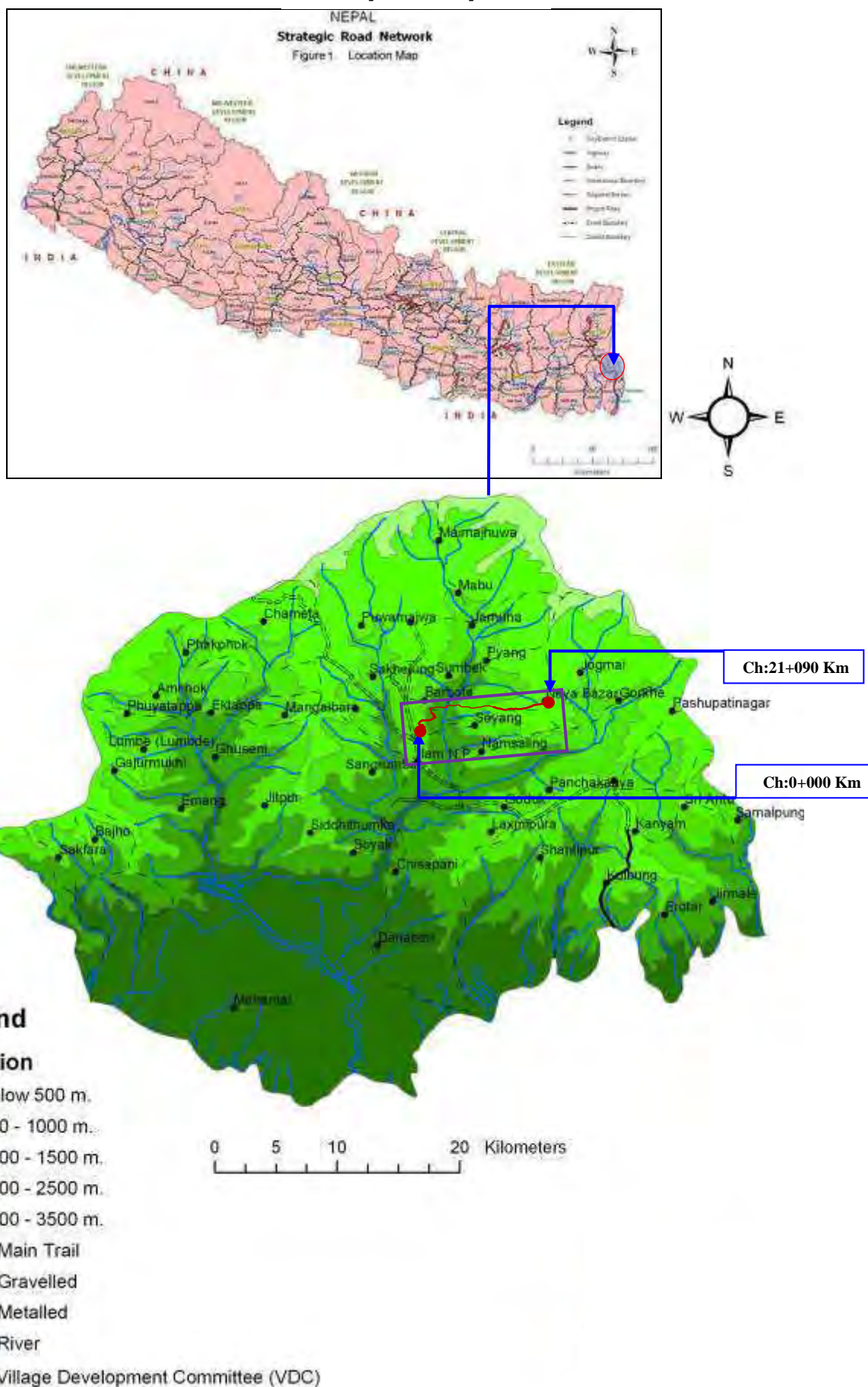
**Table 1.1: Sub-project implementation schedule**

S.N	Activity	2009				2010				2011	
		I	II	III	IV	I	II	III	IV	I	II
1	Detailed survey, design and estimate										
2	Preparation of Resettlement Plan										
2.1	Life skill and income generation training										
3	Environment Assessment and implementation										
3.1	IEE report preparation and approval from MoLD										
3.2	Implementation of EMP										
3.3	Environmental monitoring										
4	Work implementation										
4.1	Civil construction work by contractors										
4.2	Civil construction work by RBGs										

**Note:** I - January, February, March; II - April, May, June; III - July, August, September;  
IV - October, November, December



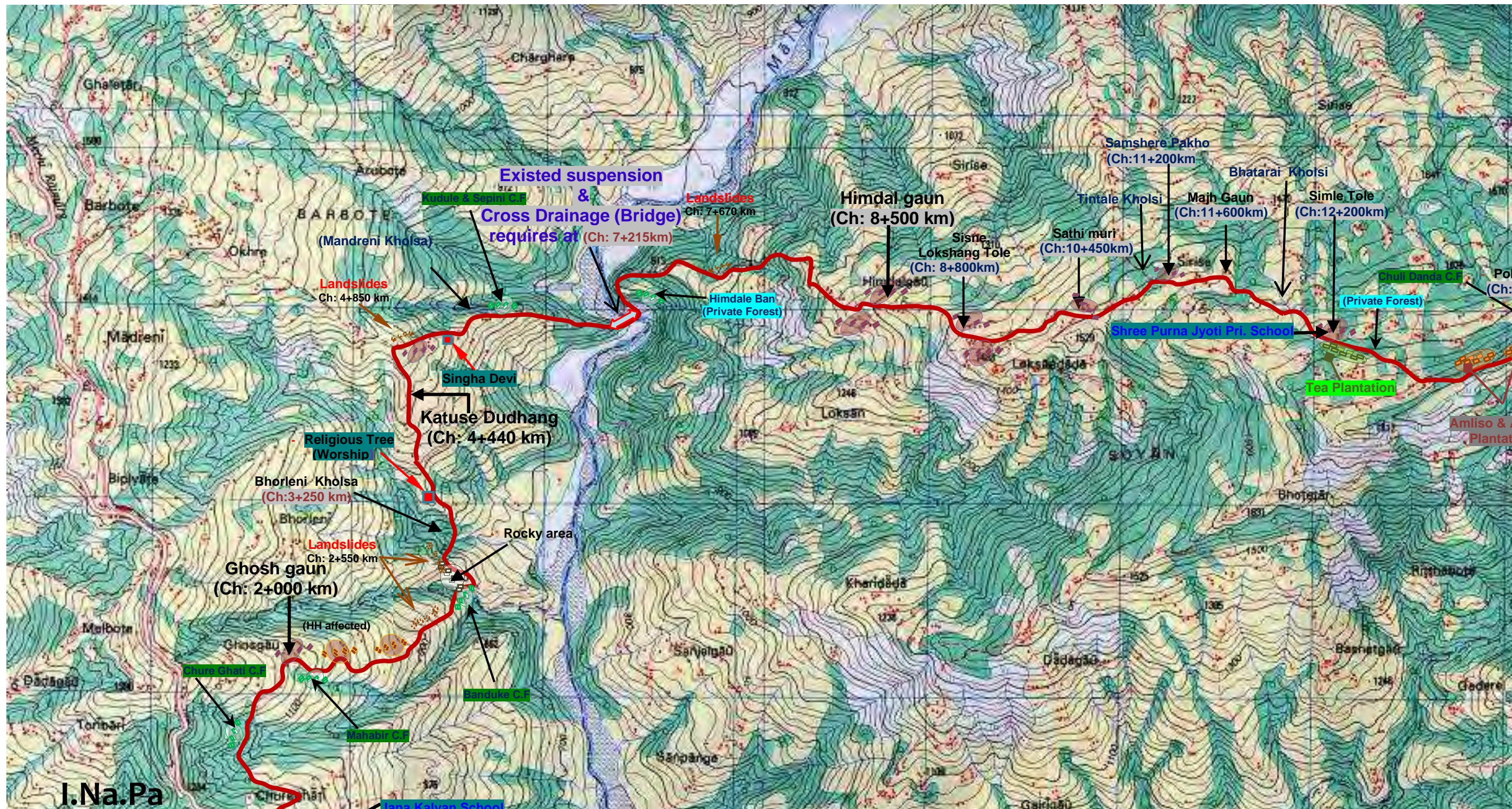
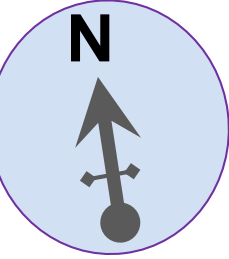
## Map of Nepal



**Map 1.1:** MAP OF NEPAL AND ILAM DISTRICT SHOWING THE LOCATION AND ROAD ALIGNMENT OF PROPOSED I.NA-PA.-DUDHANG-SOYANG-NAYA BAZAAR ROAD SUB-PROJECT



## Location Map





## CHAPTER - 2

### 2. PUBLIC CONSULTATION AND INFORMATION DISSEMINATION

#### 2.1 Public Consultation

10. In order to ensure the public involvement, the following procedures were followed during IEE report preparation.

- **Publication of notice-** a 15 days public notice was published on 17<sup>th</sup> Srawan of 2066 B.S (1<sup>st</sup> August 2009) in the Gorkhapatra, a national daily newspaper (see **Appendix-V**) seeking written opinion from concerned VDCs, DDC, schools, health posts and related local organizations. A copy of the public notice was also affixed in the above mentioned organizations and deed of enquiry (muchulka) was collected (see **Appendix-VI** for deed of inquiry and **Appendix-VII** for the names of organizations).
- IEE team also carried out interaction and group discussion with local communities and related stakeholders such as District Development Committee, District Forest Office, Village Development Offices, District Soil Conservation Office, District Agricultural Development Office and others during field survey to collect the public concerns and suggestions (see **Appendix-VIII** for the list of persons consulted; summary of Focus Group Discussion / Interaction meeting in **Appendix-IXa** and minutes of meeting with local people in **Appendix-IXb**).
- Recommendation letters were also obtained from the concerned VDCs (see **Appendix-X**). FGDs were held at major different settlements along the ZoI of the road (refer **Tables 2.1; 4.6** and **Appendix-XIb**). After reviewing draft IEE report and incorporating the suggestions from the concerned stakeholders, Final IEE report will be prepared and sent to PCU for approval from MoLD and ADB.

**Table 2.1: Table showing summary of meeting minutes**

Location	Date	No. of Participants		Issues and Suggestions of the meeting	Decision
		Male	Female		
School Danda, Siphring, I.Na.Pa-8	2066/08/08 B.S (23/11/2009)	9	2	<ul style="list-style-type: none"> <li>It will cut of transportation of potato, Kuchho time from three hours to twenty minutes to rich Biblyata Bazaar.</li> <li>No Negative impacts</li> <li>There are much positive aspects with the construction of road. It covers more VDCs to serve local benefits.</li> </ul>	<ul style="list-style-type: none"> <li>People are happy to give their Labour contribution.</li> <li>Construction of Road is necessary to be carried out even some minimum impacts may occurs.</li> </ul>
Katunje, Dudhang, Barbote-6	2066/08/09 B.S (24/11/2009)	13	4	<ul style="list-style-type: none"> <li>The people of Barbote, Soyang, Jamuna, Naya Bazaar and Ilam Municipality will be benefited by easy and fast accessibility.</li> <li>The proposed road will not harm any wildlife and occure forest distruction.</li> <li>Plantation of Amliso, Alinchi should be emphasized for bioengineering works.</li> </ul>	<ul style="list-style-type: none"> <li>The Adheri, Ujeli and Mandreni Kholsi alignment portions will be protected by providing Gabion wall.</li> <li>Bio-engineering works at Bhorleni-3 and upper area of Katuseni Bridge will be done.</li> <li>The proposed road will be constructed with proper and simple way; the road shall be constructed without any obstacle. Gabbion wall will be provided in the surrounding areas of Ghimire Kholsi.</li> </ul>
Bhimbarne Bhanjyang, Soyang	2066/08/10 B.S (25/11/2009)	12	4	<ul style="list-style-type: none"> <li>The construction of road will support on education, health and economic activities. More school-going children will stay at their own village and no need to complete from Ilam Bazaar alone.</li> <li>All grown vegetable production will not be wasted and consumed.</li> <li>All the people think that there is no any negative impact occurs by the proposed construction road.</li> </ul>	<ul style="list-style-type: none"> <li>People emphasized to include Naya bazaar area as essential part for gravelling works.</li> <li>Plantation of Amliso, Alinchi will be enhanced.</li> </ul>
VDC office, Naya Bazaar-8	2066/08/11 B.S (26/11/2009)	9	1		

## **2.2 Information Dissemination**

11. Draft IEE will be kept in the information center of DDC Ilam for public Dissemination. Information are also be disclosed through person to person contacts and interviews and group Discussions. The approved IEE report will be accessible to interested parties and general public through information center of DDC Ilam and websites of ADB, DoLIDAR and RRRSDP.

The IEE Report will be forwarded to the following offices:

1. District Development Committee, Ilam
2. District Technical Office, Ilam
3. District Project Office, Ilam
4. District Implementation Support Team, Ilam
5. Ilam Municipality, Barbote, Soyang and Naya Bazaar VDCs
6. Ministry of Local Development, Environment Management Section
7. Department of Local Infrastructure Development and Agricultural Roads
8. Project Coordination Unit, RRRSDP
9. Asian Development Bank, Nepal Resident Mission

## CHAPTER – 3

### 3. REVIEW OF RELEVANT ACTS, REGULATIONS AND GUIDELINES

12. Government of Nepal has adopted various acts, regulations and guidelines to ensure the integration of development and conservation of environment. The IEE study was being guided by the requirements and provisions of the applicable acts, rules and guidelines as given in **Table 3.1**.

**Table 3.1 Review of Environmental Acts, Regulations and Guidelines**

S.N.	Environmental Acts, Regulations and Guidelines	Description of Requirements
1	Environmental Protection Act, 2053 B.S (1997 A.D), GoN	Any development project, before implementation, shall pass through environmental assessment, which may be either IEE or an EIA depending upon the location, type and size of the projects.
2	Environmental Protection Rule 2054 B.S (1997 A.D) (amendment, 2007), GoN	The EPR and its schedules clearly provide various step-wise requirements to be followed while conducting the IEE study. It also obliges the Proponent to timely consult and inform the public on the contents of the proposal.
3	National Environmental Impact Assessment Guidelines, 1993 (2050 B.S), GoN	Provides guidance to project proponent on integrating environmental mitigation measures, particularly on the management of quarries, borrow pits, stockpiling of materials and spoil disposal, operation of the work camps, earthworks and slope stabilization, location of stone crushing plants etc.
4	Tenth Plan, 2002	The tenth plan has, inter alia, adopted a strategy of developing, constructing and expanding strategic road network, promoting private sector's participation in road network development and maintenance, and making arrangement for study, technology, environmental management and road security. It has prioritized to link all district headquarters and major commercial centers, and avoid or minimize adverse environmental impacts (NPC, 2002).
5	The Interim Constitution of Nepal, 2063 (2007).	Has provision of right regarding environment - Every person shall have the right to live in clean environment.
6	Batabaraniya Nirdeśika (Nepal; MoLD), 2057, GoN	The directive is focused in the practical implementation of small rural infrastructures through the minimization of environmental impacts. This directive includes the simple methods of environmental management in the different phases of the project cycle.
7	RRRSDP Environmental Assessment & Review Procedures (EARP), 2007, GoN	For preparation of environmental assessments of future subprojects under Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP), this EARP includes: i) The process to be adopted while preparing environmental reports, ii) the potential environmental impacts that could result from undertaking the Project based on the Initial Environmental Examinations (IEEs) of sample core subprojects; iii) the proposed mitigation measures to avoid the identified impacts; iv) institutional capacity assessment and strengthening arrangements; v) legal framework for environmental assessment, domestic and the Asian Development Bank (ADB) environmental assessment and review procedures; and finally vi) the approaches to be adopted during implementation of the Project in order to ensure that environmental aspects are dealt with in a comprehensive manner.
8	Resettlement Policy Framework	It establishes the resettlement and compensation principles, organizational arrangements and design criteria to be applied to meet the needs of the people who may be affected by the project activities resulting due to land acquisition, loss of shelter, assets or livelihoods, and/or loss of access to economic resources.
9	Environmental Assessment Guidelines, 2003, ADB	Requires that environmental considerations be incorporated into ADB operations where environmental assessment is the primary administrative tool to integrate environmental considerations into decision-making of all types of development initiatives.

