Environmental Assessment Document

Initial Environmental Examination

Grant Number: 0093 NEP

February 2010

Nepal: Rural Reconstruction and Rehabilitation Sector Development Program

Chame-Khangsar Road Subproject, Manang 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
[ADBGrant 0093NEP]

Initial Environmental Examination (IEE) Report

Of

Chame-Khangsar Road Subproject
Manang District

Submitted to:
Ministry of Local Development
Government of Nepal

Proponent:
District Development Committee/
District Technical Office
Chame,manang

February, 2010

Prepared By:
District Implementation Support Team (DIST)
BDA Nepal. Ltd.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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	Livellhood Enhancement and Skill Training
LRMP	Land Resource Management Project
M	meter
MoU	Memorandum of Understanding
MoE	Ministry of Environment
MoST	Ministry of Science and Technology
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
SMC	Social Mobilization Coordinator
SMO	Social Mobilization Officer
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

चामे-खाङसार सडकको प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदनको
कार्यकारी सारांश

पृष्ठभूमि

नेपाल सरकारले लामो द्वन्दले गर्दा क्षति भएका ग्रामीण पूर्वाधारहरुको पुन:निर्माण र पुन:स्थापना को कार्य एशियाली विकास बैंक, स्विस सरकार (SDC), ब्रिटिस सरकार (DFID) तथा ओपेक फण्ड (OFID)को आर्थिक सहयोगमा 'ग्रामीण पूर्वाधार पुन:निर्माण र पुन:स्थापना आयोजना' नेपालको बिसवटा जिल्लाहरुमा संचालन गरिरहेको छ । मनाङ्ग जिल्लामा अवस्थित प्रस्तावित चामे – खाङसार ग्रामीण सडकको पुन:स्थापना सोही कार्यक्रम अन्तर्गत संचालन गर्न लागिएको एक उप–आयोजना हो । उप-आयोजना (प्रस्ताव) अन्तर्गत ३५.२२ कि.मी. लामो उक्त कच्ची सडकको ग्राभेल स्तरमा पुनर्स्थापना गर्न प्रस्ताव गरिएको छ ।

प्रस्तावक

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

प्रारम्भिक वातावरणीय परीक्षण अध्ययनको उद्देश्य

प्रारम्भिक वातावरणीय परीक्षण अध्ययनको मुख्य उद्देश्य प्रस्तावित उप-आयोजना निर्माण तथा संचालन बाट उक्त क्षेत्रको भौतिक, जैविक, सामाजिक, आर्थिक तथा सांस्कृतिक वातावरणमा पर्न सक्ने 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

प्रस्तावित सडकले मनाङ्ग जिल्लाको सुदुर दुर्गम भेगका वासिन्दाहरुलाई सदरमुकाम संगको पहुँच वढाउनेछ भने स्थानिय स्तरमा उत्पादन हुने आलु, फापर,स्याऊ, दुध तथा छुर्पी लाई वजार संग जोडी स्थानिय आय आर्जनमा अभिवृद्धि गर्नेछ ।

अध्ययन प्रकृया

५ जुलाई, २००९ मा फिल्ड सर्वेक्षणवाट लिइएको तथ्याङ्क तथा अन्य उपलब्ध तथ्याङ्कहरुको साथै सामाजिक तथा प्राविधिक टोलीवाट पुनर्वास कार्यको सर्भेक्षणको सिलासिलामा संकलन गरेका तथ्याङ्कहरु केलाएर प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन तयार गरी निष्कर्ष तथा सुझावहरु दिइएको छ । यो प्रारम्भीक वातावरणीय परिक्षण प्रतिवेदन नेपाल सरकारको वातावरण संरक्षण ऐन १९९७, वातावरण संरक्षण नियामावली १९९७ अनुसार तथा स्थानिय विकास मन्त्रालयबाट मिति २०६६/०१/०४ मा स्विकृत गरिएको यसै प्रस्तावको कार्यसुची अनुसार तयार गरिएको छ । साथै, एशियाली विकास बैकको Environmental Assessment Guideline, 2003 तथा Safeguard Policy Statement, 2009 को समेत अनुसरण गरीएको छ ।

आयोजना को विवरण

प्रस्तावित सडकले मनाङ जिल्लाको उत्तरा-पश्चिम दुर्गम भेगका वस्तीहरुलाई जिल्लाको सदरमुकाम संग जोड्दछ । यसको कूल लम्बाइ ३५.२२ कि.मि. छ ।सडकमा तीनवटा साना पुलहरु (Ch.7+540,14+460 and 25+167 मा) निर्माण गर्नु पर्ने देखिन्छ । यो सडक छवटा गाउँ विकास समितिहरू क्रमश: चामे,पिसाङ, भ्राका,मनाङ,टंकी मनाङ र खाङसार भएर जान्छ ।

