Environmental Assessment Document

Initial Environmental Examination

Grant Number: 0093 NEP

March 2010

Nepal: Rural Reconstruction and Rehabilitation Sector Development Program

Dovilla-Phalebas Road Subproject, Parbat District

Prepared by the Government of Nepal

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]

Initial Environmental Examination (IEE) Report

Of

Dovilla-Phalebas Road Subproject, Parbat

Submitted to:
Ministry of Local Development
Government of Nepal

Proponent:
District Development Committee/
District Technical Office
Kushma,Parbat

March, 2010

Prepared By:
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ABBREVIATIONS

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

NAME AND ADDRESS OF THE PROPONENT

Name of Proposal

Rehabilitation of Dovilla-Phalebas Road Subproject, Parbat District, Nepal

Name and Address of Proponent

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EXECUTIVE SUMMARY IN NEPALI

दोविल्ला–फलेवास सडकको प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन

कार्यकारी सारांश

पृष्ठभूमि

नेपाल सरकारले लामो द्वन्दले गर्दा क्षति भएका ग्रामीण पूर्वाधारहरुको 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 आयोजनाु नेपालको बिसवटा जिल्लाहरुमा संचालन गरिरहेको छ । पर्वत जिल्लामा अवस्थित प्रस्तावित दोविल्ला- फलेबास ग्रामीण सडकको पुनःस्थापना सोही कार्यक्रम अन्तर्गत संचालन गर्न लागिएको एक उप–आयोजना हो । उप-आयोजना (प्रस्ताव) अन्तर्गत १५.५ कि.मी. लामो उक्त कच्ची सडकको ग्राभेल स्तरमा पुनर्स्थापना गर्न प्रस्ताव गरिएको छ ।

प्रस्तावक

प्रस्तावित सडक उप-आयोजनाको प्रारम्भिक वातावरणीय परीक्षणको प्रस्तावक जिल्ला विकास समिति र जिल्ला प्राविधिक कार्यालय, पर्वत हुन् । प्रस्तावकको प्रारम्भिक वातावरणीय परीक्षण स्विकृत गर्ने सम्वन्धित 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 प्रभावहरु पत्ता लगाई नकारात्मक प्रभावको न्यूनिकरण र सकारात्मक प्रभाव बढाउने उपायहरु बारे सुझाव दिनु, वातावरणीय अनुगमन योजना बनाई कार्यान्वयन गराउनु, तथा प्रस्तावित सडक आयोजनाको लागि प्रारम्भिक वातावरणीय परिक्षण गरे पुग्छ भन्ने कुराको यकिन गर्नु हो ।

प्रस्तावको सार्न्दभिकता तथा अध्ययन प्रकृया

प्रस्तावित सडकले पर्वत जिल्लाको दक्षिण भेगका वासिन्दाहरुलाई सदरमुकाम संगको पहुँच वढाउनेछ भने स्थानीय स्तरमा उत्पादन हुने तरकारी, दुध तथा अन्न लाई वजार संग जोडी स्थानिय आय आर्जनमा अभिबृद्धि गर्नेछ ।

जुलाइ/अगष्ट २००९ मा फिल्ड सर्वेक्षणवाट लिइएका तथ्याङ्क तथा अन्य उपलब्ध तथ्याङ्कहरुको साथै सामाजिक तथा प्राविधिक टोलीवाट पुनर्वास कार्यको सर्भेक्षणको लागि संकलन गरेका तथ्याङ्कहरु केलाएर प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन तयार गरी निष्कर्ष तथा सुझावहरु दिइएका छन् । यो प्रारम्भीक वाताबरणीय परिक्षण प्रतिवेदन नेपाल सरकारको वातावरण संरक्षण ऐन १९९७, वातावरण संरक्षण नियामावली १९९७ अनुसार तथा स्थानिय विकास मन्त्रालयबाट मिति २०६६/०२/२५ मा स्विकृत गरिएको यसै प्रस्तावकको कार्यसुचीमा उल्लेख गरीएको अध्ययन प्रकृया अनुसार तयार गरिएको छ साथै, एशियाली विकास बैकको इन्भाईरोमेन्टल एसिसमेन्ट गाइड लाइन २००३ र सेफगार्ड पोलिसी स्टेटमेन्ट २००९को समेत अनुसरण गरीएको छ ।

आयोजनाको विवरण

प्रस्तावित सडकले पर्वत जिल्लाको दक्षिण भेगका वस्तीहरुलाई जिल्लाको सदरमुकाम संग जोड्दछ । यसको कूल लम्बाइ १५.५ कि.मि. छ । हाल उक्त ग्रामीण सडकको पुरै सडक खण्डमा गाडी चल्छ । सडकमा एउटा पुल (Ch. ६+८४०) मा निर्माण गर्नु पर्ने देखिन्छ भने एउटा पुल (०+८६०) निर्माण भईसकेको अवस्थामा छ । यो सडक छवटा गाउँ विकास समितिहरू क्रमश चुवा, पकुवा, पिपलटारी, कटुवाचौपारी, मुडिकुवा र देविस्थान भएर जान्छ । सडकको कुल चौडाइ ५ मि. हुनेछ भने मोडहरूमा आवश्यकता अनुसारको चौडाइ हुनेछ र पूलको लम्वाई विस्तृत् डिजाइन् पछि निर्धारण हुनेछ । यो आयोजनाको कूल अनुमानित लागत पूल समेत नेरु.९२,५४७,४७२ रहेको र प्रति कि.मी अनुमानित लागत नेरु. ५,९७०,८०५ लाग्ने देखिन्छ ।

विद्यमान वातावरणीय स्थिति

यो सडक चुवा गा.वि.स.को दोविल्ला बाट समुद्री सतहदेखिको ७९७ मी. को उचाईबाट शुरु भएर समुद्री सतहदेखिको ८०७ मी. उचाईको टुटुङ्गा वजार भएर जान्छ । यस सडक खण्डमा विभिन्न प्रकारका चट्टानहरु जस्तै सेडिमेन्टेड रक आदि पाईन्छन् । यस सडक खण्डमा विभिन्न प्रकारका बालुवा र गिटी मिसिएको माटोहरु सडक खण्डमा पाइन्छन साथै यस खण्डमा कतै कतै रातो माटो पनि पाईन्छ । सडक खण्डमा पर्ने पानीका मूख्य श्रोतहरुमा सुन्द्रे खोला ,मोदी खोला, मल्याङ्दी खोला,बूके खोला,चिन्ने खोल्सा आदि पर्दछन्। प्रस्तावित पूल यस सडक खण्डमा पर्ने मल्याङ्दी खोलामा पर्दछ। यो पूल कटुवाचौपारी गा.वि.स.को मल्याङ्दी खोलामा समुद्री सतहदेखिको ९०० मी. को उचाईमा प्रस्तावित गरिएको छ। प्रस्तावित सडक तथा पूल क्षेत्रको वायु तथा पानीको स्तर सफा रहेको देखिन्छ साथै ध्वनि प्रदुषणको समस्या छैन । यो सडक प्रायः खेती गरिएको जमीन,पाखो तथा वन र बस्तीहरु भएर जान्छ ।

यस सडक खण्डमा पाइने मूख्य रुखहरुको प्रजातिहरुमा साल, चिलाउने, दवदवे, उतिश, बाँस, आरु, लप्सी का रुख आदि पर्दछन् । बादर, वनविरालो, ब्वासो, लोखर्के आदि वन्य जन्तुका साथै काग, कालिज,भगेंरा,परेवा आदि पंक्षीहरु यस सडक खण्ड भएर जाने वनमा पाईन्छन् । यो सडक खण्ड संरक्षित क्षेत्र वा मध्यवर्ती क्षेत्रमा पर्दैन ।

यो सडक खण्डको प्रभावित क्षेत्र भित्र चुवा, पकुवा, पिपलटारी, कटुवाचौपारी, मुडिकुवा र देविस्थान गा.वि.स.का १८ वटा प्रमुख वस्तीहरु पर्दछन् । जम्मा घरधुरी संख्या २८१२ र जनसंख्या १७६८५ रहेको छ र सरदर परिवार संख्या ६.२९ छ । यहाँ वसोवास गर्ने विभिन्न जात जातिका मानिसहरुमा मुख्य गरी बाहुन, क्षेत्री,नेवार, र दलित(दमै,कामी) पर्दछन्। यहाँका बासिन्दाहरुको मुख्य पेसा कृषि र पशुपालन हो । यातायातको राम्रो सुविधा नभएको तथा पहाडी क्षेत्र भएकोले कृषि उब्जनीले मात्र पर्याप्त नहुने हुदा यहाँका अधिकाशं मानिसहरु श्रम रोजगारीका अन्य पेशामा काम गर्ने तथा केही मानिसहरु सरकारी तथा अन्य संस्थामा काम गर्ने, थोरै मानिसहरुले व्यापार व्यवसाय गर्ने गर्दछन् । साथै जनसंख्याको उल्लेखनीय प्रतिशत मानिसहरु जीविकोपार्जनको सिलसिलामा हिउँदमा काठमाडौं,पोखरा तथा भारत लगायतका विभिन्न ठांउमा रोजगारीको लागि जाने गर्दछन् ।

प्रमुख वातावरणीय प्रभावहरू

सकारात्मक प्रभाव

आयोजना बाट तत्कालै हुने लाभमा स्थानीय स्तरमा रोजगारीको सिर्जना हुनेछ । आयोजना संचालनको लागी करिव २६५६३१ मनव दिन वरावरको अदक्ष र १९८२६ मावन दिन वरावरको दक्ष श्रमशक्तीको आवश्यकता पर्नेछ । आयोजना संग सम्वन्धित कार्यमा (रोजगारीमा) गरीव, तथा पिछडिएका स्थानीय जनताले प्राथमिकता पाउनेछन् । यस चरनमा हुने अन्य लाभहरुमा वन्द 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 वासिन्दालाई वजार, सामाजिक सेवा प्रदायक स्थान तथा देशका अन्य भागहरुसम्म पुग्न छिटो, छरितो तथा सुविधाजनक पहुँचको अवशर प्रदान गर्नेछ । सडक सुविधाको कारण मल तथा किटनाशक औषधीहरुको सस्तो तथा सुलभ आपुर्तिले कृषिको उत्पादकत्वमा अभिबृद्धि हुनेछ । यसले स्थानीय जनताको आय तथा खाद्य सुरक्षामा अभिबृद्धि हुनेछ साथै स्थानीय श्रोत साधनको उपयोग गर्ने साना कृषि उद्योगहरुको प्रवर्दन हुनेछ । पहुँच तथा यातायातको अवशर संगै शिक्षा, स्वास्थ्य, संचार, वजार, बैकिङ्ग तथा अन्य आर्थिक तथा सामाजिक क्षेत्रहरुको विकास हुनेछ । यसले यस क्षेत्रका मानिसहरुको समग्र जीवनस्तर उकास्न मद्दत पुऱ्याउनेछ । सडकको सञ्चालनले स्थानीय जग्गा जमिनको मुल्य बृद्धि गर्न सहयोग पुऱ्याइ स्थानीय जग्गाधनीलाई लाभ पुऱ्याउनेछ ।

आयोजना कार्यन्वयनबाट पर्न सक्ने नकारात्मक प्रभावहरुः

सडक निर्माणको क्रममा भिरहरु काट्दा, खन्दा निस्किएको माटो तथा गेगर थुपार्दा, निर्माण सामग्री झिक्नलाई खानी सञ्चालन गर्दा त्यस क्षेत्रको भिरालो ठाँऊहरुमा असर पर्न गई पहिरो तथा भु(क्षय हुन सक्ने सम्भावना रहन्छ । फोहर तथा खन्दा निस्किएका माटो, गेगर को उचित व्यवस्थापन हुन सकेन भने यसले भुक्षय वढाउन तथा जल प्रदुषण गराउन सक्छ । सडक निर्माणको दौरान बाटो चौडाइ ५ मी. कायम गर्नको लागी ०.३२८ हेक्टर जंगल क्षेत्र प्रयोग हुनेछ, तथा विभिन्न जातका गरी करिव २६९ वटा रुख विरुवाहरु काटिनेछन्। सडक निर्माण क्रियाकलापबाट जीवजन्तुलाई असर पर्ने तथा सडक निर्माण कार्यमा खटिएका कामदारहरुले वनका जीवजन्तुलाई जिस्क्याउने तथा तिनको शिकार गर्नसक्ने सम्भावना रहेता पनि ति न्युन हुनेछ ।

सडक निर्माण कार्यको दौरान ०.६२२ हेक्टर निजी जग्गा अधिग्रहण गर्नुपर्ने हुन्छ जसले गर्दा वार्षिक मकै तथा तरकारी वालीको उत्पादनमा असर पुग्नेछ । ४ वटा घर र १२ वटा पसलहरु RoW भित्र पर्दछन्। सडक निर्माण कार्यले १ वटा गोरेटो बाटो, सिचाई कुलो, ५ वटा विद्युतिय पोल र ४ वटा स्कूल/क्याम्पसको पर्खालमा असर पर्ने देखिन्छ । निर्माण कार्यको क्रममा श्रमिकहरु तथा स्थानीय जनतालाई स्वास्थ्य समस्या पर्न सक्छ तथा अप्रिय दुर्घटनाहरु घट्न सक्छन् ।