S.N.	Environmental Acts, Regulations and Guidelines	Description of Requirements
10	Safeguard Policy Statement, 2009, ADB.	ADB's Safeguard Policy Framework consists of three operational policies on the Environment, Indigenous people and Involuntary resettlement. It requires that (i) impacts are identified and assessed early in the project cycle, (ii) plans to avoid, minimize, mitigate or compensate for the potential adverse impacts are developed and implemented and (iii) affected people are informed and consulted during project preparation and implementation.
11	APPROACH for the Development of Agricultural and Rural Roads, 1999 (2055 B.S), GoN	Emphasizes labor based technology and environmental friendly, local resource oriented construction methods to be incorporated actively in rural infrastructure process.
12	Reference Manual for Environmental and Social Aspects of Integrated Road Development, 2003 (2060 B.S), GoN	Suggests stepwise process of addressing environmental and social issues alongside the technical, financial and others.
13	DFID Environmental Guide, 1999	<p>This is a short guide to planning and managing the environmental screening and appraisal of DFID activities.</p> <p>The Guide is meant to provide an easy-to-read summary of the steps involved in environmental screening and appraisal. It contains checklists and flowcharts to help one to assess all the main issues at each stage. It does not contain all the answers, but it helps to find out where to get more detailed advice on the study process.</p> <p>The Guide summarises and complements the Manual of Environmental Appraisal (the green folder) of DFID.</p> <p>The purpose of this guide is to help "main-stream" environmental issues within all development activities of DFID and helps to achieve DFID's poverty elimination goal by maximising the sustainability of the programme and projects.</p> <p>The Guide, and particularly section 6 and Section 8, was reviewed and provisions applied wherever applicable while preparing this IEE Report.</p>
14	Public Road Act, 1974	In order to ensure the construction and operation of the road projects smoothly, the Public Road act, 1974 has been enacted by government of Nepal. Section 3 of the Act empowers government to prohibit the construction of permanent structures (buildings) in the prescribed distance from the road. The DOR may acquire temporarily the land and other property adopting compensatory measures during the construction, rehabilitation and maintenance of the public road (Sections 14 and 15). The Act obliges the DOR to plant trees on both sides of the road and handover it to the local bodies (VDC or Municipality) for their management (Section 16). The Act also empowers the DOR to operate quarries and borrow pits and other facilities during the road construction (Section 17). In a nutshell, the Act facilitates the construction of this road and acquires land and property for the extraction of construction materials and development of other facilities through the compensation as negotiated and as well as maintain greenery along the roadside.
15	Guidelines for Environmental Management in Road Sector, 1999	This guideline for Environmental Management in Road Sector, 1999 articulately indicates the process of conduction EIA and IEE for road sector. The guideline also presents the environmental impacts in terms of physical, biological, social, economic and cultural aspects and developing mitigation measures. This specifically deals with the management of quarries; borrow pits, material stockpiling and spoil disposal, camp operation, earthworks and slope stabilization, and environmental pollution. It is the main set of operational guidelines that must be compiled with.
16	Guideline for Road Corridor and Alignment Selection, RAP, 2002	This also indicates articulately the environmental consideration in alignment selection. This document provides the process and methods for environmentally sound road corridor selection.
17	RAP Guidelines for Initial Environmental Examination, 2001	The RAP Guidelines for IEE, 2001 clearly indicates the objectives and process of condition of IEE in terms of project screening, preparation of Terms of Reference, desk review, fieldwork, data analysis and interpretation (identification, prediction and analysis of impacts),

S.N.	Environmental Acts, Regulations and Guidelines	Description of Requirements
		mitigation measures, monitoring plan and reporting.
18	Green Roads in Nepal, Best Practices Report: An Innovative Approach for Rural Infrastructure Development in the Himalayas and Other Mountainous Regions, 1999 (2055 B.S), GoN	Focuses on participatory, labor based and environment friendly technology with proper alignment selection, mass balancing, proper water management, bioengineering and phased construction
19	Soil Conservation and Watershed Conservation Act, 1982	Soil Conservation and Watershed Conservation Act, 1982 empowers Government of Nepal to declare any area as a protected watershed area. The Act outlines the essential parameters necessary for proper watershed management (including both rivers and lakes). It prohibits activities such as excavation of soil, sand, boulders, diversion/storage of water and logging that trigger soil erosion/landslide. It is also authorized to implement land use planning system, shift any existing settlement, industry and acquire necessary lands in the conserved watershed area.
20	Water Resources Act, 1992	Water Resource Act, 1992 of clauses 3, 7, 18, 20, 22 and 24 implies state ownership of any surface/ground water bodies of Nepal. It embodies that Government of Nepal can fix, monitor and formulate regulations pertaining to water quality standard, pollution tolerance level and development of water resource. It prohibits any action that may pollute water resource surpassing the threshold value.
21	Forest Act, 2049 BS (1993 AD) (amendment, 2007), GoN	Requires decision makers to take account of all forest values, including environmental services and biodiversity, not just the production of timber and other commodities. It includes several provisions to ensure development, conservation, management, and sustainable use of forest resources based on approved work plan.
22	Forest Rules, 2051 BS (1995 AD), GoN	Elaborates legal measures for the conservation of forests and wildlife. Expenses incurred for cutting trees and transportation shall be borne by proponent.
23	National Park and Wildlife Conservation Act, 2029 B.S (1973 AD), GoN	Addresses for conservation of ecologically valuable areas and indigenous wildlife. The Act prohibits trespassing in park areas, prohibits wildlife hunting, construction works in park area, damage to plant and animal, construction of huts and house in park area without permission of authorized person. It lists 26 species of mammals, 9 species of birds, and 3 species of reptile as protected wildlife.
24	Aquatic Animals Protection Act, 1961 and first amendment, 1998	The AAPA, 1961 provides legislative protection of the habitats of aquatic species. Section 3 confirms the punishment to any party introducing poisonous, noxious or explosive materials into water sources, or destroying any dam, bridges or water system with the intent of catching or killing aquatic life. Section 4 empowers the government to prohibit catching, killing and harming certain kinds of aquatic animals through notification in the Nepal Gazette.
25	The Labor Act, 2048 B.S (1992 AD)	Regulates the working environment and deals with occupational health and safety.
26	Local Self Governance Act 2055 B.S (1999 AD) (1999) and Regulation 2055 B.S (1999 AD), GoN	Empowers the local bodies for the conservation of soil, forest and other natural resources and implements environmental conservation activities
27	Land Acquisition Act, 2034 B.S (1977 AD) and Land Acquisition Rules, 2026 B.S (1969 AD), GoN	Specifies procedural matters on land acquisition and compensation

## CHAPTER- 4

### 4. EXISTING ENVIRONMENTAL CONDITION

#### 4.1 Physical Environment

13. This section describes the physical condition of the area that comes under the ZoI of the entire length of road and surrounding area. The data has been collected from both secondary and primary sources.

##### 4.1.1 Topography

14. The road alignment starts at Ilam municipality-8 with latitude of 26°46' N and longitude of 87°53' at elevation 1374m amsl and ends at Naya Bazaar having latitude of 26°57' N and longitude of 87°57' at elevation 2203m amsl. It passes through different valley ridges, moderate hill slopes and cultivated terrains of the Midhills in eastern Nepal.

**Table 4.1: Physiographic region of the road alignment**

Road	Physiographic Region by length				Total (Km)
	Terai	Siwalik	Middle Mountain	High Mountain	
I. Na. Pa. - Dhudhang - Soyang- Naya Bazaar		-	21.09	-	21.09

Source: LRMP, 1984

##### 4.1.2 Geology and Soil type

15. Geographically the proposed road falls under the Lesser Himalayas in mid-hill ecological belt, which has the range of rock composition of low to medium grade metasedimentary rocks and bordered in between two well-known tectonic elements, the Main Boundary Thrust (MBT) and the Main Central Thrust (MCT). The road alignment comprises rocks such as quartzite and feldspathic mica schist. No fragile and landslide prone sensitive areas are found along the alignment, but some minor sized landslides are present. Moderately weathered quartz feldspathic mica schist represents the geology of the bridge site. Both the riverbanks are stable at present, which is covered by the thin veneer of colluvium deposit less than 2 m thick.

16. In general, soil types found in entire road alignment are soft soil, hard soil, white clay, boulder mix soil. The details of topography, geology and existing features along the road alignment are presented in the **Appendix-XV**.

**Table 4.2: Geological Features along the Road Alignment**

Chainage	VDC/ Municipality	Location	Terrain slope	State of Land	Land Use Pattern	Geological Problem
Ch: 0+000 - 1+000 km	Ilam Municipality	Simpfiring	Moderate	Moist	Cultivated + Forest	Landslide Prone Area, Sharp Bending
Ch: 1+000 - 4+440 km	Barbote	Bhorlani	Moderate	Moist	Cultivated	Rocky Area
Ch: 4+440 - 7+214 km	Barbote	Dudhang	Moderate	Moist	Cultivated + Forest	
Ch: 7+250- 9+950; 12+000- 12+150; 12+500-13+700; 17+550-17+600 km	Soyang	Loksang, Sisne	Steep	Dry	Forest	High Gradient
Ch: 9+950-10+800; 12+200-12+500 km	Soyang	Sathi Muri	Moderate	Moist	Cultivated	Rising Gradient
Ch: 13+700-14+200 km	Soyang	Pokhrel Gaun	Moderate		Cultivated	-
Ch: 14+200-17+750 km	Soyang	Sirise, Baudha Dhunga	Moderate	Moist	Forest	
Ch: 18+050-19+500 km	Soyang	Sunar Gaun	Moderate	Dry	Cultivated	
Ch: 19+550-21+090km	Naya Bazaar	Basnet Tole	Moderate	Dry	Forest	-

Source: Field Survey, November, 2009

##### 4.1.3 Land use

17. As the proposed project is located in hilly ecological regions, land use along road alignment passes through ridge with flat and moderate slope. The existing road mainly passes through cultivated land (both khet and pakho) and its zone of influence include primarily, cultivated (irrigated, un-irrigated), forest, barren land and settlement. The summary of land use pattern with existing and needed area of the road alignment is shown in **Annex: XIX**.



#### 4.1.4 Soil Erosion and Sedimentation

18. The road alignment passes through hilly region. The road alignment does not pass through major landslides or erosion prone area. Some minor scale landslides existed in the entire road alignments, which usually occur during monsoon and post-monsoon season. The remarkable landslide at Ch: 0+210km due to soft soil condition. At chainages from 2+180 to 2+840, 4+ 850, 7+670, 19+750 km, there is fragile rock condition and where rock falling are frequently occurs. Similarly, with loose soil erosion site at Namgel Tole along the road alignment has been noticed. However, there are no major landslide and erosion prone areas.

#### 4.1.5 Climate

19. The climate of the sub-project area is temperate in nature at lower altitudes and cool temperate further north. Generally, rainy season starts from June and ends in September. The meteorological record shows unevenly distributed monsoon rain with the total annual average rainfall of 1545 mm. The maximum temperature of the area rises to as much as nearly 27° C during summer. The minimum goes down to 5° C in winter. ( Source:District Profile of Illam, 2058)

#### 4.1.6 Hydrology and Drainage System

20. There are various seasonal and few perennial streams along the road alignment namely Tinpane khola( Ch: 2+550 km), Bhorleni/ Mandre khola, (Ch: 4+440 km), Surule kholsa (Ch:4+700km), Bhutee khola(Ch: 6+600) , Mai Khola (7+215),Sapre, Koirale, Bhatara kholsi (Ch: 10+115 - 11+840 km), Hatti, Thotne kholsi (Ch: 13+100 - 14+900km) etc. There are numerous water spouts and sources found in the road alignment. Cross drainage (Bridge) is required at Mai Khola.

#### 4.1.7 Air, Noise and Water Quality

21. The air quality observed was good and the road alignment does not have any sources of noise nuisance. Although, noise and dust emission during vehicular movement in the existing road is a natural phenomenon and it is more significant during dry and festival season. Some educational and offices close to road alignment have noise disturbance in some extent during transportation services. Likewise, water quality seems to be good. There is no defecation problem around the drinking water sources along the road alignment. However, during the monsoon season the water will be slightly polluted.

#### 4.1.8 Existing Road Condition

22 The proposed road starts from Singfiring, Ilam Municipality-8 (Ch: 0+000 km) and ends at Basnet Tole, Naya Bazaar VDC-8 (Ch: 21+090 km). The road passes through mainly agricultural land, Kudule Sepini community forest in Barbote VDC and Himdal private forest at soyang VDC with some other few CF in the vicinity with exposed hard and soft rocky area, boulder mix soil zones and settlements. The gradient of roads is quite moderate, it generally around 8-10 % and at some critical places more than 12% , it reaches two highest places at Ch; 10+900 km and 8+300 km. There are some sharp horizontal curves and a few hairpin bends. The average road width is 3.7 m and major portion of the road passes along the east and south-east facing slope. This road will connect with the remote areas of the district and Mechi highway. Completion of road will save considerable travel time and improve income generation potentials, enhance commercial opportunities and improve market accessibility to rural people. The proposed road is in operation with occasional movement of vehicles like tractors and mini trucks.

#### 4.1.9 Existing Traffic Situation

23 Few number of mini truck, tractors and motorcycles are plying on the road only in dry season. Mostly, vehicle of vegetable and food grain transportation is regular in the road except in heavy monsoon days.

### 4.2 Biological Environment

24 This alignment does not pass through any protected area and buffer zone.

#### 4.2.1 Vegetation

25 The forest is sparse with dominant species observed in the road alignment are Uttis (*Alnus nepalensis*), Chilaune (*Schima wallichii*), Gogan (*Sauravia nepauensis*). Other main species found within ZoI of the sub-project are, Painyu (*Prunus cerasoides*), Kutmiro (*Litsea monopetala*), Malato, Salla (*Pinus roxburghii*), Bepari, Dhupi (*Cryptomeria japonica*), Paiyu (*Prunus cerasoides*), Chyuri (*Aesandra butyracea*), Khari (*Celtis australis*), Saur (*Betula alnoides*), Mauwa, Nebaro (*Ficus auriculata*), Saj and Simal (*Bombax ceiba*).

26 The main NTFP species found along the road alignment is Chirauto (*Swertia chriayita*).

#### Forest Area:

27 There is one private, five community forests (CFs) and one national forest along the periphery of the road alignment as given in the **Table 4.3**.