विद्यमान वातावरणीय स्थिति

यो सडक चामे गा.वि.स.को चामेटोल बाट समुद्री सतहदेखि २६२० मी. को उचाईबाट शुरु भएर ३८५० मी. उचाईको खाङसार गेटमा पुग्छ । सडक खण्डमा ठूला पहिरोको समस्याहरु देखिदैन । सडक खण्डमा पर्ने पानीको मूख्य श्रोतहरुमा मर्स्याङदी, घट्टे र मुगजे खोला पर्दछन् । प्रस्तावित सडक क्षेत्रको वायु तथा पानीको स्तर सफा रहेको देखिन्छ साथै ध्वनि प्रदुषणको समस्या देखिदैन । यो सडक प्राय: खेती गरिएको जमीन तथा वन र बस्तीहरु भएर जान्छ ।

यस सडक खण्डमा पाइने मूख्य रुखको प्रजातिहरुमा सल्ला, धुपी, भोजपत्र र स्याऊ आदी पर्दछन् । चितुवा,हिउँचितुवा,व्याँसो,वनकुकुर, स्याल, हिमालयन टार, घोरल,शिरो र मृग आदि वन्य जन्तुका साथै काग पंक्षी सडक छेउको वनमा पाईन्छ । यो सडक खण्ड संरक्षित क्षेत्र वा मध्यवर्ती क्षेत्रमा पर्दछ ।

यो सडक खण्डको प्रभावित क्षेत्र भित्र जम्मा घरधुरी संख्या ५४४ र जनसंख्या ३१९० रहेको छ र सरदर परिवार संख्या ६.१६ छ । यहाँ गुरुङ, लामा,घले तथा दलित (दमाई, कामी) जातीहरु बसोवास गर्दछन् ।

यहाँका बासिन्दाहरुको मुख्य पेसा कृषि,व्यापार र पशुपालन हो । यातायातको राम्रो सुविधा नभएको तथा पहाडी क्षेत्र भएकोले कृषि उब्जनीले मात्र पर्याप्त नहुने हुँदा यहाका अधिकाशं मानिसहरु श्रम रोजगारीका अन्य पेशामा काम गर्ने साथै उल्लेखनीय प्रतिशत मानिसहरु जीविकोपार्जनको सिलसिलामा हिउँदमा काठमाडौं, लाम्जुङ, पोखरा ,चितवन तथा भारत लगायतका ठांउमा रोजगारीको लागि जाने गर्दछन् ।

प्रमुख वातावरणीय प्रभावहरू

सकारात्मक प्रभाव

उप-आयोजना बाट तत्कालै हुने लाभमा स्थानीय स्तरमा रोजगारीको सिर्जना हुनेछ । आयोजना संचालनको लागी करिव १५३७८७ मानव-दिन वरावरको अदक्ष र ६११० मानव-दिन वरावरको दक्ष श्रमशक्तीको आवश्यकता पर्नेछ । आयोजना संग सम्वन्धित कार्यमा (रोजगारीमा) गरीव, महिला तथा पिछडिएका स्थानीय जनताले प्राथमिकता पाउनेछन् । यस चरणमा हुने अन्य लाभहरुमा वन्द व्यापारको बृद्धि, उप-आयोजनाले प्रदान गरेको शीपमुलक तथा जनचेतनामुलक तालिम तथा उप-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 साथै यहाँको स्याऊ उत्पादन देशको विभिन्न भागमा पुर्याउन यस सडकले मद्दत गर्दछ । यसले स्थानीय जनताको आय तथा खाद्य सुरक्षामा अभिबृद्धि हुनेछ साथै स्थानीय श्रोत साधनको उपयोग गर्ने साना कृषि उद्योगहरुको प्रवर्दन हुनेछ । पहुँच तथा यातायातको अवसर 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 ।

उप-आयोजना कार्यन्वयनबाट पर्न सक्ने नकारात्मक प्रभावहरु:

सडक निर्माणको क्रममा भिरहरु काट्दा, खन्दा निस्किएको माटो तथा ग्रेगर 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, ग्रेगर को उचित व्यवस्थापन हुन सकेन भने यसले भु-क्षय वढाउन तथा जल प्रदुषण गराउन सक्छ । सडक निर्माणको गर्नको लागी ३.३७८ हेक्टर जंगल क्षेत्र प्रयोग हुनेछ, तथा विभिन्न जातका गरी करिव ६५० वटा रुख विरुवाहरु काटिनेछन् जस मध्ये सल्ला ६२४, र स्याऊ २६ वटा रुखहरु पर्दछन् । सडक निर्माण क्रियाकलापबाट जीवजन्तुलाई असर पर्ने तथा सडक निर्माण कार्यमा खटिएका कामदारहरुले वनका जीवजन्तुलाई जिस्क्याउने तथा तिनको शिकार गर्नसक्ने सम्भावना रहन्छ ।

सडक निर्माण कार्यको दौरान १. ५३ हेक्टर निजी जग्गा अधिग्रहण गर्नुपर्ने हुन्छ जसले गर्दा वार्षिक मकै तथा तरकारी वालीको उत्पादनमा असर पुग्नेछ । सडक निर्माण कार्यको दौरान ११ वटा घर, १ वटा सामुदायिक भवन, ४ वटा पसल १३ वटा छोर्तेन,माने , ३ वटा ट्वाइलेट,३ वटा गोठ,२ वटा पर्खाल संरचनाहरुलाई क्षति पुग्ने देखिन्छ । सडक निर्माण कार्यले पानीको मुहानमा असर नपर्ने तथा कुलोमा असर पर्ने देखिन्छ । निर्माण कार्यको क्रममा श्रमिकहरु तथा स्थानीय जनताको स्वास्थ्यमा असर पर्ने अथवा अप्रिय दुर्घटनाहरु घट्न सक्ने सम्भावना रहन्छ ।

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 भु-क्षय हुन सक्छ । सवारी साधनको बृद्धिले धुलो तथा ध्वनी प्रदुषण बढ्नेछ । त्यसैगरी सडकको सुधार संगै वन क्षेत्रसम्म भएको पहुँचको बृद्धिले वन सम्पदा तथा वन्य 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 ।

प्रभाव न्यनिकरणका उपायहरु:

यस उप-आयोजनालाई 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 गरिवीको 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) ढंगले निर्माण गरिने छ । उप-आयोजनाले प्रभावित जनतालाई निर्माण कार्यमा रोजगारीमा तथा शिपमुलक तालिममा प्रथमिकता दिनेछ । उप-आयोजना निर्माणको क्रममा जग्गा फँडानी गर्दा, जमिन काट्दा, खानी सञ्चालन गर्दा, खन्दा निस्किएका माटो, ग्रेगर थुपार्दा तथा अन्य कार्य गर्दा त्यस क्षेत्रको संवेदनशील वातावरणलाई सुरक्षित

राख्न विशेष ध्यान दिनेछ । निर्माण कार्यमा कार्यरत श्रमिकहरुको बिमा गरिने छ तथा सुरक्षाका सम्पूर्ण सामग्री श्रमिकहरुलाई प्रयोगमा ल्याउन दिइने छ । वन, जीवजन्तुको संरक्षण गर्न तथा सामाजिक अक्षुणतालाई कायम राख्न जनचेतनामुलक कार्यक्रमहरु तथा तालिमहरु सञ्चालन गरिनेछ । निर्माण स्थलहरुमा प्राथमिक उपचारको सामग्रीहरुको व्यवस्था गरिने छ । काटिएका रुख विरुवाहरुको क्षतिपुर्ति वापत १:२५+३० अनुपातमा वृक्षारोपण गरिनेछ । वृक्षारोपणमा संरक्षित तथा स्थानिय प्रजातिहरुलाई 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 दुर्घट्ना बाट वचावट गर्ने उपायहरु अवलम्वन गरिनेछ ।

वातावरण व्यवस्थापन योजना

यस प्रतिवेदनमा वातावरण व्यवस्थापन योजना अन्तर्गत उप-आयोजनाबाट 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	८०२२७५७/-	BoQ मा समावेश गरिने ।
४.	पुनर्वास तथा जग्गा अधिग्रहण		पुनर्वास योजनामा समावेश गरिने ।
५.	पुननिर्माण तथा अन्य	५००,०००/-	BoQ मा समावेश गरिने ।
६.	क्षतिपुर्ती वृक्षारोपण	५५०००० /-	आयोजनाको बजेटमा समावेश गरिने ।
७.	एच. आई. भी. रोकथाम तथा अन्य चेतनामूलक कार्यक्रमहरु जस्तैः युवा साक्षरता, स्थानीय विद्यालय सहयोग आदि		सामाजिक योजना तथा आयोजनाको बजेटमा समावेश गरिने ।
८.	पेशागत स्वास्थ्य सुरक्षा तथा जानकारीमूलक सूचनापाटी	३००,०००/-	BoQ मा समावेश गरिने ।
९.	अनुगमन तथा मुल्यांकन	२००,०००/	आयोजनाको बजेटमा समावेश गरिने ।
	जम्मा :	**१०,१७२,७५७/-**	