सडक सञ्चालनको चरणमा सवारी साधनको आवगमनबाट, वर्षायामको पानीबाट तथा स्थानीय भिरपहराहरुमा गाईवस्तु चराउदा वा रुख विरुवा काट्दा भिरपहराहरुमा अस्थिरता बढ्न गई पहिरो जान सक्छ । सडक किनाराका नाला बाट वगेको अनियन्त्रित पानीले सडक मुनिका खेतवारीमा भुक्षय 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 वजारको अव्यवस्थित विस्तार हुने सम्भावना र सडक क्षेत्र मिच्ने प्रवृति देखिन सक्छ ।

यस सडक मा पर्ने मल्याङ्गदी खोला (६+८४०) मा पूल निर्माण गर्दा ०.०४ हेक्टर जग्गा सफा गर्नुपर्ने साथै केही पाखो जग्गा अधिग्रहण गर्नुपर्ने हुन्छ । यस निर्माण कार्य ले गर्दा त्यहांका पानी मा बस्ने जीवजन्तुलाई असर पर्न सक्छ ।

प्रभाव न्यनिकरणका उपायहरुः

यस आयोजनाहरुलाई वातावरण मैत्री वनाउनका लागी सकारात्मक प्रभावलाई वढावा गर्ने तथा नकारात्मक प्रभावहरुलाई नियन्त्रण या न्युनिकरण गर्ने थुप्रै उपायहरु यस प्रतिवेदनमा प्रस्तावित गरिएको छ । जनताले राजी खुशीले वाटोको लागी दिएको वाहेक आयोजनाले गरिवीका रेखामुनि परेका परिवारहरुको अधिग्रहण गर्ने सवै जग्गाको प्रचलित मुल्य अनुसार क्षतिपुर्ति दिनेछ । सडक मानव श्रम प्रविधिमा आधारित हुनेछ तथा LEP (श्रम मुलक वातावरण मैत्री सहभागीता मुलक) का साथै ठेक्का पट्टा मार्फत निर्माण गरिने छ । आयोजनाले प्रभावित जनतालाई निर्माण कार्यमा रोजगारीमा तथा शिपमुलक तालिममा प्रथमिकता 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 श्रमिकहरुको विमा गरिने छ तथा सुरक्षाका सम्पूर्ण सामग्री श्रमिकहरुलाई प्रयोगमा ल्याउन दिइने छ । वन, जीवजन्तुको संरक्षण गर्न तथा सामाजिक अक्षुणतालाई कायम राख्न यस चरणमा जनचेतनामुलक कार्यक्रमहरु तथा तालिमहरु सञ्चालन गरिनेछ ।निर्माण कार्यको क्रममा श्रमिकहरुको विमा गरिने छ तथा सरक्षाका सम्पर्ण सामाग्री श्रमिकहरुलाई प्रयोगमा ल्याउन दिईने छ । निर्माण स्थलहरुमा प्राथमिक उपचारको सामग्रीहरुको व्यवस्था गरिने छ । काटिएका रुख विरुवाहरुको क्षति पुर्ति वापत १:२५+३०% अनुपातमा बृक्षारोपन गरिनेछ साथै निजि जग्गाको हकमा १:१ को अनुपातमा बृक्षारोपण गर्न प्रोत्सान गरिनेछ । वृक्षारोपणमा संरक्षित प्रजातिकाहरुलाई प्राथमिकता दिइनेछ । सडक सञ्चालनका क्रममा सडकमा देखिएका अस्थिरताहरुलाई नियमित रुपमा मर्मत संभार गरिनेछ । सडकमा तथा सडकको कारण नजिकैको खेतवारीमा पानी जम्मा हुन नदिन उचित निकासको व्यवस्थापन गरिनेछ । सडक दुर्घटनाबाट वचावत गर्ने उपायहरु अवलम्वन गरिनेछ । पुल संरक्षणको लागी सिभिलसंरचनाहरुका साथै बायो-इन्जिनियरिङ्ग कार्य गरीनेछ।

वातावरण व्यवस्थापन योजना

यस प्रतिवेदनमा वातावरण व्यवस्थापन योजना अन्तर्गत आयोजनावाट पर्ने संभावित असरहरु, असरहरुको प्रभाव, न्युनिकरण विधि, अनुगमन विधि तथा कार्यतालिका प्रस्तावित गरिएको छ । यसका साथै न्युनिकरणका उपायहरुको तथा अनुगमन कार्यको कार्यन्वयन गर्ने जिम्मेवार निकायहरुको पनि पहिचान गरिएको छ । अनुगमनका लागी आवश्यक भौतिक, जैविक, सामाजिक-आर्थिक तथा साँस्कृतिक वातावरणका विभिन्न अनुगमन सुचाङ्कहरुको पनि पहिचान गरिएको छ । वातावरण व्यवस्थापन योजना कार्यन्वयन गर्न निम्नानुसार खर्च हुने अनुमान गरिएको छ ।

क्र. सं.	विवरण	रकम (ने.रु.)	कैफियत्
१.	वातावरण सम्बन्धी जनचेतनामूलक तालिम तथा अन्य तालिम	२००,०००/-	आयोजनाको बजेटमा समावेश गरिने ।
२.	श्रमिकहरुको विमा	४००,०००/-	BoQ मा समावेश गरिने ।
३.	बायो-इन्जिनियरिङ्ग	२,६३९,९७६/-	BoQ मा समावेश गरिने ।
४.	पुनर्वास तथा जग्गा अधिग्रहण	६०००,०००/-	पुनर्वास योजनामा समावेश गरिने ।
५.	पुननिर्माण तथा अन्य	५००,०००/-	BoQ मा समावेश गरिने ।
६.	क्षतिपुर्ती वृक्षारोपण	१३४,५००/-	आयोजनाको बजेटमा समावेश गरिने ।
७.	एच. आई. भी. रोकथाम तथा अन्य चेतनामूलक कार्यक्रमहरु जस्तैः युवा साक्षरता, स्थानीय विद्यालय सहयोग आदि	१,२७१,८०० /-	सामाजिक योजना तथा आयोजनाको बजेटमा समावेश गरिने ।
८.	पेशागत स्वास्थ्य सुरक्षा तथा जानकारीमूलक सूचनापाटी	५५०,०००/-	BoQ मा समावेश गरिने ।
९.	अनुगमन तथा मुल्यांकन	२००,०००/	आयोजनाको बजेटमा समावेश गरिने ।
	जम्मा :	**११,८९६,२७६/-**	

निष्कर्ष

परिचान गरिएका प्रायः वातावरणीय प्रभावहरु थोरै क्षेत्रमा तथा मुख्य गरी निर्माणकार्यका वखतमा सिमित रहेको पाइएको छ । प्रस्तावित न्युनिकरण विधिको पालना गरिएमा पहिचान गरिएका वातावरणीय प्रभावहरुको न्युनिकरण अथवा नियन्त्रण गर्न सकिनेछ । सडक निर्माण गर्दा प्रभावित व्यक्तिहरुको सम्पतीको क्षतिपुर्ति गर्न पुनर्वास योजनाको आवश्यकता पर्नेछ । वातावरण व्यवस्थापन योजना अन्तर्गत उल्लेख गरिएको उपायहरुको 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 रुपमा 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 15.5 km long Dovilla-Phalebas Rural Road in Parbat District is one of the Subprojects selected under the RRRSDP. It is an existing earthen road proposed for rehabilitation in gravel standard.

Project Proponent
The proponent and executing agencies of the proposed road Subproject for Initial Environmental Examination (IEE) is District Development Committee (DDC)/District Technical Office (DTO), Parbat district. Ministry of Local Development (MoLD) is the authorized body for approving the IEE of the proposed Subproject.

Objectives
The main objective of the IEE study is to identify the impacts from the construction and operation of the proposed Subproject 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 and bridge sub-Project.

Relevancy of the Proposal and Study Methodology
The proposed Subproject will provide access to district headquarter, living in rural area of Parbat district. As a result socio-economic condition of people living in that area will enhance as local products like vegetables, milk and agricluture product 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 July/August, 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 2066/02/25 by Secretary level decision of Ministry of Local Development (MoLD).

Project Description
The proposed road links with Southern part of the remote community of Parbat district with the district headquarter. The total length of the road is 15.5Km. The road alignment is already opened and motorable. Along the alignment a bridge was constructed at 0+860 and another one at 6+840 is required to construct. The road passes six village development committees namely Chuwa, Pakuwa, Pipaltari, Katuwachaupari, Mudikuwa and Devisthan. The average width of the road will be 5 m and geometry will be improved as per design required and the length of the bridge will be finalized after detail design. The total project cost including bridge is NRs 92,547,472 and per km cost is NRs. 5,970,805.

Existing Environmental Condition
The road starts from Dovilla Chowk (Pokhara-Baglung Highway), Chuwa VDC at 797 m amsl and ends at Tutunga of Devisthan VDC at 807 m amsl. The mountain in the area comprise of mainly sedimented rock at various places. Generally, boulder mixed soil is found along the road alignment. Main water bodies found across the road alignment are Sunder Khola, Modi River, Malyngdi Khola, Buke Khola, Chinne Kholsa etc.The proposed bridge lies on the Makyangdi khola at 900 m amsl. 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 forest species found in the road alignment are *Shorea robusta* (Sal), *Alnus nepalensis* (Uttis), *Schima wallichii* (Chilaune), *(Garuga pinnata)* Dabdabe, *(Bambusa sps.)* Bamboo, *Prunus*

persica (Aru), and *Choerospondias axillaris (*Lapsi). *Macaca mulatta* (Monkey), *Felis chaus* (Jungle Cat), *Vulpes vulpes (*Fox) and *Ratufa sp. (*Squirrel) are the wild animals reported in the forests of proposed road area. Similarly birds like *Corvus splendens* (Crow), *Passer domesticus* (Sparrow), *Lophura lencomelana* (Kalij Pheasant), *Columba livia* (Pigeon) etc. are found in the project area. The road does ot fall under any protected or buffer zone area.

The alignment passes through 18 major settlements from Chuwa, Pakuwa, Pipaltari, Katuwachaupari, Mudikuwa and Devisthan VDCs. The total population of subproject area is 17685, total household is 2812 and average family size of 6.29. Diverse ethnic groups such as Bahun, Chetri, Newar and occupational caste (Damai, Kami) live along the ZoI of road alignment. Subsistence agriculture and livestock farming are the main occupation. Due to limited transportation facilities and high altitude, agriculture farming is not enough for subsistence level. Moreover, significant percentage of the economically active male population also migrates to various places including Kathmandu, Pokhara and India seasonally during slack farming season for employment.

Major Environmental Impacts

Beneficial Impacts

The immediate benefit from this road Subproject is employment opportunities. The implementation of Subproject require about 265631 person days of unskilled and 19826 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 on 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, 0.328 Ha of forest area and different type of of tree total 269 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.

During construction stage, there will be loss 0.622 Ha of agricultural land which results in annual reduction agricultural production mainly, maize and millet. 4 houses are 12 business stall are within RoW. Also 1 foot trail, irrigation canal, 5 electric poles and 4 compound walls of schools/campus could be affected during construction of road. Labours and local people are prone to health effects and accidents relating to construction activities.

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.

Due to construction of Bridge at 6+840 (Mlyangdi khola) ,there will be site clearance of about 0.04 ha. barren land.During construction period ,there may chances to impact on aquatic life of that khola.

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) as well as contracting 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 will be compensated by planting of trees in the ratio of 1:25 + 30% for the numbers of tress that need to be cut down during construction and in private land,compensatory plantation will be encouraged in the ratio of 1:1. 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.For bridge protection, construction of civil structures as well as bio engineering will be done.

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 cost for implementing environmental management plan has been identified as follows:

SN	Description	Amount (NRs.)	Remarks
1	Environmental awareness raising training and other training	200,000.00	To be included in project cost
2	Insurance of workers	400,000.00	To be included in BoQ
3	Bio-engineering	2,639,976.00	
4	Resettlement and Land Acquisition	6,000,000.00	T o be included in Resettlement plan
5	Restoration or relocation of affected infrastructures, Spoil management, Reinstate of quarry, stockpiling etc.	500,000.00	To be included in BoQ
6	Compensatory Plantation cost	134,500.00	To be included in project cost
7	Health / HIV AIDS / STD prevention awareness; other awareness program such as adult literacy'; support to local school etc.	1,271,800.00	To be included in Social plan, project cost
8	Occupational health and safety, Information signboard	550,000.00	To be included in BoQ
9	Monitoring	200,000.00	To be included in project cost
	Total	**11,896,276.00**	

Conclusion and Recommendation

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.

1. Introduction

1.1 Background

1. The Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP) focuses on immediate post conflict development priorities for accelerated poverty reduction and inclusive development, thereby enhancing the effectiveness and efficiency of the delivery of public services, and improving access of rural people to economic opportunities and social services. The Program 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). The Program covers twenty districts spread over the country. Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) under the Ministry of Local Development (MLD) is the executing agency (EA). The District Development Committees (DDCs) / District Technical Office (DTO) are the Project Implementing Agencies. The DDC/DTO are supported by District Implementation Support Team (DIST) with engineering, resettlement, environment and social mobilization responsibilities. Parbat District is one of the project districts under RRRSDP. This proposal is for rehabilitation of Dovilla-Phalebas district road in fair weather standards in Parbat District.

1.2 The Name and Address of Proponent

2.