**Table 4.3: Community Forests along and the periphery of road alignment**

S.N	Name of CF/ Location	Area (ha.)	Chainage (km)	Forest Type	Main Species
1	Kudule and Sepini CF, Barbote-6	20.0	6+ 850	Natural + Manmade	Katus, Saj, Chilaune, Simal, Chilaune, Rato munte, Dhayero, Khaniyu, Mauwa
2	Maha Bhir C.F, I.Na.Pa-7 &8	49	-	Natural	Chilaune, Uttis, Pani Sajh, Malato, Dhale katus, Bans
3	Chure Ghati CF, I.Na.Pa-8		-	Natural + Manmade	Chilaune, Uttis, Siris, Bakaino, Kutmiro, Gogan, Tanki, Koiralo
4	Banduke CF, I.Na.Pa-8	5.61	2+400	Natural + Manmade	Malato, Banduke, Uttis, Chilaune, Simal
5	Surule private Forest	-	-	Manmade	Chilaune, Uttis, Siris
6	Himdale ban, Soyang-2	3.03	7+250	Natural + private	Saj, Chilaune, Chiuri, Harro
7	Chuli Danda CF, Soyang-2	10	-	Natural+ Manmade	Uttis, Chilaune, malato, Mauwa, Siris, Ratomunte, Thotne, Sangle, Angare, Jigane

Source: Field Survey, November 2009

#### 4.2.2 Wildlife

28 Mirga (*Muntiacus muntjak*), Porcupine (*Hystix indica*), Ban Biralo (*Felis chaus*), Jackal (*Canis aureus*), Rato bandar (*Macaca mulatta*), Malsanpro (*Martes flavigula*), Bandel (*Sus scrofa*), Lokharke. (*Ratufa* sp), Kharayo (*Lepus nigricollis*), Salak (*Manis crassicaudata*) and Kalo Gohoro are the wild animals reported in the forests of road alignment. Similarly birds are Kalij pheasant (*Lophura lencomelana*), Columba livia (Pigeon), Kag (*Corvus splendens*), Bhangero (*Passer domesticus*), Dhukur (*Streptopelia chinensis*), Suga (*Psittacula kramen*) are found along the road alignment.

#### 4.2.3 Aquatic life

29 Some of the aquatic species are noticed in water bodies i.e. Mai River, streams and kholsis across the road alignment. Ashala are found mainly in these water bodies.

#### 4.2.4 Endangered and protected species

30 Faunal species: Among the fauna present in the forest area along the road alignment, Jackal (*Canis aureus*) is listed in CITES Appendix-III, Lokharke (*Ratufa* sp.) is listed in CITES Appendix II and Salak (*Manis crassicaudata*) is listed in Protected Wildlife under NPWC Act 1973.

31 Floral species: Simal (*Bombax ceiba*) is protected plant of the forest Act 1993.

### 4.3 Socio-economic and Cultural Environment

#### 4.3.1 Population, Household and Ethnicity

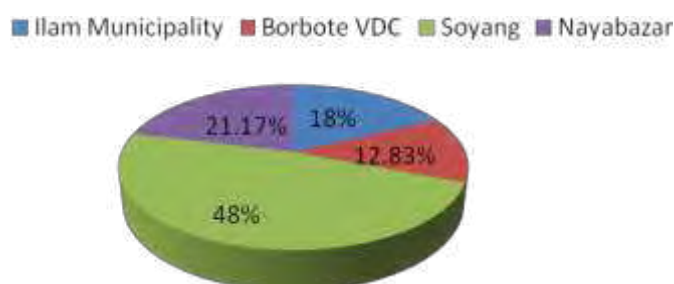
32 The alignment covers four VDCs namely: 8 no. ward of Ilam Municipality and Barbote, Soyang and Naya Bazaar VDCs. Major settlements within ZoI of the project are Ghosh Gaun, Dudhang, Himdol Gaun, Lopsang, Sathi Mure, Mane Danda, Naya Bazaar. Total population of the concerned VDCs is 5796 persons in 1,109 households and average family size of 5.19.

**Table 4.4: Demographic Features with Population Distribution**

SN	Influenced VDCs/MC	Total HHs	Population distribution by no			Population distribution by percentage		
			Male	Female	Total	Male%	Female%	Total%
1	Ilam Municipality	204	547	496	1043	52.44	47.56	100
2	Borbote	146	394	350	744	52.96	47.04	100
3	Soyang	525	1451	1333	2784	52.12	47.88	100
4	Naya Bazaar	234	647	578	1225	52.82	47.18	100
	<b>Total/Average</b>	<b>1109</b>	<b>3039</b>	<b>2757</b>	<b>5796</b>	<b>52.41</b>	<b>47.59</b>	<b>100</b>

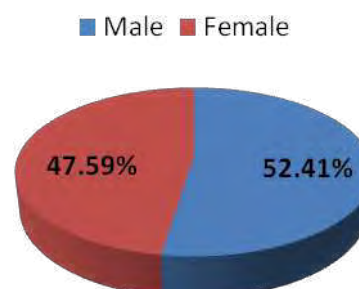
Source: Field survey and ZoI Household survey, 2009

Figure-4.1: Distribution of HHs by VDCs



Source: Field Survey, November, 2009

Figure-4.2: Distribution of HHs by Gender



Source: Field Survey, November, 2009

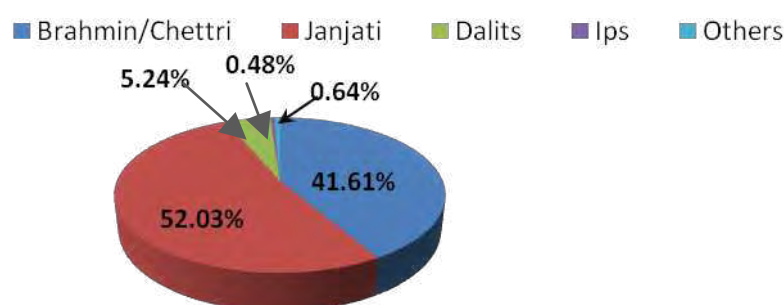
33 Major ethnic groups are Chhetri, Brahmin, Newar, Limbu, Rai, Bhote, Sherpa, Tamang, Magar and Dalit.

Table 4.5: Ethnicity and Population Composition

S.N	Influenced VDCs/MC	Population distribution by caste and ethnicity										Total
		Brahman/Chhetri		Ethnic Minority group		Janajatis		Dalits		Others		
		M	F	M	F	M	F	M	F	M	F	
1	Ilam Municipality	302	273	-	-	215	188	31	30	2	2	1043
2	Borbote	112	110	-	-	211	186	67	58	-	-	744
3	Soyang	511	506	-	-	876	797	55	39	-	-	2784
4	Naya Bazaar	315	281	15	13	257	287	12	12	19	14	1225
	Total	1240	1170	15	13	1559	1458	165	139	21	16	5796

Source: Field survey and ZoI Household survey, 2009

Figure-4.3: Distribution of population by caste and ethnicity



Source: Field Survey, November, 2009

#### 4.3.2 Market Centres and Business Facilities

34 There are grocery shops and tea stalls available in the almost all major settlements. Mainly Ghosh Gaun, Dudhang, Himdol Gaun, Lopsang, Sathi Mure, Mane Danda, Naya Bazaar have some consumable good shop. Necessity of sewerage/drainage system is felt in these places. Other smaller market centres with tea stalls and daily commodities are at Singfiring, Kudule, Bhorleni, Birmane tole, Devasthan, Kathayat Tole, Khadka goan, Soyang, Dhunge bazaar, Bhim Barne Bhanjyang, Boudhha Dhunga, Namgel tole, Sotang tole, Limbu Gaon, Sirise, Dharane Tole, Bhandari danda, Tintale Tole, Sisne, Basnet Tole etc.

#### 4.3.3 Main occupation

35 The main occupations of all people residing within the ZoI of the road alignment is agriculture and Livestock. However, farming is not enough for subsistence due to small landholding size and lack of irrigation and market facilities. Therefore, people are carrying out other economic activities like abroad labour and livestock raising, petty business, working in private service and agricultural wage labour. Details of occupation of the people according to the settlements are shown in **Appendix-XI a**.

Table 4.6 Main occupation and activities of the people in the major settlements

S.N	Influenced VDCs	Population distribution by major economic activities														Total
		Farm work own land	Farm work own land and share cropping	Sharecropping only	Agriculture labor	Public service	Private service	Children	Business	Livestock raising	Forest products	Student	none	Abroad Labor	Other	
1	Ilam Municipality	312	81	9	26	63	3	51	19	100	-	330	1	33	15	1043
2	Borbote	234	83	9	16	12	5	36	4	26	-	266	7	31	15	744
3	Soyang	1147	147	11	39	72	6	179	37	23	-	965	24	79	55	2784
4	Naya Bazar	452	10	4	14	51	8	48	116	4	-	440	4	39	35	1225
Total		2145	321	33	95	198	22	314	176	153	-	2001	36	182	120	5796

Source: Field survey, 2009 and District Profile 2066

#### 4.3.4 Local Economy

36 The economy of the area is predominantly agriculture based. Local people are gradually attracted towards cultivation of cash crops such as vegetables, ginger, tea, alinchhi, amliso. 85 percent populations are engaged in agricultural activities for their daily needs. With growing closeness to Mechi Highway with regular transportation facility, cultivation of fruits and vegetables in a commercial manner seems to have gained momentum. Diversity in employment pattern has been observed more. Local people have increasingly been engaged in business activities at urban market centers. Many people seasonally migrate to different parts of India and even further abroad to earn money for better livelihood.

#### 4.3.5 Agriculture Pattern

37 Major crops grown in the sub project area are rice, wheat, maize, millet and potato. Major cash crops that are grown are mustard, vegetables, ginger, alainchi, amliso, tea.

#### 4.3.6 Livestock

38 Cow and buffalo farming for dairy and goat farming for meat production is seldom seen. The motorable road will increase such activities in future.

#### 4.3.7 Industry

39 Some local people of major settlements are engaged in weaving of bamboo products, making of furniture and tailoring. The area has the potentiality of agro-based industries such as tea, allinchi; ginger processing, juice and candy production as well as furniture and handicraft products.

#### 4.3.8 Trade and Commerce

40 Salt, Sugar, packed / fast food items, spices, and clothes are some of daily important commodities. Similarly, major items of export are amliso, alainchi, chilly (akbare khursani), vegetables, tea, fruits, timber and bamboo products etc. whereas cereal crops such as rice, maize are both export and import items.

#### 4.3.9 Tourism Potential

41 Available numbers of local hotel and lodges are in operation at Utterpani, Thalthale, Panchakanya and Chhingtang Devasthan. Since the ZoI of the sub-project and its surrounding area has potentiality of tourism promotion, more lodge, restaurant and resorts are expected to be established. People may engage themselves in various kinds of tourism related activities such as guide, cook, porter, promotion of local handicrafts and other local products.

#### 4.3.10 Health and Sanitation

42 Major health problems associated with local people are common cold, typhoid, diarrhoea, respiratory diseases, gaeneco related diseases, malnutrition, water borne diseases etc. Sanitation awareness among local people is increasing and many of them have toilets in their own home, but there is no public sewerage system.

#### 4.3.11 Public Services

43 Details about public services and infrastructures according to the settlements are shown in **Appendix-XIb**.

##### Education

44 The proposed sub-project area consists of primary to higher secondary educational institution level. Secondary and higher secondary schools are found in majority of the settlements. Shree Purna Jyoti Primary School, Soyang VDC-3 at Ch:12+500 km, and Sirse Lower Secondary School, Soyang-2 are situated nearby road alignment. During the field survey, it was noted that local people have realized the importance of education in their life and most of them send their children to school. However, the disparity in literacy between boys and girls is highly persistent in the area along the road corridor.

##### Health Facility

45 In health sector, there are 2 healthposts, Simphring hospital in the settlement along road alignment. For serious health problem, people go to district hospital, Silgudi- India, Eastern B.P.Memorial hospital at Dharan or Kathmandu.

##### Communication

46 Regarding communication, mostly all of the major settlements have telephone facilities with CDMA connection. Mobile phones are in use more and more. Post offices have been serving the local people from all settlements.

##### Transportation facilities

47 The main means of transportation in the sub project area are mini truck/pick-up, tippers which generally carry vegetables, fruits and other local products from the area. Some grocery shops still uses porters for the transportation of daily goods from the district head quater. However, opening of existing road before some years ago has provided better accessibility to rural people for the supply of daily commodities and selling of agricultural products.

##### Electricity

48 Settlements near the Ilam municipality, some settlement in Soyang VDC and Naya Bazaar area connected with national grid line but all minor settlements in ZoI are still donot have electricity facility. There are need to promote alternative energy facilties like Solar, biogas within the ZoI of the road sub-project. As Mai Khola-I and under construction Mai Khola-II HEP with the installation capacity of 2.4 Mw and 4 Mw are located in vicinity of sub project area, it is expected that distribution of electricity will occur in near future to entire ZOI area.

##### Water Supply

49 Generally, Drinking water supply facility is available to all settlements by there own afford. Mainly, spring sources pipeline water to the public taps through gravity flow convey from constructed water collection tanks. Mostly, taps are located in common places to serve households as much as possible.

##### Irrigation

50 No proper irrigation facility has been observed in ZoI of the sub-project area. Irrigation Kulo from Bhutte khola crosses at Ch: 6+600 km and locally man-made seasonal kulo at some other points are found in the road alignment area.

##### Other Infrastructures

51 Drinking water supply pipelines at Ch: 1+100 km and Ch; 1+960 km will be affected during road construction. The spring sources at Simle tole at Ch: 12+200 km will be affected. The cost for these community infrastructures along the road alignment have been included in project cost. Disposal of spoil near the source should be strictly prohibited and if reauired, protection wall will be provided below valley side.

##### Financial Institutions

52 There are some saving and credit cooperatives found in settlements and at Naya Bazaar within ZoI of sub project area.

### Community Development Facilities/Organizations

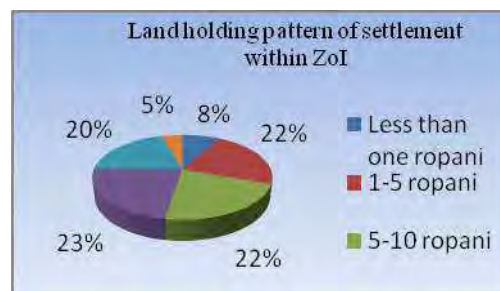
53 There are various community users structures within ZoI of the project for Buddhist community are present. Several community based organizations, youth clubs, women's group, NGOs and water/forest users groups are active in ZoI of the sub-project area.

#### 4.3.12 Land holding pattern

54 Land holding pattern within the ZoI of the road demonstrates maximum length in Soyang VDC have agricultural land. Land holding pattern within the ZoI of the road demonstrates that 22% have 1-5 ropani (approximately 1 ha= 19.8 ropani) land while 22% households have 5-10 ropani and 8% HHs have less than one ropani land. 23% of HHs have 10-20 ropani of land. No households are landless (see Annex XI c)

Source: Field Survey, November, 2009

Figure-4.4: Scenario of Land holding pattern

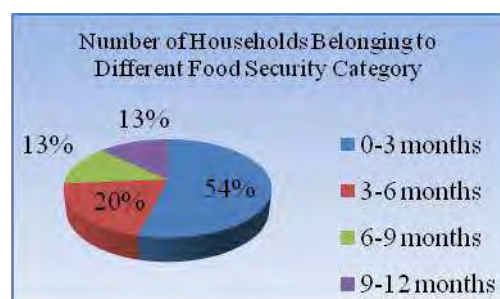


Source: Field Survey, November, 2009

#### 4.3.13 Food Security

55 About 54% of the households have enough food for only three months, 20% for 3-6 months, 13% households have enough food for 6-9 and 9-12 months. Food sufficiency condition is given in Annex XI d.

Figure-4.5: Status of Food Security



Source: Field Survey, November, 2009

#### 4.3.14 Migration pattern

56 Permanent migration takes place to a limited scale towards Kathmandu and India during insurgency period. Nowadays, seasonal migration takes place from the settlement of road alignment. Majority of them migrate during slack season to Kathmandu, Jhapa and various parts of eastern India to work as a labourer. Most of the young generation also frequently go abroad to Malaysia, Qatar Dubai, and Saudi Arabia due to lack of employment opportunities at the local level. From Soyang VDC alone, 5-10 percent of people went for migrated to abroad for employment.