निष्कर्ष

परिचान गरिएका प्रायः वातावरणीय प्रभावहरु कम महत्वका तथा मुख्य गरी निर्माणकार्यका वखतमा सिमित रहेको पाइएको छ । 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 उप-आयोजना कार्यान्वयन गर्न सिफारिश गरिन्छ । उप-आयोजनाको 'वातावरणीय प्रभाव मुल्याङ्कन' स्तरमा अध्ययन गर्न आवयक नरहेको सिफारिश समेत गरिन्छ ।

EXECUTIVE SUMMARY

Background
Government of Nepal has received financial assistance from Asian Development Bank, SDC 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 35.22 km long Chame-Khangsar Rural Road in Manang District is one of the Subprojects selected under the RRRSDP. It is an existing earthen road proposed for gravel standard.

Project Proponent
The 'Proponent' of the proposed Subproject (Proposal) is District Development Committee (DDC), /District technical office Manang. Ministry of Local Development (MoLD) is the 'Concerned Agency' for approving the IEE study. MoLD and DoLIDAR are the Executing Agency and DDCs are the respective implementating agencies.

Objectives of the IEE Study
The objectives of the IEE study is to identify the impacts on the physical, biological, socio-economic and cultural environment of the project influence area from construction and operation of the Proposal, and recommend site-specific adverse impact mitigation measures and beneficial impact augmentation measures. The Study will assess if the IEE level study is sufficient for the Subproject.

Relevancy of the Proposal
The proposed Subproject will connect a remote rural area with the district headquarters. It will provide easier access to people to social services, and market access for local products like milk,Apple, Potato,Buck Wheat,Barly, and Chhurpi. As a result, the Subproject will assist to promote economic activities, reduce poverty and increase socio-economic conditions of the people of the area.

Study Methodology
The IEE study has been conducted through review of secondary information collected from relevant agencies, and primary information collected from the field survey in July 2009. The survey methods included walk-through survey along the proposed alignment with checklists, conduction of sample household survey, organizing focus group discussions (FGD) in the related VDCs, and information supplemented by the resettlement and technical team of the Subproject.

The IEE report has been prepared following the Environmental Protection Act, 1997 and Environmental Protection Rules, 1997 (second amendment 2007) of the Government of Nepal (GoN); and Environmental Assessment Guidelines, 2003, and Safeguard Policy Statement, 2009 of ADB. The report follows the Terms of Reference for IEE Study approved by MoLD on 04/01/2066(B.S.)

Brief Description of the Subproject
The proposed road lies at the remote north-western part of Manang district. The 35.22 km road is, and passes through Chame, Pisang, Bhraka, Manang,Tanki manang and Khangsar village development committees (VDCs). Three number of bridge is required at 7+540,14+460 and 25+167.

Existing Environmental Condition
The road starts from Chame of Chame VDC at 2620m amsl and passes through Khangsar gate of Khangsar at 3850m amsl. The slope along the road alignment is stable. Marshyangdi,Ghatte and Mugje Kholas are the major natural drainages. Ambient air and water quality of the proposed project area is observed to be good and there is no noise pollution. The road passes through cultivated land, forest and settlements.

The dominant vegetation found in the road alignment are,(Salla) *Pinus wallichina Picea smithiana (dhupi), Betula utilis (bhojpatra), Pyrus Comunis (apple)* etc,leopard,Musk deer Snow leopard, wolf, wilddog, jackle, himalayan tahr,goral,serow and barking deer are the common mammals; and Corvus splendens (Crow),is the only bird found in the Subproject area. The road fall under protected area. *(Total population of the Subproject area is 3190, total household number is 544, and average family size is* 6.16) Gurung ,lama,and Ghale and occupational caste (Damai, Kami) are the main castes living in the area.

Subsistence Agriculture Business 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 ,Lamjung ,Pokhara.Chitwan 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 6110 person days of skilled and 153787 person days of unskilled 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 Zone of Influence (ZoI)[1] 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 road help to transport an apple in different part of the country. The local production like Apple will get easy and faster route to markets in different parts of country. 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 an erosion and landslide during construction and operation. Futhermore, spoils generated during construction can create the water pollution to the nearby water sources.