Name of Subproject:	Rehabilitation of Dovilla-Phalebas District Road,Parbat District, Nepal
Name of Proponent:	District Development Committee, District Technical Office
Address of Proponent:	Kushma,Parbat Phone No: 067-420151

1.3 Relevancy of the proposal

3. Despite the project area being within Parbat District, it belongs to remote and underdeveloped Southern part of the valley. The area has high potential in production of vegetable, milk and agriculture product. The proposed road will enhance access to market and social services to the people of the area, and will significantly contribute in their socio-economic development. Better access will also open door to new development opportunities.

4. IEE study of the Proposal is a legal necessity according to Environment Protection Act, 1997; and Environment Protection Rule, 1997 (Amendment 2007) of GON. Similarly, an IEE study is required according to provision of Environmental Assessment Guidelines, 2003; and Safeguard Policy Statement, 2009 of ADB.

1.4 Objectives of IEE study

5. The main objective of the IEE study is to identify the impacts from the implementation and operation of the Proposal on the physical, biological, socio-economic and cultural environment of the sub-project area. The IEE study recommends practical and site specific environmental mitigation and enhancement measures, prepare and implement environmental monitoring plan and make sure that IEE is sufficient for the proposed road sub-project.

1.5 Methodology adopted

6. The IEE study has followed the provisions of the EPA, 1997 and EPR, 1997, the provisions of ADB and approved ToR for IEE Study by MoLD on 2066/02/25 BS. It follows methodology suggested in the approved Terms of Reference for IEE Study (please refer Annex I). For the collection of environmental features related to bio physical environment, maximum 100 meter distance observable from the centre of the road alignment was taken as an influence area and socio-economic and cultural environment was taken of ZoI (one and half hour walking distance from the centre line of the road)

information of the Subproject area. The IEE study has been conducted through review of secondary information collected from relevant agencies, and primary information collected from the field survey in May/June, 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, VCDs 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.

1.6 Description of the proposal

7. The proposed 15.5 km long earthen Dovilla-Phalebas road Subproject lies in the Southern part of Parbat district in Western Development Region of Nepal which links the remote area of the district to its headquarter. This road starts from Dovilla Chowk that lies in the Pokhara-Baglung Highway and in Chuwa VDC near 5 kilometer Kushma District Headquarter office, and ends at Tutunga of Devisthan VDC. In between, the road passes through Chuwa-Pakuwa-Pipaltari-Katuwachaupari-Mudikuwa-Devisthan VDCs.

8. The road was opened in 2000 and vehicles ply during dry season. The alignment requires widening, geometrical correction in bends, grade improvements and bridge at ch 6+840. The location and alignment of the road is given in **Figure 1.1 and 1.2**. The total project cost is NRs. 92,547,472 and per km cost is NRs. 5,970,805 as shown in **Annex III**.

Salient Features of the Road Subproject

1. Name of the Subproject	:	Dovilla-Phalebas Road
2. Location		
2.1Geographical Locations		
2.1.1 Start Point	:	Chuwa VDC near Kushma (District headquarter (Pokhara- Baglung Highway))
2.1.2 End Point	:	Tutunga of Devisthan VDC
2.2 Geographical Feature		
2.2.1 Terrain	:	Hill
2.2.2 Alignment	:	Upper valley
2.2.3 Altitude	:	797 m amsl at Chuwa and 807 m amsl at Tutunga
2.2.4 Climate	:	Sub-Tropical
2.2.5 Soil	:	Clay and Boulder Mixed Soil.
3. Classification of Road	:	District Road (Rural Road Class A)
4. Status of road	:	Rehabilitation proposed for all weather
5. Length of Road	:	15.5 km
6. Standard of Pavement	:	Gravelled
7. Construction Period	:	158Days
8.Traffic Forecast	:	40 vehicles per day
9. Design speed	:	20 km/hr
10. Major Settlements:		
10.1 Major Settlements	:	Dovilla, Silmi, Majgaun, Lamachaur, Badahare, DeutiBazar, Cycle chowk, Sirsuwa, MudikuwaBazar(MatedewalTole), Satbise, Serachour, Danda, Rahale bazaar, Naya Bazar, Chandantar, Satkuriya, Choubisekuriya, Tutunga.
10.2 No. of Household	:	2812 HHs
10.3 VDCs along the Road	:	Chuwa-Pakuwa-Pipaltari-Katuwachaupari-Mudikuwa- Devisthan
11. Cross Section		
11.1 Right of way	:	5m each side (center line)
11.2 Formation width	:	5 m
11.3 Carriageway width	:	3m
11.4 Lane	:	Single
12. Structures		
12.1 Retaining Structures		
12.1.1 Dry Stone Massonary	:	517.938 Cum.
12.1.2 Gabion Wall	:	440 Nos (1 X 1X 1.5) 290 Nos (1 X 1 X 2)
12.1.3 Stone Pitching	:	10875 Cum.

13. Bio-Engineering	:	3% to total cost (NRs.2,639,976)
14. Earth Work		
14.1 Cutting	:	36253.53 Cum
14.2 Filling	:	9042.68 Cum
15. Cross drainage work		
15.1 RCC Bridge	:	1 Nos (25 m sigle span)
16. Pavement Work		
16.1 Subgrade preparation work	:	77,500.00 Sqm
16.2 15 cm thick gravel work as sub Base coarse	:	66,375.00 Cum
16. Project cost (Including Bridge)		
15.1 Total Cost (NRs)	:	NRs 92,547,472
15.2 Costs per km (NRs.)	:	NRs 5,970,805
17. Employment generartion:		
16.1 Total employment	:	285457 (person days) +52741(In Bridge)
16.1.1 Skilled	:	19826+10500(In Bridge)
16.1.2 Unskilled	:	265631+42241(In Bridge)

1.7 Construction Approach and Activities

9. The construction approach will be Labour-based, Environment-friendly and Participatory (LEP) approach and Machine Intensive Road Construction 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. Machine Intensive Road Construction Approach will be used in 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 and Side drain works.

1.8 Proposed Schedule for Implementation of Sub-project

10, following table shows the proposed implementation schedule for Dovilla-Phalebas road sub-project:

Table 1.1: Sub-project implementation schedule

SN	Activity	2008	2009				2010				2011	
		IV	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 - July, February, March
II - April, May, June
III - July, August, September
IV - October, November, December

Figure 1.1 Map of Nepal showing Parbat District

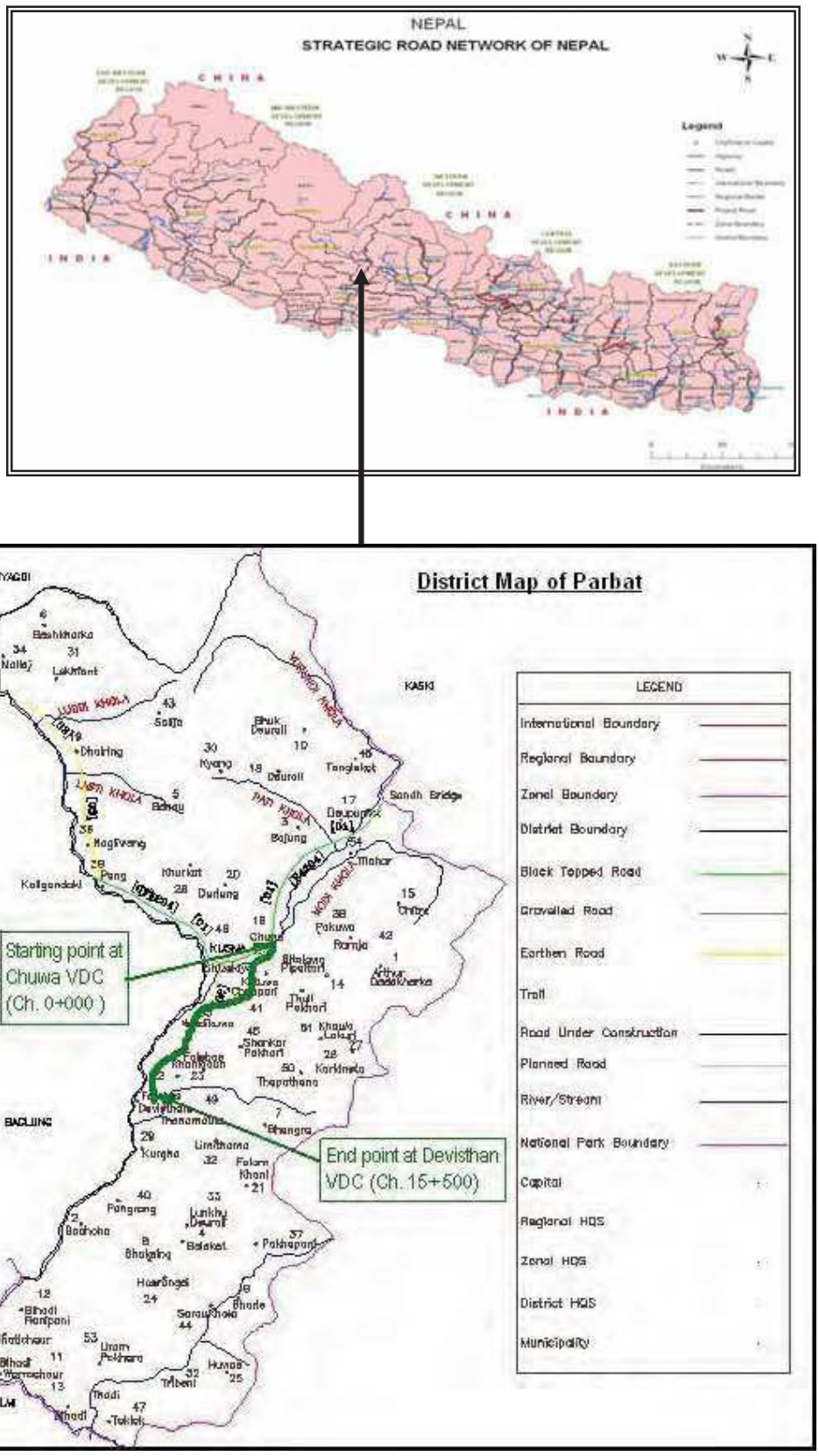
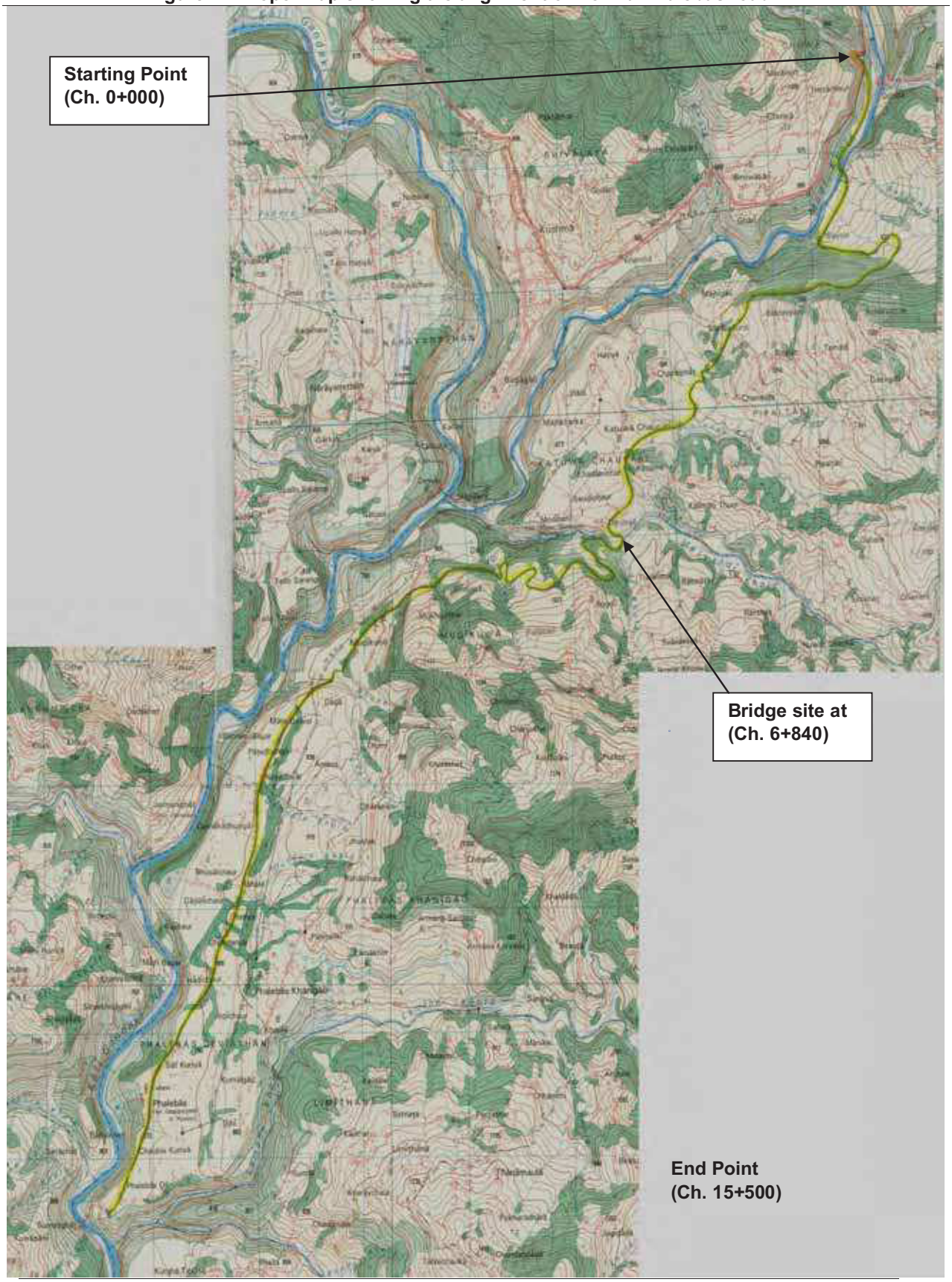


Figure 1.2. Topo. Map showing the alignment of Dovilla-Phalebas road



2. Public Consultation and Information Disclosure

2.1 Public Consultation

11. 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 **Shravan 10,2066** in the Naya Patrika, a national daily newspaper (**see Annex 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 **Annex VI** for deed of inquiry and **Annex VII** for the names of organizations).
- IEE team also carried out interaction with local communities and related stakeholders like District Forest Office, District Soil Conservation Office, District Agricultural Development Office and others during field survey to collect the public concerns and suggestions (see **Annex VIII** for the list of persons consulted). Moreover, Focus Group Discussions were conducted to collect and solicit information regarding the bio-physical and socio-economic and cultural aspects of the road. Summary of minutes of meeting with local people is given in **Annex IX** and following **Table 2.1**. The FGDs were held at different 6 major settlements along the ZoI of the road and the results of FGD are mentioned in chapter 4. Existing environmental conditions and socio-economic data are tabulated in **Annex XI a, b, c and d**.
- Draft IEE report will be sent to Chuwa, Pakuwa, Pipaltari, Katuwachoupari, Mudikuwa and Devisthan VDC for Public disclosure. Recommendation letters were also obtained from above mentioned VDCs as given in **Annex X**. A copy of draft IEE will also be kept in information center of DDC, Parbat for Public disclosure. 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 MLD and ADB.