#### 4.3.15 Settlement Pattern

57 Most of the settlements within ZoI of the project are of scattered type. Houses are mostly one or two storied thatch roofed and CGI sheet roofed ones.

#### 4.3.16 Potential Development area

58 There are historical and religious places for Buddhist community like Baudha Dhunga, Mane and Stupa which could be developed as touristic centres after the rehabilitation of the road.

Table 4.7: Development Potentialities in Various Sectors

S.N.	Sector	Development potentiality
1	Agriculture	Tea, Alinchi, Aduwa and Kuchho (Amliso-broom grass), potato, vegetable farming, tomato, timber (uttis) and citrus fruit production, milk production within the ZoI alignment.
2	Tourism Promotion	Baudha Dhunga, Uttare Pokhari and Malu Pokhari for religious tourism, Sun rise view from Mabu, Santapur and Sandakpur Danda, observation of Tintale Himdale Gupha, Sight-seeing of nature from Mrigasthali (Durga Mandhir), Shiva Mandir Danda and Bhim Barne Thumki (possible of View Tower construction), familiarization of Rai and Limbu culture, Mane, Gumba, Tusare and Singha Devi Devasthan etc.
3	Small and Cottage Industry	Bamboo products, furniture, handmade paper industry.
4	Trade and business	Development several rural markets centre and depot at various places along the road alignment i.e. Simphring, Barbote, Soyang, and Ghosh gaun for tea, Alinchi, Aduwa and Kuchho export to main market centres.

Source: Field Survey, November, 2009

59 The Naya bazaar area is already potential for tea plantation, amliso and alinchi farming. Barbote VDC is famous for huge exportation of ginger, and alichi. Other significant areas of unique geographic and touristic value along the road alignment are Tintale Himdale Gupha, Sight-seeing of nature from Mrigasthali, Shiva Mandir Danda and Bhim Barne Thumki (possible of View Tower construction). Many of the places, areas and settlements within ZoI of the project have the potentialities in various sectors. These sectors and their potentialities have been mentioned above in **Table 4.7**.

#### **4.3.17 Religious, Cultural and Historical Sites**

60 Singa Devithan, Baudha Dhunga, Aitabare, Mane, and two Bar Pipal chautaras are situated within RoW. The historical and religious sites are within ZoI of the proposed project area are given in **Appendix-XVII**.

61 Religious sites mentioned above are frequently visited for worship by the local residents as well as outside visitors. The people belongs in the main settlements of sub-project area are Hindu, Kirat and Buddhist. Among them Hindu and Kirat are major groups in the road alignment area. Particular ethnic/caste groups perform different religion and cultural activities. Main festivals observed by local people are Dashain, Tihar, Maghe/Saune Sakranti, Ubauli, Lhosar etc.

## CHAPTER- 5

### 5. PROJECT ALTERNATIVES

62 The various alternatives to achieve the project objectives with minimum environmental impacts are discussed as in the following subsections.

#### 5.1 No Action Option

63 This alternative does not allow the implementation of the Proposal. An earthen road currently exists, which is only fair weather road. As the road connects few major settlements with high potential in, tea,amsilo, ginger,alaichi and dairy products, the no action option will increase the transportation time and cost for the local people to the district headquarter and markets and vice versa resulting into low level of productivity and prevalence of poverty. The no action option will conserve some of the environmental adverse impacts at the cost of poverty and hardship of the people.

#### 5.2 Project Alternatives

64 Construction of other supporting roads could be the options for achieving the transportation and access. Considering other project alternatives, the proposed road project can be the best option to serve the home to home services.

65 The proposed road project is the best alternative for cheap and efficient transportation.

#### 5.3 Alternative Alignment

66 The alignment of the I.Na Pa-Dudhang-Soyang-Naya Bazaar road is an existing motorable earthen road. This road is in operation as a fair weathered road and proposed for the rehabilitation, requirement to acquire land and cutting trees will be minimum than in new alignment opening. Hence, new alternative alignment is not studied and the road is proposed for implementation.

#### 5.4 Alternative Design and Construction Approach

67 The proposed road has been designed considering the both LEP and Community-Driven Development (CDD) approach. Labour based, Environment friendly and Participatory (LEP) method focuses on phased construction with balanced cut and fill; manual work and use of hand tools and small equipment rather than heavy machinery; bio-engineering for slope stabilization; avoid blasting; use soft engineering structures; use of contractors only in the works that cannot be done through manual labor. The proposed road has been designed considering combination of both the LEP approach for works possible through manual labor (earth excavation, bio-engineering, gabion structures), and Machine Intensive Road Construction Approach for works that require mechanized applications (gravelling or construction of RCC cross drainage structures).

#### 5.5 Alternative Schedule and Process

68 During the rainy season, the construction work is stopped to allow the natural compaction of the road. Rehabilitation and construction work will be carried out during the remaining months. The construction period is more appropriate from October to June as the local people are generally free from farming activities.

#### 5.6 Alternative Resources

69 The physical resources consumed for the construction of the proposed road will mainly include boulders for gabions and stone for dry masonry wall. Stones are easily available in nearby areas of various sections of the road whereas fine aggregates like sand has to be transported from Mai Khola. The proposed construction will optimally use the local labour force and local materials. The construction materials like sand can be brought from sources outside the road alignment from upstream of Mai Khola. The proposed construction will optimally use available local materials to the extent possible for construction. Skilled, semi-skilled and unskilled local labor should be used as far as possible.



## CHAPTER – 6

### 6. IDENTIFICATION AND EVALUATION OF IMPACTS AND BENEFIT AUGMENTATION AND ADVERSE IMPACT MITIGATION MEASURES

70 The identification and assessment of impacts has been carried out by considering the proposed proposal activities examined in terms of its current condition and likely impacts during construction and subsequent operation phases. Most of the identified impacts have been quantified to the extent possible. The impacts have been predicted in terms of their magnitude, extent and duration. The possible impacts (positive and negative) in construction and operation phases are presented in the following sub-sections. Beneficial impacts maximization and adverse impacts mitigation measures are also suggested hereunder

71 An effective implementation of benefit maximization measures and adverse impacts mitigation measures are also suggested hereunder. (see **Table 7.2** in **Chapter 7**).

#### 6.1 Mitigation Measures During Pre-construction phase

##### 6.1.1 Route Selection

72 This is an existing road so the same alignment shall be followed with required geometrical improvements and widening of the road to the specified width of 5m. Local conditions (structures, set-back, lay-byes, mass balancing and safe disposal site for the excess excavated material, community utilities, slopes, sensitive spots etc.) and minimum land acquisition from forest, cultivable lands, settlement and cultural properties will be taken into consideration to decide on where and which side should be widened.

##### 6.1.2 Detailed Survey and Design

73 The road design will follow the rural road standards developed by DoLIDAR. The works will be executed through labor intensive construction method as far as possible and practical in the program. Bio-engineering technique will be applied for stabilization of slopes and landslides. At the detail design stage, several alternatives were explored to avoid and minimize further land requirement by using the existing track. The survey team has selected the least valuable, least agriculturally productive land for the lay-bys and other improvements and took care to avoid the acquisition of houses.

##### 6.1.3 Land and Property Acquisition, Compensation and Resettlement

74 ADB Guidelines has necessary provisions for resettlement assistance including entitlements to replacement of land and other assets and/or compensation in case of involuntary resettlement, compensation cost for houses and other affected structures without deduction for depreciation or salvageable materials. However, the resettlement framework also allows land donations in cases where the donation is made freely in public and without coercion, does not affect household food security (>9 months), where land donated is <20% of family holding, and adequate income restoration support exists for the household. The proponent commit the above and voluntary contribution will be accepted if the said criteria are met. However, land taken in the past for existing alignment will not be compensated. Structures and crops will be compensated at replacement cost and lost trees at the cost of harvesting (felling and sectioning) and transportation from the site to home. Proponent will assist to form Compensation Determination Committee (CDC) under the Chairmanship of Chief District Officer. The Committee will decide the rates applicable for compensation. The concerned households whose land will be acquired for the project will be informed about the land donation process and entitlements. Finally, the Memorandum of Understanding (MoU) will be prepared and households donating the land will sign it with DDC. If the owner of land could not be contacted an equivalent amount shall be kept separately in the DDC fund until the process is complete.

#### 6.2 Beneficial Impacts and Benefit Augmentation Measures

75 The development efforts particularly the development of transportation network will have multifold beneficial impacts. Generally, rural road projects are generally intended to improve the socio-economic benefit and upliftment of livelihood of the rural people. The largest beneficial impacts will be on the physical and socio-economic environment as given below:

##### 6.2.1 Construction Stage

###### Employment Generation and Increase in Income

76 Impacts: A major direct beneficial impacts of the road is the creation of employment opportunity to the local community, which will minimize seasonal out-migration. According to ZOI Survey, Out of total sampled HHs, 1109 HHs comprised of potential laborers who can involve in construction works. The total no. of employment generation laborers was found to be 206,114 Person days. Out of which 29,445 person days are skilled and 176,669 person days are un-skilled. The number of skilled and semi skilled manpower about construction works like mason, gabion wire

knitting, dry and retention wall making were found in negligible numbers. However, the majority of the identified laborers were non-skilled. There will be positive impacts creating income-generating activities with other economic activities in a chain manner. This is one of the direct and significant impacts of the sub-project but short-term and local in nature.

77 Measures: Work will be implemented manually through the local Road Building Groups (RBGs). Priority for employment will be given to local poor, dalit, vulnerable groups and women. They will be given training to do the job. Proponent will implement skill training, awareness, and income generation programs encouraging them to utilize their money earned through wage.

#### **Skill Enhancement**

78 Impacts: The construction of road will enhance the skills of the people in construction. Furthermore, the project will also organize training on road construction and maintenance to the Road Building Groups (RBG), Social mobilizers and supervisors. Enhancing the technical skills of local people create future employment opportunities. This impact is indirect, medium, local and long-term in nature.

79 Measures: RBG members will be given on the job training during road construction, for works like masonry, gabion wires, construction of dry and foundation walls, slope cutting and stabilization as well as bio-engineering works.

#### **Enterprise Development and Business Promotion**

80 Impacts: Many local and outside people may operate small shops and tea stall for their daily necessary items. Due to increased employment opportunities, trade, business and agricultural income will be channeled in to the local economy in the area. Since, the construction crew will have good purchasing power, this will regularly demand for different types of food, beverage and other daily necessary items. Various farm based enterprises including wide range of agricultural and livestock products like dairy, juice, poultry will be increased due to increased demand during construction period. This impact is also direct, low, local and short terms in nature.

81 Measures: Training in cooperatives, and use of local products by the construction crews. (SAP) Social Action Plan's enterprise development trainings (Tea Processing; Improved Cow raising, Bee Keeping, NTFP Production, Bio-briquette /Composed manure making, Incense stick (Aagar batti) Making, Domestication and herbal production, Dhaka weave, Processing and Marketing Training, etc.) under project activities would give local people as an opportunity to become a skilled personnel and helps them to uplift their economic condition. A harmony relationship among the local people and project staff and contractors should be created by providing necessary enterprenourship development training programmes in the sub-project area.

#### **Community Empowerment and Ownership**

82 Impacts: Various road construction coordination committees and RBGs will be constituted in order to proceed and implement the road construction activities to build and safeguard community infrastructures resulting in community empowerment and feeling of ownership among them. This impact is also indirect, low, local and short terms in nature.

83 Measures: Various coordination committees (DPCC, VICCC and RBG) will be constituted. And trainings under Social Action Plan (SAP) such as training on Compensation management, Supervision and monitoring, good governance will be given to DPCC, VICCC, and training on First Aid and safety measure, Tools handling and management, Group mobilization, Health and Hygiene, Saving/Credit mobilization and Account management and book keeping management will be given to RBGs.

#### **Women and Indigenous People Empowerment**

84 Impacts: Women and indigenous people in particular may be benefited more from improved access to the market centers and various service providing agencies such as health centers, banks, training institutions, women development office etc. Frequencies of visit to such organizations will increase women's knowledge and awareness level. Thus, the project will have indirect, significant, local and long-term impact in ZoI.

85 Measures: During the road construction, more emphasis will be given to empower women, dalit and vulnerable workers in the employment opportunities and trainings.

### **6.2.2 Operation Stage**

#### **Improvement in accessibility and saving of time and transportation cost**

86 Once the sub-project is completed, the people living within the road corridor will have easy access to market centres of Ilam Bazaar, Fikkal, Damak, Kakarbhitta, Biratnagar etc. and will enhance the transaction of goods and services. Rural people from adjoining VDCs are benefited by the easy accessibility to market centers after operation of this road. The local pedestraient, students, patients and officials from concerned VDCs will be more benefited due to fast mobility and safe access to market places compare to earlier scenario due to regular transport facility. Due to

cheap transportation cost, more people will go daily for employment opportunities in agriculture slack season in the neighbouring market centers. The efficiency of road trips in specific time will greatly enhance the socio-economic condition of sub-project area. This will uplift their economic status and contribute to reduce rural poverty. This is the direct, most significant, regional impacts and will have long-term benefits.

87 Measures; Regular maintenance work of the road will be done by the Proponent.

#### **Increase in Trade, Commerce and Development of Market centers**

88 Impact: : Improved access will increase economic activities and minor local markets like Singfiring, Kudule, Bhorleni, Birmane tole, Devisthan, Kathayat tole, Khadka goan, Soyang, Dhunge bazaar, Bhim Barne Bhanjyang, Boudhha Dhunga, Namgel tole, Sotang tole, Limbu Gaon, Sirise, Dharane tole, Bhandari danda, Tintale Tole, Sisne, Basnet Tole etc. will grow as bigger market centres. There is a possibility of increased economic opportunities and significant growth and extension of the minor settlement markets along the road corridor. Main market centres will develop at Ghosh, Dudhang, Himdol, Soyang, Lopsang, Sathi Mure, Mane Danda and Naya Bazaar area. The farmers will be more encouraged to increase agricultural production due to market accessibility. Similarly, there will be diversification in occupational pattern of local people and non-farm employment will grow to those who are till now mainly dependent on subsistence farming. This will lessen pressure on local natural resources. The impact will be indirect, low, local and long term in nature.

89 Measures: DDC/VDCs shall manage planned growth with required infrastructure facilities for healthy and hygienic environment in the market areas.

#### **Appreciation of Land Value**

90 Impacts: Mainly the land value will increase 2times the value of existing land in Dudhang, Himdol, Lopsang, Singfiring and Ghosh. The construction of road leads to appreciation of land values particularly near the market and settlement areas due to the availability of reliable transportation facilities. There will be rapid increase in the commercial production of agricultural crops due to road accessibility, which is also a major factor to raise the land value. Mainly the land price will increase in Ghosh, Dudhang, Himdol, Soyang, Lopsang, Sathi Mure, Mane Danda and Naya Bazaar by twice. This activity would likely uplift the economic condition of the local people. The impact is indirect, medium, local and long term in nature.

91 Measures: Promotion of land development activities and control of encroachment within RoW. The local people will be made aware that high value lands are acceptable to the banks and microfinance institutions to provide loans to start their own economic/social ventures.

#### **Enhancement of Community Development Services**

92 Impacts: There will be improvement in social service such as education, health, government offices, saving and credits with more frequent visit of extension workers, longer stay of professionals such as teacher, doctors to their rural duty areas. Similarly, enhanced income level will encourage local people to spend more on health and sanitation, development of education facilities by employing qualified and professional teachers and upgrading the existing health posts. Production of educated manpower will also help to increase employment opportunity in government/non-government services. This is direct, significant, local and long-term impact of the proposed project.

93 Measures: The access will be kept maintained by generating awareness and enhancing community development activities to promote linkage of social infrastructure services.

### **6.3 Adverse Impacts and Mitigation Measures**

#### **6.3.1 Construction Stage**

94 The proposed road will be constructed according to LEP approach and Community-Driven Development (CDD) approach. The method of construction is mainly labour based, and there will be minimum use of machineries only applied for the essential works such as material movement, drilling, cutting and excavation of big rocks for human safety and easiness. Therefore, there will not be severe damage to environment compared to conventional construction approach. However, it is likely to occur following impacts on physical, biological, socio-economic and cultural resources of the proposed road area and respective mitigation measures are also suggested.

#### **Physical Impacts**

##### **Change in Land Use**

95 Impacts: 2.77 ha of agricultural land, 0.7 ha of barren land, 3.41 ha of forest area and 0.22 ha. of built up area will be permanently lost due to road construction work. The changes in land use will have impact on loss of cultivated land, which will directly reduce the agricultural production. Similarly, there will also some change in land

use due to expansion of roadside settlements like tea shops, temporary shops and labor camps etc. The impact from changes in land use will be high, direct, local and long term in nature.

96 Measures: Plantation of trees, improving agricultural extension services, applying additional protective measures that the remaining land will not be lost due to erosion and temporary vegetation clearance on work site and material storage yards shall be revegetated after the completion of road construction. The proponent is also legally bounded for the compensation of tree clearance and damaged crop are included as a separate BOQ item in the contract document. During re-vegetation, local species identified during the field study will be emphasized. The spoil sites shall be stabilized with bio-engineering technologies.

#### **Change in Air Quality, Water and Noise Pollution**

97 Impacts: During the construction of the road, there is a strong possibility of dust emission affecting the local people and workers, agricultural crops, markets, schools and health posts at places where contractor may use heavy equipment during surfacing works, it might cause dust nuisance. Impact on air quality will be direct, low, local and short term in nature. The sub-project area at present does not experience high levels of noise. However, during construction, the increased construction activities may increase the noise level to some extent. The impact of road construction on the noise level will be direct, low, local, reversible and short term in nature.

98 The water quality data within the sub-project area is not available. Nevertheless, the quality of water in the water bodies and spring spouts appears to be fairly good, as is proven by the fact that they are widely utilized for household use and drinking for cattle without any illness effect. If adequate care is not taken during construction, the water bodies are likely to be affected due to the disposal of excavated materials and disposal wastes. However, since the construction will follow the green road concept appropriate consideration will be taken to dispose excavated material. The impact will be direct, low, local, short term and reversible in nature.

99 Measures: The mitigation measures include use of face mask by the workers during the time of high dust generation; frequent sprinkling water during surface of the road by contractor; use of ear muffs to protect from noise pollution during rock breaking and quarrying and avoiding the disposal of excavated materials in the water bodies. Plantation of local tree species (Siris, Painyu, Salla, Khainyu, Tanki) in about 3500 numbers along RoW on both sides of the road which act as noise and dust barrier

#### **Road slope stability and management**

100 Impacts: The destabilization of slope may also be expedited due to human activities in the road neighborhood such as quarrying stones or soil, animal grazing, irrigated cultivation. Similarly, there are also possibilities of opening new branch roads to go other remote village settlements. Most of the under construction roads are opened by local efforts without necessary considerations on technical/environmental aspects. This may cause damage to road section, disruption to transportation and other social impacts in the road alignment. The impact will be direct, high, local and long term nature.

101 Sensitive areas for possible road slope stability problems are:

- Sensitive areas of high gradient places such as : Ch: 2+470, 3+800, 4+700, 4+850, 5+280, 6+500,7+673 and Ch 18+500 km
- Landslides and soil erosion are at Ch: 2+470, 2+550, 3+800, 4+700, 4+850, 5+280, 6+500,7+673 and Ch 18+500 km .
- Connection point of road alignment with other branch roads
- Road alignment along the irrigated agricultural land

102 Measures: The following mitigation measures will be adopted:

- Rill and gully formations should be regularly monitored and immediately fixed at critical areas;
- Correction of maintenance of the slope protection measures and drainage works
- Use of Bio-engineering techniques (Grass plantation, Brush layering, Palisades, Shrub/Tree plantation, Bamboo plantation, live check dams etc.)
- Soil conservation will be done by providing cross drainage structures with rip protection works at outlet for safe discharge of drain water and bioengineering works on vulnerable and eroded roadside slopes.
- The compensatory plantation will be carried through CFUG, which helps to conserve and manage CFs properly

103 Recommended engineering structures necessary at various chainages for slope stabilization have been given in **Appendix-XIV**.

#### **Stock piling of construction materials**

104 Impacts: It is general tendency of the contractors to stockpile the constructions materials like gravels, rock aggregates, bricks, cement, etc nearest to the site, which could be in agricultural land, forest land or other private property. Similarly, these materials may be washed away by monsoon rain causing water pollution. Since the alignment passes through mostly cultivated land, the construction materials will be stock piled near by the cultivated

land. The agriculture production of these lands will be lost during the construction period or as long as the materials occupies the land. The impact will be direct, medium, local and short term.

105 Measures: Stock piling of the construction material shall not be block the drainages. Fencing of the stock piling areas will be done. Compensation will be given for use of private land. The contract specification will have a clause in the contract document that the contractors will compensate for the loss of agriculture production.

#### Operation of Quarries and borrow pits

106 Impacts: The extraction of materials from inappropriate places or in excessive amount can damage the local environment. Where quarries are required they should be limited to the areas, which are not geologically or ecologically weak. The potential adverse impacts of quarrying are accelerated erosion, landslides, disturbance in natural drainage patterns, water logging, water pollution and vector proliferation. The likely impact from the operation of quarry sites will be direct, low in magnitude, local nature and short term in duration. The borrow pit area might be located near or far, but should be economically appropriate. The potential adverse impacts are increase in risk of accidents to children and livestock, conversion of borrow areas into ponds due to accumulation of water in rainy season, removal of top soil decreases fertility of soil and impacts related to this is decline in aesthetic value.

107 Measures: The mitigation measures will be quarry and borrow operation plan will be prepared and approved by Engineer; unstable sites, erosion prone area, forest area, settlements, fertile farm land will be avoided for quarry / borrow operation; quarry sites will be rehabilitated by providing appropriate civil engineering structures (toe wall, retaining wall) and bioengineering measures (Grass plantation, Shrub/Tree plantation, Brush layering) after the extraction is complete.

108 Recommended quarry sites are given in **Table 6.1** below:

**Table 6.1: Recommended Quarry sites**

S.N.	Chainages	Description	Name of VDC	Places of quarry sites	Remarks
1.	Ch: 2+400 - 2+470; 4+700; 6+500 km	Bolders/ Aggregates	Barbote	along the road alignment	Stone quarry
2.	Ch: 8+063km		Soyang	Sureli Kholsi	Stone quarry
3.	Ch:15+150 – 15+850km		Soyang	Mingma Saila Kholsa (Near Devithan)	Stone quarry in max. quantity
4.	Ch: 20+650-20+750km		Naya Bazaar	Near Bazaar area	Stone quarry in excessive scale
5.	Ch: 7+215 km	Sand	Soyang	(i) 100m upstream of proposed Mai khola Bridge (ii) Sand deposit at Soyang-2	Sand collection from Mai Khola

Source:Field Survey, November, 2009

#### Spoil Disposal

109 Impacts: The common likely problems from the inappropriate disposal of spoils are: gulying and erosion of spoil tips especially when combined with unmanaged surface water runoff, damage to farm lands, and destruction of vegetation, crops and property at downhill through direct deposition or indirectly as result of mass flow. The impact from spoil disposal will be direct, medium, site specific and short term in nature.

110 Measures: Spoils will be safely disposed and managed with minimum environmental damage. Engineer will give approval for disposal site of spoil .Balanced cut and fill volume, re-use of excavated materials, and minimum quantity of earth works will be given emphasis.The following mitigation measures will be adopted:

- Disposal site will be provided with proper drainage, vegetation and adequate protection against erosion (bio-engineering)
- Wherever possible, surplus spoil will be used to fill eroded gullies, quarries and depressed areas
- Necessary toe walls and retaining walls will be provided to protect the disposal of soil on downhill slopes.
- Spoils will not be disposed on fragile slopes, farmland, marshy land, forest areas, natural drainage path, canals and other infrastructures.

111 Recommended Spoil Disposal Site are given in Table 6.2 below:

**Table 6.2 Safe Spoil Disposal Site**

S.N.	Chainage	Location	Remarks
1.	Ch: 6+500	Near Ghimire kholsi	Spoil Disposal
2.	Ch: 8+500 -8+600	Near Tintale kholsi	Spoil Disposal

Source:Field Survey, November, 2009

#### Drainage Management

112 Impacts: The concentrated water from the road outlet causes erosion and landslide eventually affecting the stability of the road itself. Roads usually generate large volumes of concentrated surface runoff. As part of road

construction, side and crossdrains will also be constructed. The impact will be indirect, medium, site specific and long term.

113 Measures: The mitigation measures will be to provide adequate numbers of drainage structures in order to have minimum interference with natural drainage pattern of the area; channelize surface water discharge from side drains; do not block or divert water away from natural watercourse. Details about necessary cross drainage structures and causeway, pipe culvert for water management required to mitigate the water induced adverse impacts are as given in **Appendix-XIII**.

114 Recommended causeway and pipe culvert at various chainages for Water Management have been given in **Appendix-XVIII**.

#### **Location of Camp Sites, Storage Depots**

115 Impacts: The siting of labor camp/ storage depots by contractors for carrying out contractor-based works may cause encroachment of forest, agriculture land, alteration of drainage, fuel leakage, disposal of solid waste, and waste water problems. which may cause degradation in the environment. During the construction a large number of workers will work in the construction yard. It cannot be fulfilled only from local labour and additional workers from outside the area should be supplied.

116 Measures: The following mitigation measures will be adopted:

- The location of campsites, storage depots will be kept on unproductive/ barren land away from forest area as far as possible.
- Camp Site will be provided with pit latrine and first aid facility. Soak Pit will be provided for solid waste and wastewater management.
- fuel and chemical storage areas will be on paved surface with surrounding catch drain to protect soil from leakage
- Use of agricultural lands will not be allowed unless in extreme circumstances by paying adequate compensation to the owner.
- All fuel loading, unloading, storage areas will be spill proof, leakage proof and carried out on paved areas.
- The sites will have suitable system to drain out storm water, sanitary facilities and shall not contaminate any near by water courses/drains.
- The site will also have a system for handling any emergency situation like fire, explosion etc.

117 Recommended Camp Site/ Storage Depots are given in Table 6.3 below:

**Table 6.3 Location of Camp Site/ Storage Depots**

S.N.	Chainage	Location	Remarks
1.	Ch: 0+250 km	Near Jana Kalyan School, Simphring, I. Na Pa-8	Storage Depot
2.	Ch: 4+440 km	Near Ginger Godown, Bhorlani, Borbote-6	Camp site / Storage Depot
3.	Ch: 11+840 km	Near Majh gaun, Soyang-3	Camp site / Storage Depot
4.	Ch: 17+520 km	Near Bhotetar, Soyang-2	Storage Depot
5.	Ch : 21+090 km	Near Naya Bazaar Market, W.n. 8	Storage Depot

#### **Construction Equipment Vehicles**

118 Impacts: The contractor will use machineries and tools. The related negative impacts are increase in air pollution due to emission of smoke and dust, and increase in vibration due to vehicular movement.

119 Measures: The following mitigation measures will be adopted:

- All equipment/vehicles deployed for construction activities shall be regularly maintained.
- All the vehicles deployed for material movement shall be spill proof to the extent possible.
- In any case all material movement routes shall be inspected daily twice to clear off any accidental spills.
- Materials under transportation shall be covered.

#### **Biological Impacts**

##### **Loss of Degradation of Forest and Vegetation**

120 Impacts: Some private and Kudule and Sepini community forest will be effected due to road construction work. About 431 numbers of trees will be removed during road construction. The impacts on vegetation/forest resources have been considered to be high in magnitude, site specific in extent and long term in duration. The list of affected trees in the road alignment is presented in **Appendix-XII**

121 Measures: The loss of trees cannot be minimized, however, it can be compensated by the replantation. According to the Work Procedure for Providing the Forest Land for Other Use, 2063 of Government of Nepal,

proponent will manage a nursery to grow tree sapling and plant in 1:25+10% in forest and 1:1 in private land. Plantation of local tree species (Siris, Painyu, Salla, Khainyu, Tanki) in about 3500 numbers along RoW on both sides of the road.

#### **Impact on wildlife loss or degradation of habitat and hunting**

122 Impacts: The proposed area is not significant habitat for wildlife and bird species. However, the construction of road may disturb wildlife and bird species present in surrounding forests along the road corridor. The impact will be indirect, low, local and short term in nature.

123 Measures: The following mitigation measures will be adopted:

- Site clearance for construction shall be limited to the minimum width. No tree or vegetation shall be cut unless absolutely necessary.
- The construction activities near forest area will be appropriately managed so that there will be least disturbance to the wildlife and birds.
- Workers shall be actively discouraged from collecting fuel wood from forest or hunting/harassing of birds or animals.
- Coordination with DFO to control the activities like illegal hunting and poaching by enforcing acts and regulations strictly.

#### **Impacts on Flora and Funa (Rare and Endangered species as listed in CITES and IUCN Red data book)**

124 Impacts: Although there are endangered and protected species like Jackal (*Canis aureus*), Lokharke (*Ratufa* sp.) and Salak (*Manis crassicaudata*), the construction of road will have no impact on flora and fauna (listed in CITES and IUCN category).

125 Measures: Mitigation measures are, no vegetation shall be cut unless absolutely necessary and minimum site clearance, discouraging workers for collecting fuel wood from forest or hunting/harassing faunas; shall be followed.

#### **Chemical Issues**

126 Impacts: Storage of fuels and chemicals, and operation of vehicles and machineries result in the spillage of hazardous chemicals that can pollute nearby water bodies, kholsi and soil; and affects health of the workers.

127 Measures: The mitigation measures will be to store fuels and chemicals on paved surface with surrounding catch drain to protect soil from leakage. Proper storage of hazardous chemicals and providing information signboards. Use of safety gears to workers during handling of chemicals and fuels. Close monitoring during operation of machineries.

#### **Socio-economic Impacts**

##### **Loss or degradation of Farm land and Productivity**

128 Impacts: There will be permanent loss of 2.77 ha. of agricultural land will be lost due to road rehabilitation works. This will lead to annual loss of food grain production among the families losing lands to the project. Moreover, spoils on farm land will also affect the production of agricultural crops. During the construction phase due to the excavation and other construction works, the loss of the agricultural production is difficult to predict without knowing the construction schedule. This impact is expected to be high in magnitude, local in extent and of long term in duration.

129 Measures: Productive land acquisition for the road alignment will be minimized as far as possible. Compensation for the loss of property will be provided to the affected people. A separate Resettlement Plan will be prepared to address land acquisition and compensation issues.

##### **Loss or degradation of private properties**

130 Impacts: The construction of road will not affect any private houses and structures. There will be loss of private land but no loss of residential houses. The impact will be direct, site specific, short term and medium in magnitude. Details about property loss and damage will be described in Resettlement Plan Report.

131 Measures: Compensation and resettlement measures will be dealt as per decision made by Compensation Determination Committee (CDC).

##### **Impact on Community infrastructures**

132 Impacts: Drinking water supply pipelines at Ch: 1+100 km and Ch: 1+960 km will be affected during road construction. The spring sources at Simle tole at Ch: 12+200 km ( i.e 10m downstream from road alignment) will be affected if side drainage system is not proper constructed. The impact will be direct, site specific, short term and medium in magnitude.