Table 2.1: Summary of FGD Meeting

Location	Date	No. of Participants		Decision
		Male	Female	
Dovilla	13 Aug, 09	12	3	1. FGD program disseminated information on the project. 2. Participants committed on providing land voluntarily for the road. 3. Cash compensation should be provided for land and crop, free distribution of seedlings for private planting, good drainage system, and protection of water sources. 4. Project work should be careful to protect environment.
Cycle chowk	18 Aug, 09	8	1	
Mudikuwa	19 Aug, 09	13	2	
Rahale	21 Aug, 09	11	5	
Naya bazaar	24 Aug, 09	16	4	
Tutunga	01 Aug, 07	19	2	

2.2 Information Disclosure

12. Draft IEE was kept at information center of DDC Parbat for public disclosure. Information was also disseminated through person to person contacts and interviews and group discussions. However, available institutions at the local level were informed through notice distribution or pasting at concerned VDCs, school, health posts and public places within the road alignment corridors. The approved IEE report will be accessible to interested parties and general public through websites of ADB, DoLIDAR and RRRSDP. Following offices will get the IEE report:

1. District Development Committee, Parbat
2. District Technical Office, Parbat
3. District Project Office,Parbat
4. District Implementation Support Team, Parbat
5. Chuwa,Pakuwa,Pipaltari,Katuwachoupari,Mudikuwa and Devisthan 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

3. Review of Relevant Acts, Regulations and Guidelines

13. The IEE study has followed the provisions of following acts, regulations and guidelines of Government of Nepal and ADB to ensure development and conservation of environment.

Table 3.1: Review of Environmental Acts, Regulations and Guidelines

SN	Environmental Acts, Regulations and Guidelines	Description of Requirements
1	Three Years Interim Plan, 2007/08-2009/10, GoN	Requires all projects will be formulated and constructed based on methods that optimally utilize the local skill and resources and generate employment opportunities.
2	Environmental Protection Act, 1997, 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.
3	Environmental Protection Rule 1997 (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 and IEE study.
4	Forest Act, 1993 (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.
5	Forest Rules, 1995, GoN	Elaborates legal measures for the conservation of forests and wildlife. Expenses incurred for cutting trees and transportation shall be borne by proponent.
6	*Batabaraniya Nirdesika* (Nepal; MLD), 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	National Park and Wildlife Conservation Act, 1973, 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.
8	Local Self Governance Act (1999) and Regulation (1999), GoN	Empowers the local bodies for the conservation of soil, forest and other natural resources and implements environmental conservation activities
9	Land Acquisition Act, 1977 and Land Acquisition Rules, 1969, GoN	Specifies procedural matters on land acquisition and compensation
10	National Environmental Impact Assessment Guidelines, 1993, 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.
11	APPROACH for the Development of Agricultural and Rural Roads, 1999, GoN	Emphasizes labor based technology and environmental friendly, local resource oriented construction methods to be incorporated actively in rural infrastructure process.
12	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.
13	Reference Manual for Environmental and Social Aspects of Integrated Road Development, 2003, GoN	Suggests stepwise process of addressing environmental and social issues alongside the technical, financial and others
14	Green Roads in Nepal, Best Practices Report: An Innovative Approach for Rural Infrastructure Development in the Himalayas and Other Mountainous Regions, 1999, GoN	Focuses on participatory, labor based and environment friendly technology with proper alignment selection, mass balancing, proper water management, bioengineering and phased construction
15	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
16	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.
17	The Interim Constitution of Nepal, 2063 (2007).	Has provision of right regarding environment - Every person shall have the right to live in clean environment.
18	The Labor Act, 1992	Regulates the working environment and deals with occupational health and safety.

4. Existing Environmental Condition

14. Baseline information on the existing physical, biological as well as socio-economic and cultural environment of the proposed Subproject is described in this chapter.

4.1 Physical Environment

15. This section describes the physical condition of the area that comes under the ZoI of the road section.

4.1.1 Topography

16. The proposed road alignment starts from Dovilla Chowk (Pokhara-Baglung Highway), Chuwa VDC and forwarded to South to Tutunga of Devisthan VDC facing west slope. As the altitude of the project area varies from 797 m amsl to 807 m amsl, the climate of the project area are same for the road alignment.

17. The proposed 25 m single span bridge at ch. 6+840 located in Ktuwachoupari VDC and the nature of ground slope seems steep nature. The altitude of bridge site is 900m amsl **.**

4.1.2 Geology and Soil Type

18. The road section comprises of sedimented highly wethered types of rocks. Generally, Boulder mixed soil is found along the road alignment. The bridge section comprises of sedimented type of bed and generally boulder mixed soil is found along the bridge alignment. Following **Table 4.1** presents the geological features observed along the road alignment.

Table 4.1 Geological features along the road alignment

Chainage	Location	Terrain slope	State of Land dry/wet	Land Use Pattern	Geological Problem
0+000 - 0+860 Km	Chuwa	Moderate	Moist	Baren/ Cultivated	Gully erosion
0+860 - 2+000 km	Pakuwa	Steep	Moist	Cultivated	Gully erosion
2+000 - 3+500 km	Pipaltari	Moderate	Moist	Forest+Cultivated+ Setellement	Small Scale landslide
3+500 - 6+800 km	Katuwachoupari	Moderate	Dry	Cultivated+ Setellement	Cultivated
6+800 - 10+500 km	Mudikuwa	Moderate	Dry	Forest+Cultivated+ Setellement	Cultivated
10+500-15+500	Devisthan	Moderate	Dry	Cultivated+ Setellement	Cultivated

Source: Field survey, July/August, 2009

4.1.3 Climate

19. The road lies in the Subtropical climatic region. Generally, rainy season starts from June and ends in September. The meteorological record shows unevenly distributed monsoon rain in the project area with the total average annual rainfall of 2500 mm. Average minimum temperature of 7.5° C and average maximum temperature of 32.3°C is observed in the area.

4.1.4 Hydrology and Drainage System

20. The main river in the project area is Modi River and Mlyangdi Khola. The proposed 25 m single span bridge is proposed at 6+840(Malyangdi Khola).The proposed bridge for Malyangdi khola have more discharge only during rainy seasons due to surface runoff and in dry sesons it has only about 300 ltr/sec.The summary of the cross drainage works along the road alignment is given in **Annex XIV.**

4.1.5 Soil Erosion and Sedimentation

21. The stability of slopes along the road corridor depends upon slope angle, the material constituting the slope; rock discontinuities and hydrological conditions. Proposed alignment does not pass through major landslides or erosion prone area. There is approximately 30*10m landslide near the chainage 2+700.

4.1.6 Existing Road Condition

22. The maximum and the minimum gradient along the road alignment is 12% and 1% respectively. The whole length of the road alignment is motor-able. The width of the road alignment in average is about 4m. The road is operable only during dry season.Bridge at ch.6+840 is proposed to upgrade as all weather road.

4.1.7 Existing Traffic Situation

23. Four regular passenger buses ply on the road whereas number of mini truck/pick up are 15 and number of motorcycles are around 40 in winter season. In rainy season, no. of vehicles operating in this road reduces by half.

4.1.8 Land Use

24. Land use pattern of the area through which the road passes through, settellement area, cultivated land, forest and barren as shown in **Annex IX.**About 0.04 ha of barren land will be cleared (Site clearance) during bridge construction.

4.1.9 Air, Noise and Water Quality

25. The air, noise and water quality are not tested, but are observed to be within acceptable limit. Dust emission during vehicle operation has become common phenomena in the existing road and it is more significant during dry and winter season.

4.2 Biological Environment

26. This alignment does not pass through any protected area.

4.2.1 Vegetation

27. The dominant forest and fodder species reported in the road alignment are (*Alnus nepalensis)* Uttis, (*Schima wallichii)* Chilaune*, (Bambusa sps.)* Bamboo, *(Prunus persica)* Aru, *(Shorea robusta)* Sal, *(Garuga pinnata)* Dabdabe and *(Choerospondias axillaris)* Lapsi.The forest is sparse with dominant species such as Uttis, Chilaune and Lapsi. NTFPs are not found along the road alignment and bridge area.The dominant vegetation in the bridge project area mainly Uttis and Chilaune. *(Shorea robusta)* Sal is listed as protected plant species and forest products by Forest Act 1993 which is categorized into timber trees banned for felling, transportation and export for commercial purposes. *(Choerospondias axillaris)* Lapsi is listed as Rare Species in IUCN Red Data Book.

28. The road alignment passes through government forest in different locations. In total 0.328 ha forest areas will be lost due to the construction of this road. Total number of trees to be removed is 269.

4.2.2 Wildlife

29. *Macaca mulatta* (Monkey), *Felis chaus* (Jungle Cat), *Vulpes vulpes (*Fox) and *Ratufa sp.* (Squirrel) are the wild animals reported in the forests of proposed road area. Similarly birds like *Corvus splendens* (Crow), *Passer domesticus* (Sparrow), *Lophura lencomelana* (Kalij Pheasant), *Columba livia* (Pigeon) etc. are found in the project area. *Ratufa sp.* (Squirrel) is listed in CITES Appendix II.

4.2.3 Aquatic Life

30. Fish species found in water bodies along the road alignment are Asala (*Schizothorax plagiostomus*), Katle (*Accrocheilus spp.*), Hile, Gandyaula, and Buduna. These fish species are mainly found in Modi Khola and Malyangdi Khola area are Hile, and Buduna.

4.3 Socio-economic and Cultural Environment

4.3.1 Population, Household and Ethnicity

31. The alignment covers Six VDCs namely: Chuwa, Pakuwa, Pipaltari, Katuwachopari, Mudikuwa and Devisthan. Major settlements within ZoI of the project are Dovilla, Silmi, Majgaun, Lamachaur, Badahare, DeutiBazar, CycleChock, Sirsuwa, MudikuwaBazar (MatedewalTole), Satbise, Danda, SeraChour, RahaleBazaar, Kamale bazaar (NayaBazar), Chandantar, Satkuriya, Choubiskuriya, and Tutunga. Major castes in the area are Brahman, Chhetri, Newar and Dalit. Major occupations include agriculture, business, livestock and services.

4.3.2 Main Occupation

32. The main occupation of all people residing within the ZoI of the proposed road alignment is agriculture and livestock (53%). However, agriculture farming is not enough for subsistence level due to

small landholding size and lack of irrigation facilities. Therefore people are carrying out other economic activities like labour for different works. There are not any dependent fisher people on the Malyangdi khola.

4.3.3 Market Centres and Business Facilities

33. Major settlements along the road alignment are Dovilla, Silmi, Majgaun, Lamachaur, Badhare, DeutiBazar, CycleChock, Sirsuwa, MudikuwaBazar (MatedewalTole), Satbise, Danda, SeraChour, RahaleBazaar, Kamale bazaar (NayaBazar), Chandantar, Satkuriya, Choubiskuriya, and Tutunga. There are grocery shops and tea stalls available in the almost all settlements. Cycle chowk, Naya Bazaar, Rahale bazar and Tutunga Bazaar have also some hotels and restaurants. Necessity of sewerage/drainage system has been felt in these places. Other smaller market centres with shops of daily commodities are also found along the road alignment.

4.3.4 Local Economy

34. The economy of the area is predominantly agriculture based some are harvesting forest products such as uttis for timber. Local people are gradually attracted towards cultivation of cash crops such as Orange, ginger, and lapsi. Dairy production and selling it to the local market has been also another source of income for local farmers. Over 53 percent populations base upon agricultural activities for their livelihood. With growing closeness of the project area with Pokhara city, Kushma, Baglung due to transportation facility, cultivation of fruits, vegetables in a commercial scale seems to gain momentum. Diversity in employment pattern has been also observed in recent years. Local people have increasingly engaged in business activities in Cycle chowk, Mudikuwa Bazar, Naya bazaar (Kamale bazaar) and Tutunga area. Many people seasonally migrate to Pokhara, Kathmandu and even different parts of India to earn some money for their livelihood.

4.3.5 Agriculture Pattern

35. Major crops that are cultivated in the project area are rice, wheat, maize, millet, potato and beans. Local peoples are also found to be encouraged in cash crops in recent days. Major cash crops that are grown in the project area are mustard, vegetables and agriculture product. The area has appropriate climate and soil for farming of citrus type of fruits such as orange, lemon, *and nibuwa.*

4.3.6 Livestock

36. Due to availability of good number of fodder trees, the project area has also immense potentiality of cow and buffalo farming for dairy and goat farming for meat.

4.3.7 Industry

37. Some local people are engaged in weaving of bamboo products, making of furniture, dairy production, and tailoring. The area has the potentiality of agro-based industries such as dairy, food processing as well as furniture, bamboo products.

4.3.8 Trade and Commerce

38. Goods of daily commodities are major imports in the project area, which includes salt, sugar, packed food items, spices, clothes and other items of daily uses. Similarly, major items exported from the project area are milk, lapsi, vegetables, fruits (mainly Orange), furnitures and bamboo products.

4.3.9 Tourism Related Services

39. Some small hotel, lodges are in operation in Cycle chowk, Mudikuwa Bazar, Naya bazaar (kamala bazaar) and Tutunga. Since the ZoI of the project and its surrounding area has potentiality of various types of tourism promotion, more lodge, restaurant and resorts are expected to be established in the area.

4.3.10 Health and Sanitation

40. Major health problems observed in the area are gastric, water borne diseases, gout, respiratory diseases, skin, malnutrition, typhoid etc. Sanitation awareness among local people is increasing and many of them have toilets in their home, but there is no public sewerage system. No major sanitation problem seems in settlement area.

4.3.10 Public Services and Infrastructures

Education: The proposed project area consists of a total of 30 educational institutions ranging from primary level to college level educational institutions. There is a higher secondary school in Mudikuwa settlement, Tutunga settlement. Most of the families send their children to school. Female enrollment in

schools is lower than that of male students. Literacy rate in the project area has been estimated around 57.56 percent.

***Health Facility*:** There are altogether 7 health posts/sub health posts in various settlements and one Ayurbedic community centre is also found in Rahale bazaar.

***Communication*:** All of the settlements have telephone facilities mostly with CDMA connection. Six post offices have been serving the local people.

***Transportation*:** Public bus service is available. Tippers generally carry vegetables, milk and other local products from the area.

***Electricity*:** Almost all settlements in ZoI are connected with national grid transmission line.

***Water Supply*:** Piped drinking water supply is available to all settlements.

***Irrigation*:** There is irrigation canal (kulo) at the upper part of malyangdi Khola (ch.6+850 to 6+920) and water pipe lines for irrigation propose at Ch 8+640 to 6+780 lie within formation width .

***Other Infrastructures/services*:** There is a Suspended Bridge at ch 6+770, Agricultural Service Sub-Centre and Veterinary Service Sub Centre are also available in the project area.

***Industries*:** Cottage and other industries are not well developed within the ZoI. There are some rice and flour mill in various settlements. Many people have skills mainly of weaving bamboo baskets, Tailoring etc.and these skills can be commercialized to increase there income.

***Financial Institutions*:** There is a Nepal Bank Ltd, Rastriya Banijya Bank, Everest Bank and Kasthmandap Development Bank in Parbat.

***Community Development Facilities/Organizations*:** Several community centers, community based organizations, youth clubs, women's group, NGOs and water/forest users groups are also active in ZoI of the project.

41. Following Public Services and Infrastructures are affected during road construction.

Table 4.2: Affected Public Services and Infrastructures During Road Construction

Type of Public Service and Infrastructure	Chainage/ Location	Distance from the Road	Remarks
Foot trail	2+850	Adjacent	May damaged during road construction
Suspended Bridge	6+770	Within RoW	Not affected
Pipe Lines(for irrigation)	6+955 to 7+010	Adjacent	May damaged during
Electric Poles	11+200,11+700,12+200,12+700,13+200	Within formation width	Need to be relocated
Tap Stand	10+840	Within RoW	Not affected
Eye Ball Boarding School	5+140	Within RoW	Not affected
Gayatri Primary School	5+300	Adjacent	Compound wall will be affected
Sarbajenik Lower Secondary	5+940	Adjacent	Compound wall will be affected
Matedewal Secondary school	10+024	Within RoW	Compound wall will be affected
Sunrise Boarding School	11+030	Within RoW	Not affected
Parbat Multiple Campus(PMC)	15+040	Adjacent	Compound wall will be affected
Janata Higher Secondary school	15+160	Within RoW	Not affected

Source: Field Survey, July/August, 2009

4.3.11 Land Holding Pattern

42. Land holding pattern within the ZoI of the road project demonstrates that most of the population have 1-5 ropani (approximately 1 ha = 19.8 ropani) land while very few households fall under 5-10 ropani land holding category. No households are landless and few HHs have less than one ropani land. Details about land holding pattern are given in the **Annex XI c.**

4.3.12 Food Security

43. About 60% of the households have enough food for only for three to nine months. On the contrary, 23 percent of the households of the project area have food sufficiency for whole year, 4 percent households are of hand to mouth existence category and 7 percent households are reported as food surplus ones. Food sufficiency condition is given in **Annex XI d.**

4.3.13 Migration Pattern

44. Permanent migration takes place in limited scale towards Kushma, Baglung, Pokhara, and Kathmandu. Similalry, seasonal migration also takes place during slack farming season from Mangsir to Poush mainly in Pokhara, Kathmandu and various parts of India.

4.3.14 Settlement Pattern

45. Most of the settlements within ZoI of the project are scattered type. Housing pattern of these settlements are mostly one or two storied, CGI sheet roofed buildings. Some of them are also thatch roofed buildings. RCC buildings have been started to appear in market centres such as Cycle chowk, Mudikuwa, Naya bazar, Rahale bazaar and Tutunga Bazaar.

4.3.15 Potential for Development

46. 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 in **Table 4.3** below.

Table 4.3: Development Potentialities in Various Sectors

SN	Sector	Devlopment potentiality
1	Agriculture	Potato, vegetable farming, timber (uttis) production, dairy production within the whole ZoI
2	Tourism Promotion	There are many places along the alignment in which the tourisim activities can be enhanced such as in Cycle chowk, Mudikuwa and Tutunga Settlements.
3	Small and Cottage Industry	Bamboo products, furniture, dairy industry within the whole ZoI
3	Trade and business	Development several rural market centres at various places along the road alignment and main market centres at Cycle chowk, Naya bazar, Rahale bazaar, Mudikuwa and Tutunga Bazaar.

Source: Field Survey, July/August, 2009

4.3. 16 Religious, Cultural and Historical Sites

47. There are no Religious, Cultural and Historical Sites along the road alignment.

5. Project Alternatives

48. Assessment on alternatives of the Subproject is discussed as in the following subsections.

5.1 No Action Option

49. 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 dairy, vegetable and coffee 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

50. Construction of ropeway, airport and road could be the options for achieving the transportation and access.

51. Ropeway can be a mode of transportation to enhance accessibility of the people within ZoI. The ropeway primarily serves to transport goods and it normally does not provide facilities for human mobility except it is built with cable car facilities, is very costly. In the current power crisis situation in Nepal, cable car cannot be operated efficiently. Also, it does not connect and serve the settlements along the alignment. Hence this alternative is not feasible.

52. Air distance to project area from Pokhara is very short and thus air connection is not feasible.

53. Considering other project alternatives, the proposed road project can be the best option to serve the purpose of efficient transportation requirement.

5.3 Alternative Alignment

54. The alignment of the Dovilla-Phalebas road is an existing motor able earthen road. This road is in operation as a fair weather road and since this is the existing 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 feasible and the proposed road can be the best option.

5.4 Alternative Design and Construction Approach

55. There are two types of road design and construction methods: Conventional and green road approach. In conventional method, heavy machineries and equipment, use of explosives, heavy concrete structures with the side drains, bridges and culverts etc. are extensively involved.Green road approach which is normally referred as a labour based, environment friendly and participatory (LEP) method focuses to conserve the delicate mountain ecology through the protection of vegetation cover and least disturbance to the local geology as means of soil conservation. Under this approach, construction work is done manually from the local labour without using heavy machinery and explosives. Spoil disposal is minimized through balance in cutting and filling. Simple dry stone walls and stone causeways will be used. Preservation of vegetation cover is maintained through application of re-vegetation and stabilization of slopes by bio-engineering.

56. The proposed road has been designed considering the both LEP and contractor approach. The construction work will not be carried by only using the labours but equipment and machineries will also be used where manual work is not possible.

5.5 Alternative Schedule and Process

57. 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

58. 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 other locations. The proposed construction will optimally use the local labour force and local materials.

6. Identification of Impacts and Benefit Augmentation/Mitigation Measures

59. 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. Several such impacts have been identified based on site observation, field survey, and information obtained from the stakeholders and few were identified on value judgment. Impacts from the proposed road sub-project can be both beneficial as well as adverse. 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 phase are presented in the following sub-sections.

60. An effective implementation of benefit maximization measures and adverse impacts mitigation measures are also suggested hereunder. (See also **Table 7.2**).

6.1 Mitigation Measures During Pre-construction phase

6.1.1 Detailed Survey and Design

61. 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 this program. Bio-engineering technique will be applied for stabilization of slopes. 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. These changes will be incorporated into the subproject detail design.

6.1.2 Land and Property Acquisition, Compensation and Resettlement

62. 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.

63. 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

6. 2.1 Construction Stage

Employment Generation and Increase in Income

64. Impacts: One of the major direct beneficial impacts of the road during construction stage is the creation of employment opportunity to the local community. Total employment during construction of this road alignment is 285457 person days in which 19826 person days as skilled and 265631 person days as unskilled. During the construction of bridge further 10500 skilled and 42241 unskilled employments will be generated. The amount of money that is earned by the wages will directly enhance various economic activities and enterprise development with multiplier effect.

65. This is one of the direct and significant impacts of the project but it is of short-term and local in nature.

66. Measures: Benefit augmentation measures will be implementing the work as much as possible through the local Road Building Groups (RBGs) the local people particularly poor; dalit (occupational caste), ethnic minority and women will be given priority for employment. They will be given training to do the job. To utilize their money earned from the project works, RRRSDP will implement life skill training for income generation activities.

Skill Enhancement

67. Impacts: Although many people in the project area are unskilled at present, the construction of road is likely to enhance their skills in construction, and large number of people will get practical or hands on training. Furthermore, the project will also organize training on road construction and maintenance to the Road Building Groups (RBGs), Social mobilizers and supervisors. This will enhance the technical skills of local people. The skill and knowledge acquired from the project during construction will enhance employment opportunities of such manpower who can earn livelihoods from similar project in future. This impact is indirect, medium, local and long-term in nature.

68. Measures: Road Building group members will be given on the job training on masonry, gabion wires, construction of dry and foundation walls, slope cutting and stabilization, bioengineering works.

Enterprise Development and Business Promotion

69. Impacts: During construction period, different types of commercial activities will come into operation. Local shops and restaurant will be opened to meet these demands around Cycle chowk, Naya bazar, Rahale bazaar, Mudikuwa and Tutunga Bazaar of the construction sites. Since they will have good purchasing power, they will regularly demand for different types of food, beverage and other daily necessary items. To meet these demands, many local and outside people may operate a number of small shops and restaurants around the vicinity of the construction sites. Various farm based enterprises including wide range of agricultural and livestock products will also gain momentum as a result of increased demand by labors during construction period. This will increase local trade and business in the area. This impact is also direct, low significance, local and short terms in nature.

70. Measures: Providing support to local entrepreneurs, promotion of cooperatives and linkage with bank and other financial institutions.

Community Empowerment and Ownership

71. Impacts: During construction period, various road construction coordination committees and road building groups will be constituted in order to proceed and implement the road construction activities. In this process, they will be oriented and trained to build and safeguard community infrastructures which will result in community empowerment and feeling of ownership among them. This impact is also indirect, low, local and short terms in nature.

Measures: Various coordination committees will be constituted and training will be given to them.

6.2.2 Operation Stage

Improvement in Accessibility and Saving of Time and Transportation Cost

72. Impacts: Once the road project is completed, the people living within the road corridor will have easy access to cities and markets. This will enhance the transaction of goods and access to social services. Access to input and services will increase, which will be cheaper due to transportation facility.

73. Once the bridge is completed, it makes all weather road and makes easier access for both the people and vehical

74. Measures: Regular maintenance of the road will be done by the Proponent.

Increase in Trade, Commerce and Development of Market centers

75. Impact: There is a possibility of increased economic opportunities and significant growth and extension of the minor local markets along the road like in Cycle chowk, Naya bazaar, Rahale bazaar, Mudikuwa, Tutunga and others. The farmers will be more interested to increase agricultural production and dairy products 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.

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

Appreciation of Land Value

77. Impacts: The construction of road leads to appreciation of land values particularly near the market and settlement areas. Mainly the land value will increase in Cycle chowk, Naya bazar, Rahale bazaar, Mudikuwa and Tutunga Bazaar. The land price would increase due to the availability of reliable transportation facilities. This would uplift the economic condition of the local people. The impact is indirect, medium, local and long term in nature.

78. 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 for them to start their own economic/social ventures.