133 Mitigation measures Costs for affected community infrastructures along the road alignments have been included in project cost and relocation cost for community structures will be included in resettlement plan. Drinking water supply pipelines will be rehabilitated. Disposal of spoil near the area shall be strictly prohibited and if required protection wall will be provided below valley side.

#### **Impacts on occupational health and safety**

134 Impacts: During construction, workers will be exposed to respiration and eye diseases due to exposure to dust, risk of accident during work, polluted drinking water, unhygienic sanitary facilities, hearing loss due to high level of noise. Increased contact between local and migrated workers can cause spread of serious health risks like STDs and HIV/AIDS. This impact is direct, high in magnitude, short term and local.

135 Measures: Make mandatory the use of helmets, safety belts, masks, gloves and boot by workers depending on nature of work; sprinkle water at high dust sites; provide clean drinking water at sites and camp; pit toilets at sites and camp; first aid facilities at sites and camp with training to use them; provide group accidental insurance for workers. Awareness generation to local people and workers on HIV AIDS and other communicable diseases.

#### **Decline in Aesthetic Value**

136 Impact: Landscape degradation and scar on topography due to the road; quarrying operations; and indiscriminate dumping of spoil on open land and hill slopes. The likely impact will be direct, low in magnitude, local in extent and short term in duration.

137 Measures: Discourage indiscriminate dumping of spoil material; quarry sites will be properly closed to suit the local landscape and cover by plantation of local species trees.

#### **Impacts on cultural, religious and archeological sites**

138 Impacts: There are a small Mane/Stupa in the RoW at Bhotetar, Soyang-2, which needs to be relocated at proper site. But, there is no any cultural, religious and archeological sites to be severely affected along the road alignment.

### **6.3.2 Operation stage**

#### **Physical Environment**

##### **Impact due to air, water and noise pollution**

139 Impacts: During operation period, the number of vehicles will ply along the road and will emit gaseous pollutants, which will increase the pollution level of ambient air along the road corridor. At the same time, increase in air pollution is likely from the dusts emitted from the road surface due to movement of vehicles and wind. This will cause adverse health impact to the people living in the road vicinity. During operation period, the surface water may be polluted by road runoff containing oil, grease, lubricants and other chemical spills and it may cause water pollution. The spoil and other construction material and wastes into water bodies during maintenance may also degrade water quality. These water resources of the road alignment will have direct, low, local and long term impact.

140 Noise level during the operation period will increase due to the movement of vehicles and other activities. As the road is of district road category and the vehicular movement is not expected to be very high. However, due to low traffic volume, the impact due to noise pollution will be direct, low, local and long term. The impact of this kind will be direct, low, local and long term.

141 Measures: Measures to be adopted will include plantation of trees on both sides of road as far as possible; restrict horn near forest, health posts, schools and settlements; provide speed limit for vehicle at sensitive areas. Bothside plantation along the road alignment will be done to extent possible which act as barrier to minimize noise pollution.

#### **Road Slope Stability and Management**

142 Impacts: The destabilization of slope may also be expedited due to human activities in the road neighborhood such as quarrying stones or soil, animal grazing, irrigated cultivation, opening of branch roads that will connect the road with other village settlements. This may cause damage to road section, disruption to transportation and other social impacts in the nearby areas. The inadequate maintenance of the road, blockage of drains, damages the road surface can lead to slides and slope failure.

143 Sensitive areas for possible road slope stability problems are:

- Sensitive areas of high gradient (Ch: 8+300 km; Ch:10+900 km) and rock falling places (Ch:2+180 to 2+840 km)

The impact will be direct, medium local and long term nature.

144 Measures: The following mitigation measures will be adopted by DDC after completion of sub-project:



- Rill and gully formations should be regularly monitored and immediately fixed at critical areas;
- Correction of maintenance of the slope protection measures and drainage works
- Minor landslide and mass wasting shall be immediately cleared and slope restored with appropriate geological stabilization technology
- Soil conservation will be done by providing cross drainage structures with rip protection works at outlet for safe discharge of drain water and bioengineering works on vulnerable and eroded roadside slopes.

### **Biological Environment**

#### **Depletion of Forest Resources**

145      Impacts: The forest resources may deplete due to human pressure on forest to meet increasing needs of heating and cooking, illegal felling/cutting of trees for timber. The impact will be indirect, medium, local and long term.

146      Measures: The mitigation measures recommended are support District Forest Office and VDCs to encourage and support local community in controlling illegal harvesting of forest resources; awareness programs organized to educate local people on the importance of forest conservation. Compensatory plantation will be carried through CFUGs which helps to conserve and manage CFs according to operational plans by plantation of trees, fencing and control of undesirable activities. Improved access will facilitate easy transportation of LPG Gas and kerosene to replace use of firewood.

#### **Disturbance to the wildlife and Illegal Hunting**

147      Impacts: Although the wildlife population is reported low, however, they may be disturbed due to the frequent movement of the vehicles. Vehicular flow, horn blowing in the forest area will have impact on the wildlife and bird species. There may occur illegal hunting during operation period by the people from market areas due to easy accessibility. Wildlife and birds will be disturbed due to the vehicle movement. The impact will be indirect, low, local and long term in nature.

148      Measures: Mitigation measure will be to erect appropriate sign boards informing drivers on prohibition of blowing horns in the forest areas. Community and authorities will remain vigilant and alert on illegal felling of timber and killing of wildlife.

#### **Impact on aquatic life**

149      Impacts: During the road operation, fuel oil, grease, lubricants and other chemical leakage may be spillout. There is not such major aquatic source found in the existing road alignment and low impact on aquatic life. The impact will be indirect, low, local and for long term.

150      Measures: The mitigation measure recommended are:

- Adequate precaution and regulation mechanisms are needed to control leakage in aquatic source.
- Awareness programmes shall be organized to educate local people for the conservation of aquatic life under awareness programme of Social Action Plan.

### **Socio-economic and Cultural Impacts**

#### **New Settlement and Market Center Development**

151      Impacts: Expansion of settlement area and market can be observed at Simphring, Barbote, Soyang, and Ghosh gaun. Encroachment of RoW may take place. This will reduce road capacity, increase road accidents, and adversely impact road. The impact will be direct, medium, local and for long term.

152      Measures: The mitigation measures to be adopted include regulation of settlement with proper planning; plantations of trees in the RoW so that it is not encroached; provide sewerage in market areas. Authorities and VDCs will control encroachment of road.

**Change in Social behavior**

153      Impacts: People may leave their family in their villages to dwell near the new spots for economic incentives. This will ultimately affect the traditional bonds, norms and functions of the family. This will also cause impact on social and cultural transition. Access facilities may bring social nuisance like increase in alcohol consumption, gambling, prostitution, and may increase girl trafficking. The impact will be indirect, medium, local and long term in nature.

154      Measures: The mitigation measures recommended will be facilitating awareness raising programs to the communities about negative social behavior like gambling, excess use of alcohol.

**Impact of Road safety**

155      Impacts: Movement of vehicles in the road will invite accidents. Inadequate provisions of road safety measures like no provisions of signals and lack of enforcement of traffic rules during operation period may invite accidents. The impact will be direct, medium, local and long term in nature.

156      Measures: The mitigation measures adopted will be:

- Applying appropriate road safety measures with the help of 3-Es i.e. Engineering, Enforcement and Education.
- Appropriate spoil disposal sites should be identified and utilized
- Required safety signs will be used along the road

## Chapter- 7

### 7. ENVIRONMENTAL MANAGEMENT PLAN

157 The EMP is prepared to guide implementation of mitigation measures and monitoring requirements.

#### 7.1 Institutions and Their Roles

**Table 7.1: Institution and their roles**

Institution	Role	Responsibility in the Project	Remark
Ministry of Environment	Mandated to formulate and implement environmental policies, plans and programs at national level	Facilitate when needed on environmental safeguards	No direct responsibility in the project
Ministry of Local Development (MoLD)	It is concerned line ministry, executive agency and concerned agency as per EPA/EPR. Environment Management Section is responsible to look into safeguard matters for the ministry.	<ul style="list-style-type: none"> <li>To review IEE ToR and Report, and give approval.</li> <li>Coordinate with project on safeguard issues</li> <li>Conduct environmental monitoring from central level.</li> </ul>	Executing Agency
Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR)	Department under MoLD responsible to execute infrastructure projects under MoLD. Provides back-up support to DDCs in technical matters through DTO.	RRRSDP is being executed under overall coordination and supervision of the Department for the Ministry. It is also supporting DDCs through DTOs to implement the project.	Executing Agency
RRRSDP- Project Coordination Unit	Project specific unit.	Technical Unit to support and coordinate all activities for implementation of RRRSDP. Review, comment, and forward IEE ToR and Report for review to ADB and for approval to MoLD	First Class Officer / DDG of DoLIDAR has been heading the PCU.
District Development Committee / District Technical Office	DDC/DTO is Project Implementing Agency.	<ul style="list-style-type: none"> <li>Prepare IEE ToR and submit for approval to PCU/MoLD</li> <li>Conduct IEE Study, Public Consultation, and prepare IEE Report</li> <li>Receive comments from PCU/ADB/MoLD and modify accordingly. Get final approval from MoLD.</li> <li>Conduct environmental safeguard monitoring</li> <li>Reporting</li> </ul>	District Technical Officer is the Project Manager
District Project Office	Project implementation office working directly under DDC/DTO.	Responsible for overall activities related to implementation of the works at field level.	Implementing Agency
Central Implementation Support Consultant (CISC)	Support consultants at central level	Technical and management support to PCU	Consultant
District Implementation Support Team (DIST)	Support consultants at district level	Technical and management support to DPO	Consultant

158 To support for smooth implementation of the project, there are various district level committees and groups including District Project Coordination Committee (a sub- committee of DDC), Village Infrastructure Construction Coordination Committee (to coordinate at VDC level). Road Building Groups are formed under participation of local people from ZoI. They carryout the construction works tat can be conducted manually. Contractor will be appointed for works requiring higher skill and mechanized support.

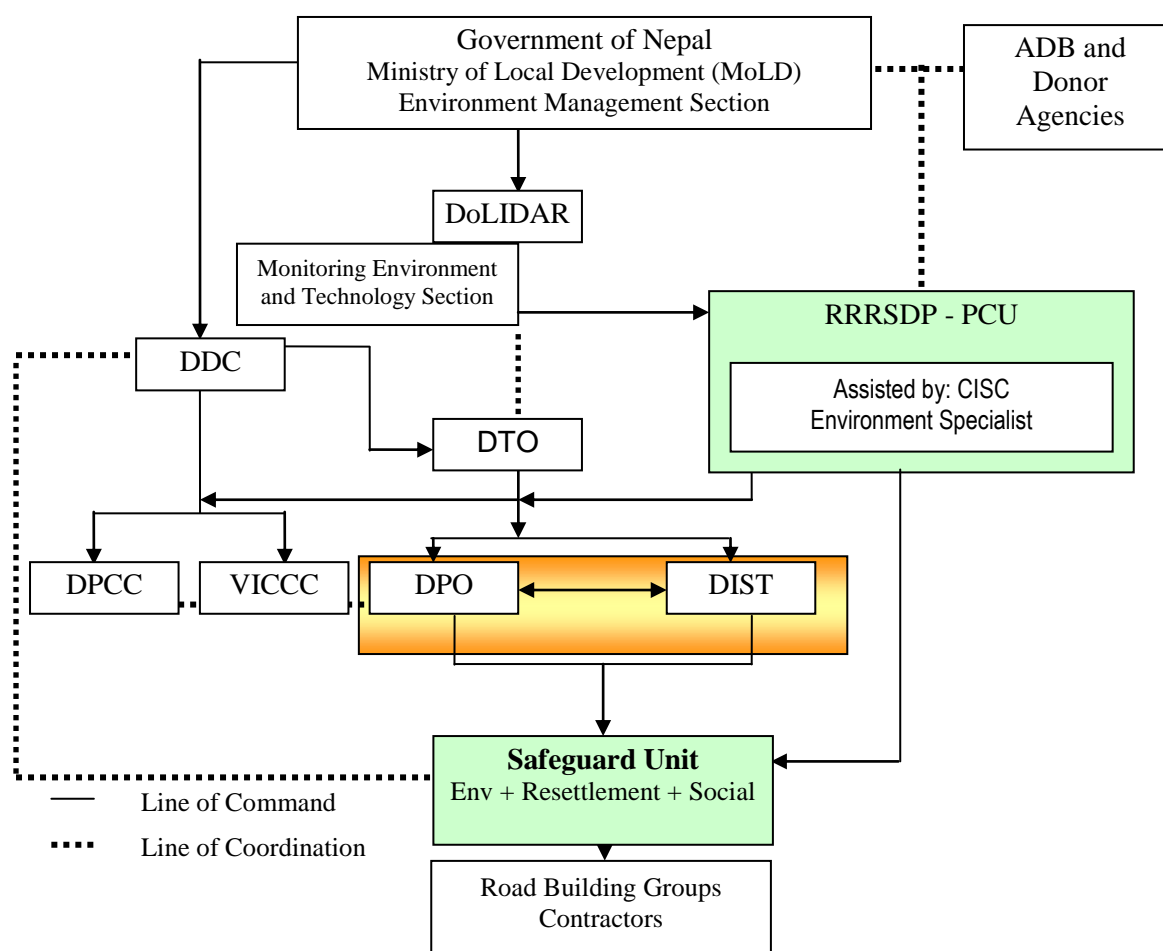
## 7.2. Reporting and Documentation

159 Monitoring checklist will be developed as per the Environment Management Plan (EMP). The checklist will be used for regular monitoring. Trimerseerly EMP compliance report will be prepared and submitted to the DDC, and DDC will forward it to PCU / DoLIDAR.

160 The monthly reports will be based on recurrent site inspections and will report on the effectiveness of the mitigation measures; the contractor's compliance with the environmental specifications; measures recommended in the events of non-compliance, and recommendations for any other corrective plan.

161 The trimester environment monitoring report will be submitted for the first year of operation of the road by the Proponent (DDC/DTO) to Executing Agency (PCU/DoLIDAR), who will forward the report to ADB. This is to ensure that post project monitoring is also carried out at least for one year.

**Fig. 7.1: Environmental Management Organization Structure**



## 7.3. Environmental Management Plan

162 The DDC/DTO with support of DPO/DIST at local level and PCU/CISC at central level will be responsible for conducting careful and routine monitoring of environmental safeguard and ensure the implementation of mitigation measures and according to EMAP. Overall implementation of the EMP will become proponent's responsibility. Framework for implementing environmental management plan is shown by **Table 7.2**.

Table 7.2: Beneficial Impacts and Proposed Enhancement Measures

Activity	Effect	Related Beneficial Impacts	Type of Impact *)				Benefit Augmentation Measures	Responsible Agencies	
			Nat	Mag	Ext	Dur		Executing Agency	Supporting Agency
Construction Stage									
Construction of road	Employment Generation and Increase in Income	Increase in income level	D	H	L	ST	Involve local people to extent possible to implement manual works through labour-based approach (Skilled-29,445 person days & Unskilled-176669 person days)	DDC/DTODIST	DPCC / VICCC / CISC
On the job training to local labour	Skill Enhancement	Increase in income generating activities, employment opportunities	IN	M	L	LT	Priority to Affected Peoples (APs) and vulnerable groups, job training on various constructions works.	DPO/DIST	DDC/DTO / CISC
Construction of road	Enterprise Development and Business Promotion	Enhancement in local economy	D	M	L	ST	Provide support to local entrepreneurs, promotion of cooperatives and linkage with financial institutions.	DDC/DTO	DIST/ CISC
Construction coordination committee and RBG program	Community Empowerment and Ownership	Increase in income and ownership.	IN	L	L	ST	Provide skill trainings	DPO/DIST	DDC/DTO / CISC
Construction of road	Women and Indigenous People Empowerment	Empower the women and indigenous people	IN	H	L	LT	Priority to women, dalit and vulnerable workers. At least 50% workers will be women.	DDC/DTO	DIST/VICCC
Operation Stage									
Operation of Road	Improvement in accessibility and saving time and transportation cost	Saving in travel time and travel cost	D	H	R	LT	Proper maintenance (regular, emergency) , continuation of bioengineering	DTO	DDC / DoLIDAR
	Increase in Trade, Commerce and Development of Market centers	Shifts towards improved and commercial agriculture	IN	L	L	LT	Encourage local farmers towards improved agricultural practices by providing trainings under social action plan to grow quality and demanding products with implication of improved seeds and modern techniques.	Local farmers	DDC, VDC
	Enhancement of Community Development Services	Ease of access to social service and raise in quality service	D	H	L	LT	Keep road maintained to ensure access facility that will attract development of other social services facilities	Local people, DDC, VDC	DDC, VDC
	Availability of agricultural inputs and extension facilities	Increase in productivity and sale of farm product in the settlements like Raja Rani Bazaar, Deurali/Aitabare, Samewa, Thadagaun, Lapha chowk, Lhapse, Saurye and Budhabare bazaar	IN	H	L	LT	Promotion of market linkages and networking for better market price by providing Small business and Micro Enterprise Development Training under Livelihood Enhancement Skills Training (LEST) programs of Social Action Plan.	Local farmers	DDC, VDC
	Appreciation of Land Value	Improvement in local economic condition	IN	M	L	LT	Promotion of land development activities and control of encroachment within RoW. Awareness program shall be organized on use of high value land to get bank loans for setting up enterprise ventures.	DDC/DPO	DDC/VDC

Table 7.3: Adverse Impacts and Proposed Mitigation Measures

Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact (*)					Mitigation Measures	Responsibility for Mitigation Measure		
			Nat	Mag	Ext	Dur	Rev		Responsible Executing Agency	Relevant Supporting Agency	
Construction Stage											
Physical Environment											
Construction of Road, site clearance, (pavement work, side/cross drainage work)	Change in land use; 2.77 ha of cultivated land, 0.7 ha of barren land and 3.41 ha of forest will be lost	Loss of agricultural land, production, loss of property	D	H	L	LT	IR	Avoid fertile land, forest, settlement areas etc.	DDC/DTO	DIST	
Construction works, operation of construction vehicles, material hauling and unloading etc.	Dust from exposed surface, from construction equipments and vehicles	Air pollution, public health risks	D	L	L	ST	Re	Use of face mask while working on dust prone areas, covering of dust sources at	DDC/DTO / RBGs	DIST	
	Increase in level of noise around school, health posts, forest areas	Noise pollution, disturbance and annoyance.	D	L	L	ST	Re	Restrict horn near school, health posts etc. ch: 0+200 and 12+500km	DDC/DTO / Contractor	DIST	
Operation of quarry sites and stockpiles of material, Cutting of slope, earth excavation and spoil disposal	Increase in sediment level, spills and leakage of oils and chemicals to water bodies	Water pollution and impact on users	D	L	L	ST	Re	Proper spoil management, and prevention of leakage and spills of construction chemicals, restriction in urination and defecation in open areas	DDC/DTO	DIST/VICCC/ VDC	
	River bank cutting and erosion, change in river regime, instability, land slide	Damage to farmland, water pollution etc.	D	L	L	ST	Re	Proper selection and management of quarry sites, rehabilitation of quarry sites after completion of work. Bolders/ Aggregates: Ch: 2+400 - 2+470; 4+700; 6+500 , 8+063, 15+150 – 15+850, 20+650 - 20+750. Sand: 7+215 km	DDC/DTO/ Contractor/ RBGs	CISC/DIST/ VICCC	
Site Clearance,exavation	Slope Instability: Ch: 2+470, 3+800, 4+700, 4+850, 5+280, 6+500,7+673 and Ch 18+500 km	Slope instability and erosion	D	H	L	LT	Re	Civil structures with bio-engineering application (Such as Grass plantation, Tree/Shrub plantation, Brush layering, Palisades, Bamboo plantation, Live checkdam construction etc.) shall be used to stabilize the slopes. Drainage management (Catch drain, rip-rap drain, checkdam etc.)	DDC/DTO	DIST	
Construction of road (Camp Operation, Storage of construction materials)	Location of Camp Sites, Storage Depots	Encroachment of forest, agriculture land, solid waste,and waste water may cause pollution	D	M	SS	ST	Re	Locate camp site away from productive land and forest area ,use local labor and local houses as camp; pay compensation to land owner of camp area; proper storage of chemical and materials; drinking water facilities and latrine.	DPO assisted by DIST/ Contractor	DIST/VICCC	

Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact (*)					Mitigation Measures	Responsibility for Mitigation Measure	
			Nat	Mag	Ext	Dur	Rev		Responsible Executing Agency	Relevant Supporting Agency
Construction of Road, (earthworks)	Spoil Disposal and imposed weight of spoil on fragile slopes	Gully erosion, landslide, disruption of road, damage to farmland, water pollution etc.	D	M	SS	ST	Re	Proper site selection and management of spoil at designated areas approved by Engineer; provision of proper drainages, toe walls; Proposed spoil disposal sites are 6+500 near Ghimire Khola and 8+500-8+600 near Tintale Khola	DDC/DTO	DIST/VICCC/ VDC
Construction of Road (Side and cross drainage works)	Drainage Management, generation of large volume of surface runoff	Erosion, landslide, damage to farmland	IN	M	SS	LT	IR	Proper drainage structures and proper spoil disposal, Avoid blockage or diversion of natural channels due to construction of road and disposal of spoils.	DDC/DTO	DIST
Operation of construction equipments	Construction machineries and tools (Rollers, tippers, spreader, water tanker etc.)	Air pollution due to emission of smoke, increase in vibration and noise pollution	D	H	SS	ST	Re	Equipment/vehicles deployed for construction activities shall be regularly maintained. All the vehicles deployed for material movement shall be spill proof to the extent possible	DPO assisted by DIST/ Contractor	DIST/CISC/PCU
<b>Chemical Environment</b>										
Storage of Chemicals and operation of machineries	Spillage of fuels and chemicals.	Pollution to the nearby water sources and soil. Health hazards to the workers	D	M	L	ST	Re	Store fuels and chemicals on paved surface with surrounding catch drain to protect soil from leakage. Provide information signboards. Use of safety gears. Close monitoring during operation of machineries.	DTO/DIST/ Contractor	PCU/CISC/DIST
<b>Biological Environment</b>										
Clearance of vegetation necessary for road formation	Loss or Degradation of Forests and Vegetation (3.41 ha. and 431 nos. of trees )	Loss of green cover; loss of environmental benefits from vegetation, disturbance in ecological function (dust and noise absorbance, aesthetic value etc	D	H	SS	LT	Re	Cutting of tree only in formation width, compensatory plantation of local species of tree at 1:25 ratio + 10 percent in forest land and 1:1 in private land.	DDC/DTO/ DFO	DFO/CFUGs/ DIST
Construction activity	Impact on Wildlife Due To Loss of Habitat and Hunting	Pressure on forest resulting in forest degradation; habitat degradation	IN	L	L	ST	Re	Work only in day time, do not disturb wildlife, aware workers	Local Contractors if establish labour camps	DTO / DIST/ CFUGs
<b>Socio-economic Environment</b>										

Acquisition of land for maintaining road width	Loss or Degradation of Farm Land and Productivity	Reduced production, hardship, food shortage	D	H	L	LT	IR	Minimize productive land acquisition through alignment selection	DDC/DTO	CFC <sup>2</sup> DIST/VICCC
Acquisition of land and property for maintaining road width	Loss of Private Properties	Loss of private land.	D	M	SS	ST	IR	Compensation and resettlement to the owner as described in resettlement plan	DDC/DTO	CFC <sup>3</sup> /DIST
Demolition of structures along road alignment	Impact on Community Infrastructure	Loss of services provided by them	D	M	SS	ST	Re	Restoration and relocation of affected infrastructures at Chainages: 1+100, 1+960, and 12+200.	DDC/DTO	PCU DIST/CISC/ VICCC/VDC
Construction of Road	Accidental damage to structures during works, sedimentation in canals etc.	Damage to the community or private structures/ hardship	IN	L	SS	ST	Re	Due attention to preserve these structures during construction works, restoration if any damage incurred	DIST/Local Contractors	DTO / VDC
	Occupational health and safety matters	Injury, fatal accidents, outbreak of epidemics and diseases, decline in capacity to work	D	H	L	ST	IR	Occupational health and safety regulations, firstaid facility at sites with health treatment arrangements; Proper drinking water and toilet facility for construction crew	DDC/DTO / Contractors	DIST/CISC
	Decrease in aesthetic value	Disturbances in working areas and scar on topography	D	L	L	ST	Re	Cover the road alignment by planting tree on both sides; manage working areas.	DPO in assistance by DIST / Contractors	PCU / CISC / Users Committee / VDC



Operation Stage											
Physical Environment											
Operation of vehicles	Air, water and noise pollution effects, particularly near sensitive spots( School, healthpost)	Disturbance to students, patients, wildlife, effect to nearby agriculture land and crops	D	L	L	LT	Re	Speed limit for vehicles, no horn signs, use vegetation barrier. Regular maintenance of drainage.	DDC/DTO	DoLIDAR/Local administration	
Quarrying, operation of construction equipments	Road Slope Stability and Management	Slides and slope failure, Disturbance to traffic flow, pollution of water bodies, impacts on agriculture land, loss of vegetation.	D	M	L	LT	Re	Regular maintenance of slope protection structures, Selection of healthy upland farming techniques	DDC/DTO/ VDC	DoLIDAR , DFO, DWSSC	
Biological Environment											
Road operation	Depletion of Forest Resources	Loss of timber, forest resources and benefits	IN	M	L	MT	IR	Enforcement of law, vigilance and monitoring, participation of community	DFO/ CFUGs/VDCs	CDO / CBOs, NGOs	
Road operation	Disturbance to wildlife and Illegal Hunting	Collision of wildlife with vehicles, disturbance in their normal activities	IN	L	L	LT	Re	Warning traffic signal, Awareness training to driver to limit speed and horn use	DTO/ CFUGs	DDC/CDO / DFO	
Socio-economic Environment											
Easy Access by road operation	New Settlement and Market Center Development	Encroachment of RoW, increased accidents, delay in traffic movement, depletion of local resources, water pollution	D	M	L	LT	IR	Awareness program, enforcement of law, planning of land development, plantation of trees.	DDC/DTO	CDO / VICCC	
Operation of Road	Change in Social behavior	Social and cultural conflicts	IN	M	L	LT	Re	Awareness, Enforcement of law and order, Provision of training for skill	DTO	DDC/DoLIDAR	
Operation of Road	Impact Road Safety	Increase in accidents	D	M	L	LT	IR	Appropriate road safety measures, Safety signs along the road.	DTO	DDC/DoLIDAR	

\* Legend Value in parenthesis is level of significance:

**Nature-** IN= Indirect; D= Direct; **Magnitude-** L= Low; M= Medium; H= High; **Extent-** SS= Site Specific; L= Local; R= Regional; N= National; CB=Cross-boundary

**Duration-** ST= Short Term; MT= Medium Term; LT= Long term Re=Reversible; IR= Irreversible

#### 7.4. Mitigation cost

163 The estimated cost for beneficial augmentation measures like awareness raising program, skill training, promotion of small scale industries, and income generation activities will be covered by the Community Empowerment Component and Livelihood Enhancement Skills Training (LEST) program of the RRRSDP. Costs for income generation and awareness program activities for Affected Persons (APs) are included in Social Action Plan. The design and cost estimate for most of the suggested mitigation measures such as slope stabilization, quarry site management, spoil disposal, supply of face masks, helmets, muffs, accidental insurance, bioengineering measures, plantation, land slide rehabilitation shall be incorporated in the design and cost estimates. Therefore, most of the mitigation measures suggested would be a part of main project cost. All proposed mitigation measures will be integrated in the project design so that these measures may automatically form part of the construction and operational phases of the project. The indicative cost for environmental enhancement and mitigation is presented in the **Table 7.4**.

**Table 7.4: Cost Estimate for Environmental Enhancement and Mitigation Measures**

S.N.	Environmental Protection Measures	Estimated Budget (NRs.)	Remarks
<b>1. Benefits Augmentation Measures</b>			
1.1	Training to DC/DTO/DPO/DIST to conduct environmental monitoring and reporting	50,000.00	To be included in project cost
1.2	Training to Naika of RBGs	50,000.00	To be included in project cost
1.3	Enhancement in Technical Skills (Bio-engineering)	100,000.00	To be included in project cost
	Sub-Total (1)	<b>200,000.00</b>	
<b>2. Adverse Impacts Mitigation Measures</b>			
2.1	Bio-engineering work/Roadside plantation (including plantation of 3500 trees)	751,530.00	To be included in BoQ
2.2	RBG Insurance	50,000.00	To be included in BoQ
2.3	Information Signboard	50,000.00	To be included in BoQ
2.4	Compensation for properties	549,004.00	To be included in Resettlement plan
2.5	Restoration or relocation of affected infrastructures, spoils disposal site management and rehabilitation, reinstate of quarry etc.	500,000.00	To be included in BoQ
2.7	Compensatory plantation Re-plantation / Re-forestation	798,434.00	To be included in project cost
2.8	Social Action Plan Cost	1,742,301.00	To be included in Social plan, project cost
2.9	Occupational health and safety; First aid boxes, campsite sanitation (Pit latrine); solid waste management, Safety measures for workers (Helmets, gloves, masks, boots, etc.)	500,000.00	To be included in BoQ
	Sub-Total (2)	<b>4,941,269.00</b>	
	<b>Total</b>	<b>5,141,269.00</b>	

## 7.5. Implementation of Mitigation Measures

164 The mitigation measures will be integrated into project design and tender documents. Using this approach, the mitigation measures will automatically become part of the project construction and operation phase. By including mitigation measures in the contract or in specific items in the Bill of Quantities, monitoring and supervision of mitigation implementation could be covered under the normal engineering supervision provisions of the contract. The project contractor will be bound by the parameters identified in the environmental assessment pertaining to specific mitigation measures in the contract. The final acceptance of the completed works should not occur until the environmental clauses have been satisfactorily implemented.

165 The tender instruction to bidders will explicitly mention the site-specific mitigation measures to be performed, the materials to be used, labor camp arrangements, and waste disposal areas, as well as other site specific environmental requirements. Action to be taken against failure to comply with EMP requirements will also be clearly agreed in the contract agreement document.

## 7.6. Environmental Monitoring

166 The IEE prescribes the mitigation measures in order to minimize adverse impacts and to enhance beneficial impacts. Environmental monitoring plan is an important tool to ensure the implementation of mitigation measures.

### 7.6.1 Monitoring Responsibility

167 Monitoring is an integral part of the project proponent. The Proponent, DDC/DTO Lalitpur will develop in-built monitoring mechanism to safeguard environment construction and operational stages. DDC/DTO will be supported by District Implementation Team (DPO and DIST) team in the district and Environmental Management Specialist from the CISC will ensure meaningful monitoring and undertaking corrective actions.

168 According to EPR, 1997, the MoLD/DoLIDAR is responsible for monitoring and evaluation of the impact of the implementation of the project. The MoLD/DoLIDAR checks whether the DDC/DTO is carrying out monitoring activities as per the IEE, and if the prescribed mitigation measures are being implemented. Total cost estimated for central level environmental monitoring is NRs. 50,000.