Increased Crop Productivity and Sale of Farm Products

79. Impacts: Due to easy and cheaper availability of agricultural inputs and technologies, productivity will be increased along the road. Sale of farm and livestock products will be increased in the settlements along the road corridor like Cycle chowk, Sirsuwa, Naya bazaar, Rahale bazaar, Mudikuwa, Choubise kuriya, Tutunga settlements, which are potential areas for the production of vegetables, fruits and cash crops such as ginger, Orange, Vegetables etc. Operation of road will further commercialize the subsistence agriculture of rural area. The economy of rural area will be further monetized and it will help the rural economy. This is the indirect, significant, local and long term impacts from the proposed road.

80. Measures: Promotion of market linkages and networking for better market price.

Enhancement of Community Development Services

81. Impacts: Due to increase in employment opportunities, trade, business and income, it is expected that there will be improvement in social service such as education, health, government offices, saving and credits. The improvement can also be expected 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 the number of employees in government/non government services. This is direct, significant, local and long-term impact of the proposed project.

82. Measures: The access will be kept maintained so that other development and services will follow in the project area.

Women and Indigenous People Empowerment

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

84. Measures: During the road construction and rehabilitation, more emphasis will be given to women, dalit and vulnerable workers. At least 50% workers will be women.

6. 3 Adverse Impacts and Mitigation Measures

6. 3.1 Construction Stage

85. The proposed road will be constructed according to LEP where manual works are possible; and contractor's approach where the work cannot be done manually.The bridge will be constructed through Machine Intensive Construction Approach. The likely impacts on physical, biological, socio-economic and cultural resources of the proposed road area and respective mitigation measures are presented here under.

Physical Impacts

Change in Land Use

86. Impacts: 0.622 ha. of cultivated land, 0.11 ha.of barren land, 0.382 ha.of forest and 0.355 ha.of settlement areas will be permanently lost during construction and 0.04 ha of barren land needs to clear

during bridge construction. This may reduce product of agricultural product annually. The impact from changes in land use will be high, direct, local and for long term.

87. Measures: The mitigation measures will be compensatory. Proponent will assist the farmers in coordination with district agriculture office for better agriculture extension services. planting of trees in the ratio of 1:25 + 30% for the numbers of tress that need to be cut down during construction and in private land,compensatory plantation will be encouraged in the ratio of 1:1. Local timber, fruit and fodder plants shall be given emphasis.

Spoil Disposal

88. Impacts: The common likely problems from the inappropriate disposal of spoils are: gullying 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.

89. Measures: Spoils will be safely disposed and managed with minimum environmental damage which includes balanced cut and fill volume, re-use of excavated materials and minimum quantity of earth works. The following mitigation measures will be adopted:

- Wherever possible, surplus spoil will be used to fill eroded gullies, quarries and depressed areas.
- Excess spoils will be disposed in specified tipping sites (See table 6.1) in a controlled manner.
- Spoils will not be disposed on fragile slopes, farmland, marshy land, forest areas, natural drainage path, canals and other infrastructures.
- After the disposal, the site will be provided with proper drainage, vegetation and adequate protection against erosion (bio-engineering, Turfing etc.)
- Necessary toe walls and retaining walls will be provided to protect the disposal of soil on downhill slopes.

Table 6.1 Safe Spoil Disposal Site

SN	Chainages	Recommended Spoil disposal sites
1	0+250	Disposal site at lower side of the road(Barren Land)
2	2+150	Disposal site at lower side of the road(Forest land)
3	5+300	Chine Kholsa(Provide pipe culvert for cross drainage
4	6+500	Near Malyangdi River(structure provide)
5	6+850	For filling area(structure provide)
6	13+380	Both side of Dandure Kholsi(Devisthan,ward no:9)(Provide pipe culvert for cross drainage

Source: Field Survey July/August, 2009

Slope Instability

90. Impacts: Removal of vegetation and open cuts with exposed soil to rain may cause soil erosion as well as landslide. The road is an existing corridor, and thus the hill slopes will not be disturbed by making large and steep cuttings. Major instability areas are also not present along the road alignment except for the one at 2+700. The likely impact of slope instability and soil erosion is indirect, medium, site specific and mid-term nature.

91. The following mitigation measures will be adopted during construction:

- Ensuring minimum cut slope
- Selecting cut and fill slope at correct angle depending upon the soil type
- Adoption of bio-engineering techniques
- Ensuring minimum damage of vegetation during construction
- No construction work during rainy season
- Mass balancing in cut and fill
- Use of toe wall before disposing spoils on hill slopes
- Use of check dams, drainage management.
- For slope stability at 2+700 provide retaining structure (Gabion Wall) and bio-engineering works
- For protection of bridge embankment, Gabion structures and Bioengineering measures(Grass plantation,Brush layering and tree plantation is proposed.
- At down stream of the bridge site, Lunching apron is proposed for the protection of scouring.

92. Recommended engineering structures necessary at various chainages for slope stabilization have been given in **Annex XVI**

Water Management

93. Impacts: The concentrated water from the road outlet causes erosion and landslide eventually affecting the stability of the road itself. The impact will be indirect, medium, site specific and medium term.

94. Measures: Roads usually generate large volumes of concentrated surface runoff. The concentrated water flowing through the road and from the outlets cause erosion and landslides, eventually affecting the stability of the road itself, in order to avoid this, the following mitigation measures are suggested:

- Provide adequate and appropriate numbers of drainage structures in order to have minimum interference with and impact on natural drainage pattern of the area,
- Avoid surface water discharge into farmland or risky locations,
- Do not divert water away from natural water course unless it is absolutely necessary
- Avoid blockage or diversion of natural channels due to construction of road and disposal of spoils.
- Outward road slope as per green road standard to minimize water accumulation.
- River flow do not affect by construction of Bridge

95. Details about necessary structures required to mitigate the water induced adverse impacts are as given in **Annex XIV.**

Air Dust, Noise and Water Pollution

96. Impacts: Although the air quality of the project area is not measured, the air does not appear to be polluted. During the construction of the road, there is a strong possibility of dust emission. This may affect the local people and workers, agricultural crops, markets, schools and health posts. Contractor may use heavy equipment during surfacing works, which might be source of dust nuisance. Impact on air quality will be direct, low, local and short term in nature. The 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.

97. The water quality data within the project area is not tested. Nevertheless the quality of water in the water bodies, within the project area appears to be fairly good, as they are widely utilized households for drinking. During construction these water bodies may be polluted by spoil and construction wastes. The impact will be direct, low, local, short term and reversible in nature.

98. Measures: The following mitigation measures will be adopted:

- Use of face mask by the workers working in the areas of high dust generation
- Contractor will frequently sprinkle water during surfacing of the road.
- Use of ear muffles, helmet to lessen noise pollution during rock breaking and quarrying and bridge works.
- Avoiding the disposal of excavated materials in the water bodies

Quarry Operation

99. Impacts: The extraction of materials from inappropriate places or in excessive amount can damage the local environment. The potential adverse impacts of quarrying are accelerated erosion, landslides, disturbance in natural drainage patterns, water logging and 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.

100. Measures: Following mitigation measures will be adopted:

- Appropriate planning for quarry and borrow operation will be made.
- Unstable sites, erosion prone area, dense forest area, settlements, fertile farm land will be avoided for quarry operation.
- After the extraction is completed, the quarry site will be rehabilitated by providing appropriate civil structures and bioengineering measures.

Recommended quarry sites are given in **Table 6.2**.

Table 6.2: Recommended Quarry sites

SN	Chainages	Places of recommended quarry sites
1	0+860	Stone collection from Modi river and nearby sides

2	2+250	Stone quarry from forest
3	0+700	Stone collection from Modi river and from rocky portion of hill in a limited scale
4	6+840	Malyangdi Khola for stone collection for bridge down stream 200 m for sand kaligandaki river
5	about 15Km from starting point of proposed road	Sand and stone mainly collection from Kaligandaki River

Source: Field Survey July/August, 2009

Location of Camp Sites, Storage Depots

101. Impacts: The siting of labor camp/ storage depts by contractors for carrying out contractor-based works may cause encroachment of forest, agriculture land, alteration of drainage, disposal of solid waste, and waste water etc. which may cause degradation in the environment.

102. Measures: The following mitigation measures will be adopted:

- The location of camp sites, storage depots will be kept on unproductive/ barren lands, away from forest areas as far as possible.
- Use of agricultural lands will not be allowed unless in extreme circumstances by paying adequate compensation to the owner.
- The sites will have proper management of sanitary facilities by providing PIT latrine, sockpit and shall not contaminate any near by water courses/drains.

Appropriate camp site should be at 3+900 near Majhgaun, at 10+510 near Mudikuwa and at 15+000 near Tutunga; for bridge camp site at 6+200(open area).

Construction Equipment Vehicles

103. Impacts: The contractor based construction 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.

104. 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.
- Materials under transportation shall be covered.

Crusher Plants

105. Impacts and Measures: The crushed aggregates required for construction of civil structures and surfacing will be procured from market and there will not be any impact.

Decline in Aesthetic Value

106. Impact: Landscape degradation relates particularly to poorly designed or monitored activities resulting from quarrying operations and from indiscriminate dumping of spoil material. Road may create scars on the landscape.

107. The likely impact will be direct, low in magnitude, local nature and short term in duration

108. The following mitigation measures will be adopted:

- Indiscriminate dumping of spoil material will be discouraged.
- After the extraction is completed, the quarry site will be rehabilitated to suit the local landscape.
- Plantation of local species along the roadside to cover the scar by greenery.

Biological Impacts

Loss or Degradation of Forests and Vegetation

109. Impacts: Total of 0.382 ha of forest will be permanently lost due to road construction work and 0.04 ha. of barren land needs to clear during bridge construction. 269 numbers of trees of various species will be removed from forest and private land during road construction (See **Annex XII)**. The impacts on vegetation/forest resources have been considered to be high in magnitude, site specific in extent and long term in duration, whereas loss of other forest resources will be moderate, local and long term in

magnitude, extent and duration respectively. During bridge construction there is no need of removing tree.

110. Measures: The loss of trees can not be minimized; however, it can be compensated by the plantation. According to the Work Procedure for Providing the Forest Land for Other Use, 2063 of Government of Nepal, project has to carry out plantation equivalent to the forest area lost from the construction of the road or pay for the plantation and protection cost for five years to the District Forest Office. Proponent will manage a nursery to grow tree sapling and plant them in 1:25 ratio + 30 % for the numbers of trees that need to be cut down during construction and in private land,compensatory plantation will be encouraged in the ratio of 1:1. Emphasis will be given to plant the trees along the sides of the road in RoW.Bioengineering measures will be done for bridge embankment protection.

Impact on Wildlife Due To Loss of Habitat and Hunting

111. 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. The proposed bridge of Malyangdi khola is not significant habitat for aquatic life.

112. 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 Fauna (as listed in CITES and IUCN Red Data Book)

113. Impacts: There will be no impact on flora and fauna.

Socio-economic Impacts

Loss or Degradation of Farm Land and Productivity

114. Impacts: There will be permanent loss of 0.622 ha of agricultural land due to road rehabilitation. 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. This impact is expected to be direct, high in magnitude, local in extent and of long term in duration

115. 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 of Private Properties

116. Impacts: The proposed road alignment passes through nearby the settlements of Dovilla,Silmi,Majgaun, Badahare, Cycle Chowk, Sirsuwa, Naya Bazar, Mudikuwa Bazar (Matedewal), Satbise, Danda, Serachour, Rahale bazar, Chandantar, Satkuriya, Choubis Kuriya, Tutunga. During the construction phase, the people of such settlements suffer by their property losses and damage by road construction works in some extent. The impact will be direct, site specific, short term and medium in magnitude.

117, Details about property loss and damage will be described in Resettlement Plan Report (See **Annex XV).**

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

Impact on Community Infrastructure

119. Impacts: The potential impacts during road construction are given in Table 6.3. Schools at 5+140, 10+024,15+040 and 15+160 are adjacent to the road, and might be affected by dust, noise pollution and accident.

120. Measures: In order to avoid any impacts, the following mitigation measures will be adopted.

- Restore all disturbed infrastructures to the condition before disturbance or improve where appropriate.
- Avoid contamination of water resources systems during construction
- Schedule the construction activities during off- agriculture season.

Table 6.3: **Affected Public Services and Infrastructure with Specific Mitigation Measures**

Type of Public Service and Infrastructure	Chainage/ Location	Distance from the Road	Mitigation measurs
Foot trail	2+850	Adjacent	Damaged during road construction, required to reinstate.
Pipe Lines(for irrigation)	6+955 to 7+010	Adjacent	Relocation required.
Electric Poles	11+200,11+700, 12+200,12+700, 13+200	Within formation width	Relocation required.
Gayatri Primary School	Katuwachoupari	Adjacent	Reinstate of compound wall is required Information signboard will be placed (Such as School area, Speed limit), and Use of horns should be restricted. Road side plantation.
Sarbajenik Lower Secondary	Katuwachoupari	Adjacent	Reinstate of compound wall is required Information signboard will be placed (Such as School area, Speed limit), and Use of horns should be restricted. Road side plantation.
Matedewal Secondary school	10+024	Within RoW	Reinstate of compound wall is required Information signboard will be placed (Such as School area, Speed limit), and Use of horns should be restricted. Road side plantation.
Parbat Multiple Campus(PMC)	15+040	Adjacent	Reinstate of compound wall is required Information signboard will be placed (Such as School area, Speed limit), and Use of horns should be restricted. Road side plantation.

Source: Field survey July/August,2009

Impacts on Cultural, Religious and Archeological Sites

121. Impacts: There are no any cultural, religious and archeological sites along the road alignment.

Impacts on Health and Safety Matters

122. Impacts: During construction, workers will be exposed to various risks and hazards. Potential impacts to health are respiration and eye diseases due to exposure to dust, risk of accident during work. The lack of proper sanitary measures and increase in waste and water pollution can lead to an outbreak of epidemics and diseases. This impact is considered to be of the direct, high in magnitude, for short term and localized.

123. Measures: The following measures shall be adopted:

- The workers will be provided with helmets, masks depending on the nature of the construction work.
- Drinking water facility and temporary pit latrine will be established at construction sites to control open defecation and pollution of water bodies by the workers.
- Workers will be provided with first aid and health facilities.
- Group accidental insurance will be done for the workers.
- First aid training will be provided to field staffs.
- Safety measures for bridge construction(Helmets,boots,Gloves)

6. 3.2 Operation Stage

<u>Physical Environment</u>

Road Slope Stability and Management

124. 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. Sensitive areas for possible road slope stability problems are: Periphery areas of streams/kholsis/springs/ water seepage areas, which are at chainages 1+580(kholsi), 4+500(kholsi), 4+680(Kholsi), 4+820(Kholsi), 5+300(Kholsi) and 6+840(river). The impact will be direct, medium, local and long term.

125. Measures: The following mitigation measures will be adopted by DDC after completion of 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 technology (bio-engineering).
- Soil conservation will be promoted in the right of way and vulnerable areas beyond the road alignment.

Impact Due to Air, Noise and Water Pollution

126. Impacts: During operation period, vehicles will ply along the road and will emit gaseous pollutants. This will increase the pollution level of ambient air along the road corridor. Continued dust pollution may cause adverse health impact to the people living in the vicinity. As the road is of district road category and the vehicular movement is not expected to be very high, the overall impact of air pollution will, thus, be direct, low, local and long term. Noise level during the operation period will increase due to the movement of vehicles and other activities. However, due to low traffic volume, the impact due to noise pollution will be direct, low, local and long term. The disposal of wastes, washing of vehicles in water bodies may degrade the water quality. The impact of this kind will be direct, low, local and for long term.

127. Measures: Following mitigation measures will be adopted:
- Community and road user awareness program will be organized to enhance public understanding.
- Plantation will be done near the settlements.
- Use of horns should be restricted near dense forest, health posts, schools and settlements.
- For control of dust nuisance, sprinkling of water, speed limit of vehicle and vegetative barrier by planting trees along roadsides will be designed.

Biological Environment

Depletion of Forest Resources

128. Impacts: The forest resources depletion may occur due to ineffective drainage works, inappropriate spoil disposal and construction practices. The development of market centers may exert pressure on forest and eventually deplete the forest resources. To meet the increasing needs of the forest products, illegal felling/cutting of poles and trees may occur. Operation of road may increase in timber smuggling due to easy access and easy transportation facilities. The impact will be indirect, medium, local and for long term.

129. Measures: The mitigation measures recommended are:
- Encourage and support local community for controlling illegal harvesting of forest resources.
- Awareness programs shall be organized to educate local people on the conservation of forest.
- DFO will be more vigilant.

Disturbance to the Wildlife and Illegal Hunting

130. Impacts: Although the wildlife population is reported low, they may be disturbed due to the frequent movement of the vehicles. Vehicular movement, blowing of horn in the forest area will have adverse impact on the wildlife and bird species. There may occur illegal hunting during operation period by the people from outside due to easy accessibility. The impact will be indirect, low, local and for long term.

131. Measures: Wildlife and birds will be disturbed due to the vehicle movement. The mitigation measure for this is to erect appropriate sign boards informing drivers about:
- Prohibition of blowing horns in the dense forest areas
- Potential areas for wildlife crossing

Socio-economic and Cultural Impacts

New Settlement and Market Center Development

132. Impacts: The existing trend is to settle along the road side for the economic activities through the establishment of shops, restaurants, stalls and hotels. Expansion of settlement area and market can be observed in Cycle chowk, Mudikuwa, Naya bazaar (Kamale bazaar), Rahale bazaar and Tutunga. This may trigger the practice of encroaching right of way (RoW). Consequently, this will reduce road capacity and increase road accidents. The increasing trend of roadside settlement is likely to increase household waste as well as wastewater on the road. The impact will be direct, medium, local and for long term.

133. Measures: The following mitigation measures will be adopted:
- Awareness raising program through local organizations for planned settlements.
- Regulate settlement growth with proper planning/zoning along RoW.
- Plantation of trees along the road so that RoW is not encroached
- Give efforts by concern agencies for infrastructure facilities like drainage, sewerage etc. in the market areas.

Change in Social behavior

134. Impacts: People may leave their family in their villages to do well near the new spots for economic incentives. This may ultimately affect the traditional bonds, norms and functions of the family. This may also cause impact on social and cultural transition. However, on the other side, there will be also increased interdependence among diverse social groups and interlinkage between different geographical areas which will promote the social cohesion and culture of tolerance among people. The impact will be indirect, medium, local and for short term.

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

Road Safety Measures

136. 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.

137. Measures: The mitigation measures adopted will be:
- Applying appropriate road safety measures with the help of 3-Es i.e. Engineering, Enforcement and Education.
- Required safety signs will be used along the road
- Delinator will be placed at both side of bridge

7. Environmental Management Plan

138. 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 (MLD)	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.	▪ To review IEE ToR and Report, and give approval. ▪ Coordinate with project on safeguard issues ▪ Conduct environmental monitoring from central level.	Executing Agency
Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR)	Department under MLD responsible to execute infrastructure projects under MLD. 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 MLD	First Class Officer / DDG of DoLIDAR has been heading the PCU.
District Development Committee / District Technical Office	DDC/DTO is Project Implementing Agency.	▪ Prepare IEE ToR and submit for approval to PCU/MLD ▪ Conduct IEE Study, Public Consultation, and prepare IEE Report ▪ Receive comments from PCU/ADB/MLD and modify accordingly. Get final approval from MLD. ▪ Conduct environmental safeguard monitoring ▪ Reporting	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

139. 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 that can be conducted manually. Contractor will be appointed for works requiring higher skill and mechanized support.

7.2. Reporting and Documentation

140. As part of EMP, reports will be produced at regular time intervals. Three monthly progress reports will be prepared and submitted to the DDC, and DDC will forward it to the PCU and DoLIDAR. Monitoring checklist will be developed as per the Environment Management Action Plan (EMP). The checklist will be used for regular monitoring and included in the Progress Report.

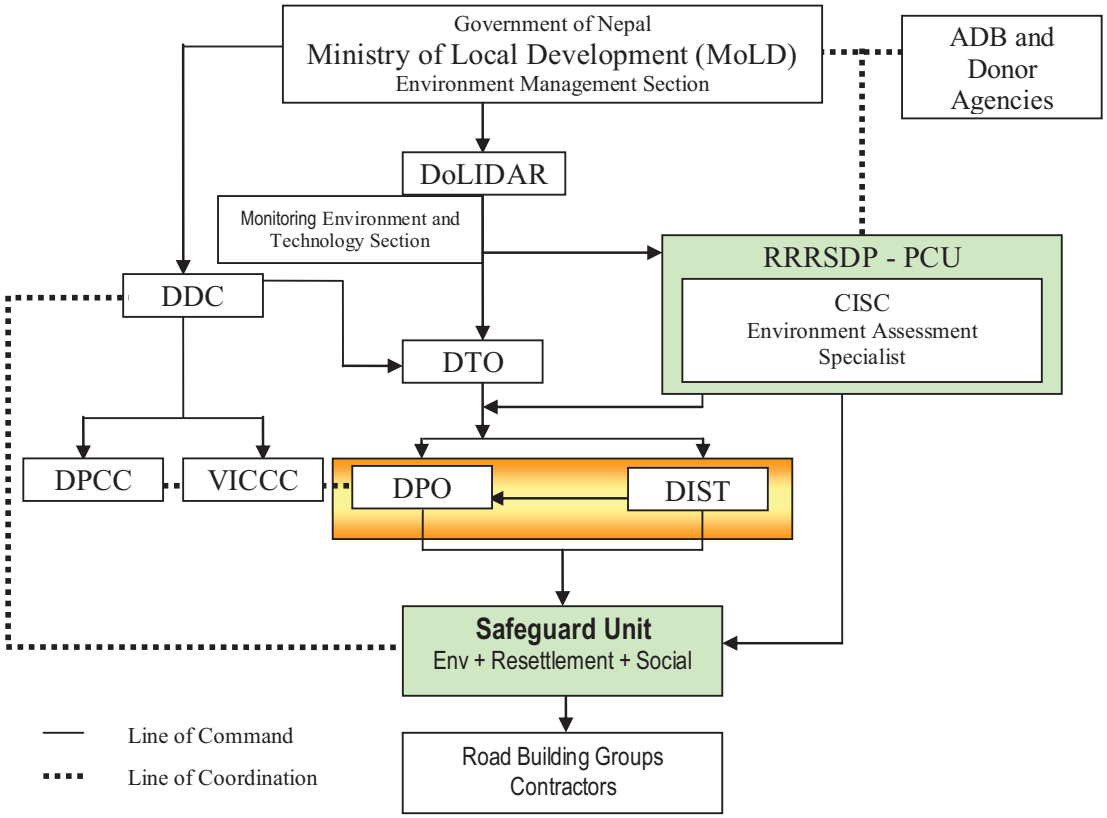
141. The Contract with contractor will clearly state that the DDC/DTO must approve the road building groups/contractor's arrangements for environmental protection, health and safety, waste management and other environment related actions identified during the detailed design phase.

142. The DIST through DPO will inform the DDC/DTO in case of non-compliance and of any other environmental issue that requires immediate attention. The contract will detail the remedies for non-compliance by the Contractor. The „Naike' (Leader) of RBGs will be given orientation training on ensuring environmental protection measures. Routine monitoring of such measures will be carried-out through supervision staff (environmental, social and technical staff).

143. 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 remedial actions.

144. 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

145. 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: Road Subproject

A. 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 the extent possible to implement manual works through labour-based approach (30326 labour skilled and 307872 un skilled for road and bridge)	DDC/DTODIST	DPCC / VICCC / CISC/PCU
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/PCU
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/PCU
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/PCU /DTO / CISC
Bio-engineering and other slope protection measures	Stabilization of slopes	Decline in soil erosion, uninterrupted access round the year	D	M	L	LT	Training on slope stabilization and bio-engineering to the locals during Project	Proponent through DIST	CISC/DDC / DTO /PCU
Operation Stage									
Operation of Road	Improvement in Accessibility and Saving of 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
Operation of Road	Increase in Trade, Commerce and Development of Market centers	Shifts towards improved commercial agriculture and increase in non-agricultural occupation	IN	L	L	LT	Manage planned growth with required infrastructure facilities for healthy and hygienic environment in the market areas providing drainage and sewerage systems.	DPO	DDC/VDC
Operation of Road	Appreciation of Land Value	Improvement in local economic condition	IN	M	L	LT	Land development & management, observe that RoW is not encroached. Locals will be made aware on this fact so that they can rip its benefit. Mainly the land value will increase in Cycle chowk, Naya bazar, Rahale bazaar, Mudikuwa and Tutunga Bazaar.	DDC/DPO	DDC/VDC
Operation of Road	Increased Crop Productivity and Sale of Farm Products	Enhancement in local economy	IN	H	L	LT	Promotion of market linkages and networking for better market price.	DDC/DPO	DDC/VDC
Operation of Road	Enhancement of Community Development Services	Socioeconomic development and raise in quality service	D	H	L	LT	Encourage local people in local decision making regarding development and social services facility	Local people, DDC, VDC	DDC, VDC
Operation 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

B: 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		Executing Agency	Supporting Agency
Pre-Construction and Construction Stage										
Physical Environment										
Construction of Road, site clearance	Change in land use (Loss of 0.622 ha. of cultivated land, 0.11 ha.of barren land, 0.382 ha.of forest and 0.355 ha.of settlement areas) Further 0.04 ha of barren land needs to clear during bridge construction.	Loss of agricultural land, production, loss of property	D	H	L	LT	IR	Avoid fertile land, forest, settlement areas etc.	DDC/DTO	DIST
Construction of Road, earth excavation	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 management of spoils and waste, provision of proper drainages, toe walls Proposed spoil disposal sites are 0+250, 2+150, 5+300,6+500, 6+850, 13+380	DDC/DTO	DIST/VICCC/ VDC
Site clearance, excavation	Slope Instability (Ch 2+700); site clearance for bridge	Erosion, landslide, loss of property	IN	M	SS	MT	Re	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.)At down stream of the bridge site, Lunching apron is proposed for the protection of scouring. For protection of bridge embankment, Gabion structures and Bioengineering measures(Grass plantation,Brush layering and tree plantation is proposed.	DDC/DTO	DIST
Construction of Road	Water Management, generation of large volume of surface runoff	Erosion, landslide, damage to farmland	IN	M	SS	MT	Re	Proper drainage structures and proper spoil disposal, Avoid blockage or diversion of natural channels due to construction of road and disposal of spoils. Not affected to river flow during bridge construction.	DDC/DTO	DIST
Construction works, operation of construction vehicles, material hauling and	Air pollution due to dust from exposed surface, from construction equipments and vehicles	Affect on local people and workers health and affect onagriculture.	D	L	L	ST	Re	Use of face mask while working on dust prone areas, covering of dust sources. Use of ear muffles, helmet to lessen noise pollution during rock breaking and quarrying and bridge works.	DDC/DTO / RBGs	DIST

Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact *)					Mitigation Measures	Responsibility for Mitigation Measure	
			Nat	Mag	Ext	Dur	Rev		Executing Agency	Supporting Agency
unloading etc. Slope cutting, spoil and waste disposal.	Noise pollution	Disturbance and annoyance around school, health posts, forest areas.	D	L	L	ST	Re	Restrict horn near school, health posts etc.	DDC/DTO / Contractor	DIST
	Water pollution due to sediment level, spills and leakage of oils and chemicals to water bodies	Risk of water borne diseases/excavated matrail of bridge	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..should be despose spoil material in safe location/proposed location.	DDC/DTO/ Contractor/ RBGs	DIST/VICCC
Cutting of slopes	Quarry operation and its potential effect on instability, landslide	Water pollution, damage to farmland, disturbance in natural drainage	D	L	L	ST	Re	Proper selection and management of quarry sites, rehabilitation of quarry sites after completion of work. Recommended quarry sites are Ch 0+860, 2+250, 0+700,6+840 (Malyangdi Khola) and 15 km from starting point (Kaligandaki river)	DDC/DTO/ Contractor/ RBGs	CISC/DIST/ VICCC
Construction of road	Location of Camp Sites, Storage Depots	Encroachment of forest, agriculture land, alteration of drainage, disposal of solid waste, and waste water	D	L	L	ST	Re	Proper selection of camp sites away from forests, proper sanitary facilities by providing Pit Latrine, sockpit. Appropriate camp sites are 3+900 near Majhgaun, at 10+510 near Mudikuwa and at 15+000 near Tutunga for bridge camp site at 6+200(open area).	DDC/DTO/ Contractor	DIST/VICCC
Construction of road	Construction Equipment Vehicles	Dust and Noise pollution and health risks to workers	D	L	SS	ST	Re	Cover of materials under transportation, facility of safety measures for workers, vigilance and monitoring	DDC/DTO/ Contractor	DIST
Construction of road, quarrying operation, spoil disposal	Decline in Aesthetic Value	Scars of Landslide	D	L	L	ST	Re	Discourage indiscriminate dumping of spoil, rehabilitation of quarry, plantation of local species along the roadside	DDC/DTO/ Contractor	DIST/CISC/PCU
Biological Environment										
Clearance of vegetation necessary for road formation	Loss or Degradation of Forests and Vegetation (0.328 Ha, and 269 nos tree).Further 0.04 ha. of barren land needs to clear during bridge construction. During bridge construction there is no need of removing tree.	Loss of environmental benefits from vegetation, disturbance in ecological function (dust and noise absorbance, aesthetic value etc.)	D	L	L	LT	Re	Minimize cutting of tree, vegetation and bio-engineering measures. Compensatory plantation of trees in forest at ratio 1:25 +30% will be done and in private land, compensatory plantation will be encouraged in the ratio of 1:1. Bioengineering measures will be done for bridge embankment protection.	DDC/DTO/ DFO	DFO/CFUGs/DIST

Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact *)					Mitigation Measures	Responsibility for Mitigation Measure	
			Nat	Mag	Ext	Dur	Rev		Executing Agency	Supporting Agency
Construction activity	Impact on Wildlife Due To Loss of Habitat and Hunting	Loss of biodiversity and valuable species of wildlife	IN	L	L	ST	Re	Work only in day time, do not disturb wildlife, aware workers	DDC/DTO/ DFO	DFO/CFUGs/DIST
Socio-Economic Environment										
Acquisition of land for maintaining road width*	Loss or Degradation of Farm Land and Productivity (Loss of 0.622Ha agricultural land)	Reduced production, hardship, food shortage	D	H	L	LT	IR	Minimize productive land acquisition through alignment selection, Compensation for affected people	DDC/DTO	CFC[1] DIST/VICCC
Acquisition of land and property for maintaining road width	Loss of Private Properties	Displacement of people, hardship	D	H	SS	LT	IR	Compensation and resettlement to the owner as described in resettlement plan	DDC/DTO	CFC[1]/DIST
Demolition of structures along road alignment	Impact on Community Infrastructure:	Loss of services provided by them	D	M	SS	ST	Re	Restoration or relocation of affected infrastructures: Foot Trail (2+850); Pipe Lines(irrigation) (6+955 to 7+010); Electric Poles at 11+200, 11+700, 12+200, 12+700,13+200 ; Compound wall of [Gayatri Primary School (5+300), Sarbajenik Lower Secondary (5+940), Matedewal Secondary school (10+024), Parbat Multiple Campus(PMC) (15+040)]	DDC/DTO	PCU/DIST/CISC/ VICCC/VDC
Occupational health and safety aspects	Health and safety matters	Injury, fatal accidents, outbreak of epidemics and diseases, decline in capacity to work	D	H	L	ST	Re	Occupational health and safety regulations, first aid facility at sites with health treatment arrangements, contingency planning; Proper drinking water and toilet facility for construction crew.During bridge construction safty measures will be adopted.	DDC/DTO / Contractor	DIST/CISC/PCU
Operation Stage										
Physical Environment										
Quarrying, operation of construction equipments	Road Slope Instability 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	IR	Regular maintenance of slope protection structures, Selection of healthy upland farming techniques..Quarry location for sand Kaligandaki river and for stone from Modi Khola and Malyangdi khola.for bridge and road)	DDC/DTO/ VDC	DoLIDAR , DFO, District Watershed and Soil Conservation Office (DWSSC)
Operation of vehicles,	Air, Noise and Water Pollution	Disturbance to students, patients, wildlife, effect to nearby agriculture	D	L	L	LT	Re	Speed limit for vehicles, no horn signs, use vegetation barrier.	DDC/DTO	DoLIDAR/Local administration

* Activities that will be carried out during pre-construction period

[1] The Land Acquisition Guidelines, 1991 specify the establishment of an Acquisition and Rehabilitation Committee (also known as Compensation Fixation Committee, "CFC") for fixing the rate of compensation of private properties to be acquired, consisting of the concerned Chief District Officer (Chair), Land Revenue Officer, representative of the DDC and the Project Manager and others as deemed necessary.

Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact *)					Mitigation Measures	Responsibility for Mitigation Measure	
			Nat	Mag	Ext	Dur	Rev		Executing Agency	Supporting Agency
Inadequate drainage		land and crops								
Biological Environment										
Road operation	Depletion of Forest Resources	Loss of timber, forest resources and benefits	IN	M	L	LT	IR	Enforcement of law, vigilance and monitoring, participation of community	DFO/ CFUGs/VDCs	DDC/CDO
Road operation	Disturbance to the Wildlife and Illegal Hunting	Collision of wildlife with vehicles, disturbance in their normal activities, Loss of biodiversity	IN	L	L	LT	IR	Warning traffic signal, Awareness training to driver to limit speed and horn use ,Enforcement of law, vigilance and monitoring	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	ST	Re	Awareness, Enforcement of law and order, Provision of training for skill	DTO	DDC/DoLIDAR
Operation of Road	Road accident	Increase in accidents	D	M	L	LT	IR	Appropriate road safety measures, Safety signs along the road. Delinator will be placed at both side of bridge.	DTO	DDC/DoLIDAR

7.3: Bridge

A. 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 bridge	Employment Generation and Increase in Income, temporary tea stall, shop	Increase in income level , Enhancement in some peoples economy	D	H	L	ST	Involve local people to the extent possible , 10500 labour skilled and 42241 unskilled will be required for bridge construction)	DDC/DTO/DIST	DPCC / VICCC / CISC/PCU
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 Bridge maintenance.	DPO/DIST	DDC/DTO / CISC/PCU
Operation Stage									

Activity	Effect	Related Beneficial Impacts	Type of Impact *)				Benefit Augmentation Measures	Responsible Agencies	
			Nat	Mag	Ext	Dur		Executing Agency	Supporting Agency
Operation of bridge	Improvement in Accessibility and Saving of 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
Operation of bridge	Appreciation of Land Value	Improvement in local economic condition	IN	M	L	LT	Management, observe that RoW is not encroached. Locals will be made aware on this fact so that they can rip its benefit.	DDC/DPO	DDC/VDC

B. 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		Executing Agency	Supporting Agency
Construction Stage										
Construction of bridge, site clearance	Change in land use Loss of 0.04 ha. of barren land needs to clear during bridge construction.	Loss of barren land	D	H	L	LT	IR	Project site is selected to minimum loss or damage of agriculture land, forest, private land or property.	DDC/DTO	DIST
Construction of bridge, earth excavation	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 management of spoils and waste, provision of proper drainages, toe walls Proposed spoil disposal sites are 0+250, 2+150, 5+300,6+500, 6+850, 13+380	DDC/DTO	DIST/VICCC/ VDC
Construction of bridge	Water Management	Affected on river flow, Erosion, landslide, damage to farmland	IN	M	SS	MT	Re	Site is selected maximum flow of water location for bridge so water can easily flow out and events of flooding, and further damage of the road and other nearby infrastructures can be prevented. No affect on river flow during bridge construction. Bridge protection work such as Bio-enginering, Gabion protection work, Lunching apron are proposed.	DDC/DTO	DIST
Construction works, operation of construction vehicles, material	Air , dust, noise and water pollution	Affect on local people and workers health and affect on agriculture, excavated material of bridge affect on rivers aquatic	D	L	L	ST	Re	Use of ear muffles, helmet to lessen noise pollution during rock breaking and quarrying and bridge works. Strictly follow excavated materials will be disposed in proposed location.	DDC/DTO/ Contractor/RBGs	DIST

Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact *)					Mitigation Measures	Responsibility for Mitigation Measure	
			Nat	Mag	Ext	Dur	Rev		Executing Agency	Supporting Agency
hauling and unloading etc.		life								
Collection of Construction materials	Quarry site, or boulder, sand and aggregates	Water pollution, damage to farmland, disturbance in natural drainage damage forest and vegetation	D	L	L	ST	Re	Proper selection and management of quarry sites, rehabilitation of quarry sites after completion of work. Recommended quarry sites are Ch 0+860, 0+700, 2+250. 6+840 (Malyangdi Khola) and 15 km from starting point (Kaligandaki river).	DDC/DTO/ Contractor/RBGs	CISC/DIST/ VICCC
Construction of Bridge	Location of Camp Sites, Storage Depots	Encroachment of forest, agriculture land, alteration of drainage, disposal of solid waste, and waste water	D	L	L	ST	Re	Proper selection of camp sites away from forests, proper sanitary facilities by providing Pit Latrine, sockpit. Appropriate camp sites for bridge is at 6+200(open area).	DDC/DTO/ Contractor	DIST/VICCC
Occupational health and safety aspects	Health and safety matters	Injury, fatal accidents, outbreak of epidemics and diseases, decline in capacity to work	D	H	L	ST	Re	During bridge construction safety measures (ear muffles, helmet, boots) will be provided to workers, first aid facility at sites with health treatment arrangements, contingency planning; Proper drinking water and toilet facility for construction crew.	DDC/DTO / Contractor	DIST/CISC/PCU
Operation Stage										
Operation of bridge	Community infrastructures access road will be in risk due to flood (flow of water), Scouring	Slides and slope failure , Disturbance to traffic flow.	D	M	L	LT	IR	Regular maintenance of road and bridge. Necessary structures such as check dam, lunching apron will be placed for protection of bridge at 6+480.	DDC/DTO/VDC	DoLIDAR , DFO, District Watershed and Soil Conservation Office (DWSSC)

* 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

146. 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, muffles, 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

SN.	Environmental Protection Measures	Estimated Budget (NRs.)	Remarks
1. Benefits Augmentation Measures			
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 Naike 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)	200,000.00	
2. Adverse Impacts Mitigation Measures			
2.1	Bio-engineering work	2639976.00	To be included in BoQ
2.2	RBG Insurance	400,000.00	To be included in BoQ
2.3	Information Signboard	50,000.00	To be included in BoQ
2.4	Compensation for properties	60,00,000.00	T o 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(8743 Nos.) / Re-forestation	134,500.00	To be included in project cost
2.8	Health / HIV AIDS / STD prevention awareness; other awareness program such as adult literacy'; support to local school etc.	12,71,800.00	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)	11,496,276.00	
	Total	**11,696,276.00**	

7.5. Implementation of Mitigation Measures

147. 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.

148. 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

149. 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

150. Monitoring is an integral part of the project proponent. The Proponent, DDC/DTO Parbat 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.

151. According to EPR, 1997, the MLD/DoLIDAR is responsible for monitoring and evaluation of the impact of the implementation of the project. The MLD/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.

152. 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 monitoring plan as given in **Table 7.4 and 7.5** shall be followed. At least one monitoring in each construction season is necessary.

153. 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 7.5**.

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
	TOTAL				**200,000.00**

Thus, total environmental monitoring and management cost is NRs. 11,896,276.00

7.6.2 Types of Monitoring and Monitoring Parameters

154. Monitoring is an on going component of the environmental assessment process and subsequent environmental management and mitigation activities. There are basically two types of environmental monitoring:

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.**

155. 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

156. 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

157. 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

158. 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 7.6: Compliance Monitoring for Dovilla-Phalebas 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 / MLD
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 / MLD
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	DPCC / 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
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

Parameters/Issues	Responsible Implementing Agency	Verifiable Indicators	Verification Methods	Schedule	Responsible Monitoring Agency
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