169 DDC/DTO with support from PCU/CISC will make arrangements for sub-project level monitoring. It will constitute a monitoring team. Project's district management team should be responsible for forming the monitoring team, financing the monitoring works, providing logistics and other necessary support. Thus, it is recommended that an external team hired by DDC/DTO take responsibility for periodic monitoring of the environmental performance, in addition to the regular supervision and guidance provided by the DIST at the site. The sub-project specific environmental monitoring and management plan as given in **Table 7.4 and 7.5** shall be followed. DIST team will conduct regular environmental monitoring.

170 The sub-project level monitoring team should submit its report to RRRSDP district management, which should forward a copy to the RRRSDP-PCU. Total cost of environmental monitoring (field visits, observation, review of reports and report preparation) is estimated NRs.200,000.00 as given in **Table 7.4**.

**Table 7.5: Environmental Monitoring Cost**

S. No.	Detail	Unit	Quantity	Rate	Total (NRs.)
1	Environmental Management Specialist	Man-month			Included in the Cost of DIST
2	Sociologist / Public Relation Expert	Man-month			Included in the Cost of DIST
3	Stationary and Computer		LS		70,000.00
4	Printing and Photocopies		LS		30,000.00
5	Transportation		LS		50,000.00
6	Cost for Monitoring by MoLD/DoLIDAR		LS		50,000.00
	<b>TOTAL</b>				<b>200,000.00</b>

Thus, total environmental monitoring and management cost is NRs 5341269.00

## 7.6.2 Types of Monitoring and Monitoring Parameters for this project

171 Monitoring is an on going component of the environmental assessment process and subsequent environmental management and mitigation activities. There are three types of environment monitoring: Baseline monitoring, Compliance Monitoring and Impact Monitoring. The types of environmental monitoring for this subproject are:

- a. **Compliance Monitoring** - It verifies whether contract environmental clauses and the mitigation measures are properly implemented in the field. The frame work for compliance monitoring is given in the **Table 7.6**.
- b. **Impact Monitoring** - It confirms whether the environmental mitigation measures specified in the project design and contract are correctly formulated. The frame work for impact monitoring is given in the **Table 7.7**.

**Table 7.6: Monitoring Indicators Selected for IEE**

Monitored Sector	Parameters Selected for Monitoring
Soil, Landslide, Erosion Waste management sites	<ul style="list-style-type: none"> <li>▪ Number, location and extent of slope failures</li> <li>▪ Cause analysis for slope failure, natural/man-made</li> <li>▪ Area (ha.) of land, forest and properties affected</li> <li>▪ Nos. and extent of gully erosions and pavement failures</li> <li>▪ Nos. and extent of road subsiding effects</li> <li>▪ Suitability of corrective/bio-engineering measures</li> <li>▪ Nos. of days and nature of traffic delays due to slides</li> <li>▪ Sites and suitability for safe disposal of wastes and garbage</li> </ul>
Bio-engineering	<ul style="list-style-type: none"> <li>▪ Nos. and plant species selected for bio-engineering, disaggregated by protective function</li> </ul>
Water Pollution, Water Resources and their uses: Surface/ ground water Irrigation water Drinking water Public taps	<ul style="list-style-type: none"> <li>▪ Nos. and extent of water-logging at operative and/or decommissioned construction sites</li> <li>▪ Blockage of waterways - extent and secondary impacts</li> <li>▪ Water pollution incidents due to unsafe disposal of waste and spoil, analyzing effects on local fisheries</li> <li>▪ Damage to farm lands due to water shortage or pollution</li> <li>▪ Use of field kit for drinking water quality, determining pH, particulates, turbidity etc.</li> </ul>
Air and Noise Level in relation to traffic volume	<ul style="list-style-type: none"> <li>▪ Assessment of noise level in site by direct observation and interview with stakeholders</li> <li>▪ Visual assessment of dust development at selected sites/sensitive spots and interview with local stakeholders</li> <li>▪ Traffic volume measurements</li> </ul>
Road Safety	<ul style="list-style-type: none"> <li>▪ Speed measurements at selected spots</li> <li>▪ Nos. and type of road accidents recorded in the Traffic Police and in local health service centers</li> <li>▪ Suitability of local road signs</li> <li>▪ Records on public and driver road safety awareness campaigns</li> </ul>
Wildlife/ Habitat Disturbance Impacts on Forest resources	<ul style="list-style-type: none"> <li>▪ Nos. and extent of road accidents inflicting wildlife</li> <li>▪ DFO records of illegal timber extraction and wildlife trade</li> <li>▪ Observations and handling of invasive species</li> </ul>
Socio-economic Development near Road alignment	<ul style="list-style-type: none"> <li>▪ Demographic, economic and education data</li> <li>▪ Nos. and extent of new settlements /types and ethnic groups</li> <li>▪ Nos. and extent of new businesses</li> <li>▪ Nos. and extent of new services and utilities</li> </ul>
Community awareness programs relating to environment protection and avoidance of social conflicts	<ul style="list-style-type: none"> <li>▪ Nos./schedule of campaigns and nos. of beneficiaries</li> <li>▪ Revision of training agenda &amp; propagated information material</li> <li>▪ Questionnaire evaluation, interviewing selected participants on the impacts of the training provided by associated NGOs and Contractors</li> <li>▪ Nos. of beneficiaries having received awareness training against the spread of HIV/AIDS and girl/boy trafficking</li> <li>▪ Records from locals and local police concerning social conflicts</li> </ul>

172 The nature and purpose of environmental monitoring will be different in the pre-construction, stage, construction stage and operation stage of the project.

### Pre-construction Stage

173 Monitoring at this stage of project is to:

- Confirm that plan, route selection and design of the road has considered the recommendation made by IEE
- Judge the level of preparation for implementing the construction related mitigation, and
- Prepare up-to-date environmental status of specific site where the impacts are assessed to be significant

**Construction Stage**

174 This stage of monitoring is to check compliance with the best practices, norms and standards and on implementation of the mitigation measures prescribed by IEE. The following parameters will mainly be focused on:

- Disposal of spoil and construction wastes and its consequences
- Disruption of natural water courses, drainage work and its consequences
- Slope protection measures
- Loss, stratification or degradation of forest vegetation
- Care, sensitivity or disruption of community infrastructures
- Loss or degradation or threat to private properties
- Care, sensitivity or disruption to cultural sites
- Quarrying and borrow pits

**Operation Stage**

175 The monitoring in this stage is mainly related to road features, road induced activities and their impacts on receiving environment. The following parameters are mainly monitored during operation stage:

- Drainage structures, their outfall and damage to private properties, community properties and natural resources
- Effectiveness of the slope protection and soil erosion measures
- Encroachment into road side, public land, forest or marginal land
- Status of waste disposal sites, quarry sites, and borrow pits
- Road accidents
- Symptoms of emergence of road side settlements, changes in agricultural pattern
- Activities of road neighboring communities
- Illegal felling of trees and hunting of wildlife

**Table 7.7: Compliance Monitoring for I.Na.Pa- Dudhang-Soyang-Naya Bazaar Road Construction Works**

Parameters/Issues	Responsible Implementing Agency	Verifiable Indicators	Verification Methods	Schedule	Responsible Monitoring Agency
Final alignment selection as per IEE /EMP recommendation	DIST	Incorporation of IEE / EMP recommendations into alignment selection process and design document	Walkthrough along final road alignment, verifying sensitive areas	Initial stage preconstruction phase	Proponent through CISC; DoLIDAR
Land and property acquisition and compensation	Proponent with assistance of DIST	Cadastral records, Land and properties acquisition procedures; Procedures followed during voluntary donation of Land; Preparation of inventory of infrastructures likely to be affected	Public consultation, photos; geo-referencing; Check inventory against cadastral records and Discuss with people	Initial stage pre-construction phase - well ahead of construction	CFC / PCU (CISC) / DOLIDAR / MoLD
Resettlement, assistance and compensation	Proponent / DIST	Legal provisions by GoN; Compensations paid	Check compliance to legal procedures	Well ahead of construction	CFC / PCU (CISC) / DOLIDAR / MoLD
Site selection and preparation of construction logistics	Proponent / VICCC	Project's arrangement for materials storage, and construction activities	Site observation, geo-referencing and photographic documentation	Beginning of construction period	DIST/ DPO
Use of local labour, particularly vulnerable groups and women	DRCC / VICCC / DIST	Specifications which obligate the contractors/BG to observe certain quotas for employing local labour, specially vulnerable groups and women, prohibition of child labour	Records that facilitates and coordinates the process for local people's employment, interviews	During the entire period where labour work is contracted, trimester	Proponent / DPO
Awareness and orientation training on road construction to technicians, and locally employed labourers	Proponent in assistance of DIST	Training programmes for skill development, occupational safety and environmental protection associated with road construction works	Specifications; Training records, check training programme reports, assess feedback from participants	Beginning of construction and during construction	DIST / Proponent (DTO)
Compliance to Occupational health and safety matters	DIST / Contractor (if involved)	Health and safety regulations, first aid and medical arrangements, contingency plan, number and type of safety equipments such as mask, helmet, glove, safety belt, First Aid, Emergency Rescue	Spot checks at work sites, photos, accident records, interviews	throughout construction activities, trimester	Proponent / DPO
Compliance to Environmental Protection Measures, including pollution prevention, water and soil management, slope stabilisation, cut and fill, waste management, spoils, sensitive habitats and critical sites, protection of fauna and flora	Contractor / RBG/ DIST	Arrangement specified in the Code of Practice and in Manuals relating to environmental protection; EMP detail in IEE Document; records and observations on pollution, waste management, spoil deposit. Training programmes for labourers to prevent impacts on wildlife sensitive habitats, forests and fuel wood use.	Site inspection, Discussion with Project management, consultants, and local people. Quantifying site-specific impacts, photos, laboratory tests where required. Existing patrol, control and enforcement mechanisms, enforcement records	Before and during construction period	DPO/Proponent

Parameters/Issues	Responsible Implementing Agency	Verifiable Indicators	Verification Methods	Schedule	Responsible Monitoring Agency
Vegetation clearance	Contractor / RBG / DIST	Actual number of trees felled during construction works; Location (in Formation Width or RoW	Record, inspection and interview with local people and CFUGs	After detail design and before construction work	DPO CFUGs / Proponent
Measures to avoid pressure on forest and wildlife	Contractor / RBG / DIST	Use of firewood or fossil fuel by construction crew, events of hunting and poaching of wildlife	Inspection, interview with local people and CFUGs	Once a month during construction	DPO / CFUGs / Proponent
Measures to protect environment from air & noise pollution	Contractor / RBG / DIST	Dust level and noise level at work sites, major settlements and sensitive spots like health centres and schools	Visual observation, Observation of good construction practices and Discussion with residents and workers	Once in a month during construction	Proponent / DPO
Measures to protect water bodies from pollution	Contractor / RBG / DIST	Visual observation, observation of open defecation/waste/spoil disposal around water sources near construction sites ; Parameters like pH, hardness, DO, Turbidity etc.	Site inspection, test of site-selected samples of local streams water using standard field kit, interview	Once in a month during construction; Upon demand for testing with field kit	Proponent / DPO
Restoration, rehabilitation, reconstruction of all infrastructure services disrupted or damaged by the proposal activities	Contractor / RBG / DIST	Continued services by the facilities and functional public life	Site observation; VDC records; Public Consultation Meetings; Photos	Once in 15 days during construction	Proponent / DPO
Adequate technical and environmental supervision	DIST	Adequate number of technicians regularly at site Ability to implement labour based road construction concept	Check number and type of technicians available at site; Skill of work carried out; Discussion	Twice a month during construction	DPO , Proponent
Clean up and reinstatement of the construction sites (camps, quarries, borrow pits)	Contractor / RBG / DIST	Decommissioned sites indicate no adverse/residual environmental impacts, and are rehabilitated to the satisfaction of the supervisor and land owners	Site observation; Comparing photos; Consultation with land owners and CBOs	At end of construction period	Proponent / DPO

**Table 7.8: Impact / Effect Monitoring for I.Na.Pa- Dudhang-Soyang-Naya Bazaar Road Construction Works**

Parameters /Issues	Verifiable Indicators	Verification Methods	Location	Schedule	Responsible Implementation and Monitoring Agency
Slope stability and erosion	Inclination, slope failures causes; Drainage facilities such as catch drain, side drains and functionality of cross drainage structures; Fresh gullies and erosion; Success/failure of bio-engineering solutions	Site observation, photos DISTussion with people and technicians	Near steep slopes and at landslide areas and sites where bio-engineering failed	Continuously during construction and operation	DIST during construction; Proponent / DPO / Soil Conservation Office during operation
Bio-engineering of disturbed slopes	Re-vegetation through bio-engineering application on disturbed slope; Establishment of nursery	Site observation; Inspection of nursery and its production rate, photos, measurements	Cut slope area, where vegetation is cleared; Nursery	During and at end of Project construction	DIST/ Proponent
Disposal of Spoils and construction wastes	Affected aesthetic value, affected forest and agriculture, initiated land erosion by local blocked drainage, hazard to downhill slope residents and agricultural lands	Site observation and interviews, photos, geo-referencing sites	At specific locations where such sites occur	During construction	DIST/ Proponent
Quarrying of construction materials	Initiated erosion, changes in river regime, erosion by river systems, landslide due to quarrying, degradation of vegetation, water logging, waterborne diseases	Site observation, photos, records from local health centres	Quarry site areas	During construction	DIST/ Proponent
Disruption of drainage system	Status of rehabilitation Service status of irrigation and water supply system; Operation and maintenance requirement	Observation and interviews, photos, fisheries data, wildlife records	Disrupted aquatic system, irrigation schemes	During construction	DIST / Proponent
Loss or degradation of farmland, houses and properties	Status of road side land; Production / yield; Status of road side houses; Status of standing crop along alignment	Observation, data collection and analysis and interview with stakeholders	Road side land and houses	During construction	Proponent / DIST/ VICCC
Water quality	observation of open defecation and waste disposal around water sources near construction sites ; Parameters like pH, hardness, DO etc.	Visual observation, measurement of water sample using standard field kit	local streams	During construction; Upon demand for testing with field kit	DIST / Proponent
Air quality	Dust level in ambient air	Visual inspection and comparison with baseline condition	At construction sites and at sensitive spots (schools, health spots, major settlements)	During construction and operation	DIST / Proponent



## CHAPTER – 8

### 8. CONCLUSION AND RECOMMENDATION

#### 8.1 Conclusion

176 The IEE study of the proposed I.Na Pa-Dudhang-Soyang-Naya Bazaar road sub-project does not pass through any environmentally sensitive area and have minimal detrimental effects associated with loss of forest and agricultural land. Most of the adverse impacts predicted are of low significance and short term as well as of reversible nature.

177 In essence, the consideration of land use change is not thought to be a concern. RRRSDP policy to ensure that changes are catered for under the environmental monitoring, and to attempt to translate potential changes into pro-livelihoods opportunities. The beneficial impacts with the facility of access to market centers and location of social services will enhance productivity in rural area and improve the quality of life of the people. In addition, local people will get direct employment as workers, which will contribute significantly, in improving their economic status. These benefits from the implementation of the proposed road subproject are more significant and long term in nature against the adverse impacts most of which could be mitigated or avoided.

178 The IEE has shown that none of the anticipated environmental impacts of constructing the proposed road is significant enough to need a detailed follow-up EIA or special environmental study. Therefore, this IEE is sufficient for approval of the sub-project.

#### 8.2 Recommendation

179 The proposed road subproject is recommended for implementation with incorporation of mitigation measures and environmental management plan.

180 A key consideration in selecting the road alignment is to minimize the acquisition of valuable agricultural and forest land. However, some agricultural and forest land and possibly some built areas will have to be acquired for construction of the proposed road. A Resettlement Plan will be required to ensure that the persons affected by these losses are properly compensated.

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