During road widening and construction required 3.378 Ha of forest area and different type of tree have to be cleared. Among them 624 nos of salla,and 26 nos of Apple, and total 650 nos of tree/shrubwill be affected by the project construction. 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 1.53 Ha of agricultural land which results in annual reduction of agricultural production mainly,Bucket Wheat, maize and barley.11 houses, 1 community structures, 4 business stall,13 Chhorten and mane,3 Toilet,3 cattle shed,and 2 wall structures will be affected. Also, irrigation line could be affected during construction of road. But not affected on the water supply line.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.

Mitigation Measures

The various benefit augmentation measures and adverse impact mitigation measures have been proposed in the report to make this project environment friendly. Other than land donated by local people for the projects, adequate compensation will be provided to affected poor and marginalize household for all the lands that need to acquire. The construction of road will be based on Labour-based, Environment friendly and Participatory (LEP) Approach. Affected families will be given high

[1] ZoI is one and half hour walking distance from the road and areas of related VDCs.

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 trees that need to be cut down during construction. Protected species will be given emphasis for plantation. Proper maintenance and proper drain system will be provided to prevent accumulation of water on the nearby agricultural lands during operation. Adequate road safety measures will be provided to minimize road accident.

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	8022757	
4	Resettlement and Land Acquisition		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	550000.00	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.		To be included in Social plan, project cost
8	Occupational health and safety, Information signboard	300,000.00	To be included in BoQ
9	Monitoring	200,000.00	To be included in project cost
	Total	10,172,757.00	

Conclusion and Recommendation

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

SALIENT FEATURES

1. Name of the Project	:	Chame-Khangsar Road
2. Location		
2.1Geographical Locations		
2.1.1 Start Point	:	Chame of Chame VDC
2.1.2 End Point	:	Khangsar gate of Khangsar VDC
2.2 Geographical Feature		
2.2.1 Terrain	:	Mountainous
2.2.2 Alignment	:	Ridge/upper valley: approx.
2.2.3 Altitude	:	2620 m at Chame to 3850m at Khangsar
2.2.4 Climate	:	Cool temperate/Alpine
2.2.5 Soil	:	Alluvial soil, colluvial soil
3. Classification of Road	:	District Road (Rural Road Class A)
4. Status of road	:	Rehabilitation proposed for all weather
5. Length of Road	:	35.22 km
6. Standard of Pavement	:	Gravelled
7. Traffic Forecast	:	20 vehicles per day
8. Design speed	:	20 km/hr
9. Major Settlements:		
9.1 Major Settlements	:	Chame,Talekhau.Bhratang,Dhukurpokhari, Pisang,Humde,Mugje,Bhraka,Manang,Tanki Manang and Khangsar
9.2 No. of Household	:	544 HHs
9.3 VDCs along the Road	:	Chame,Pisang,Bhrake,Manang,Tanki Manang, Khangsar
10. Cross Section		
10.1 Right of way	:	5m each side (center line)
10.2 Formation width	:	4m
10.3 Carriageway width	:	3m
10.4 Lane	:	Single
11. Structures		
11.1 Dry Stone Massonary	:	24,500 Cum.
11.2 Gabion Wall	:	24,758 Cum.
11.3 Stone Pitching	:	1017.51 Cum.
12. Bio-Engineering	:	3% to total cost (NRs.8263440)
13. Earth Work		
13.1 Cutting	:	57,106.27 Cum
13.2 Filling	:	44,848.07 Cum
14. Project cost		
14.1 Total Cost (NRs)	:	NRs275,448,004
14.2 Costs per km (NRs.)	:	NRs7820784
15. Employment generartion:		
15.1 Total employment	:	159897 (person days)
15.1.1 Skilled	:	6110
15.1.2 Unskilled	:	153787

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, safeguards and social mobilization responsibilities.

2. Manang District is one of the project districts under RRRSDP. This Proposal is for rehabilitation in gravel standard of the 35.22 km long Chame-Khangsar district road in Manang District.

1.2 The Name and Address of Proponent

Name of Proposal	:	Rehabilitation of Chame-KhangsarDistrict Road, Manang District, Nepal
Name of Proponent	:	District Development Committee, District Technical Office, Manang
Address of Proponent	:	Chame, Manang District Phone No: 066-440127 Fax No:066-440127

1.3 Relevancy of the Proposal

3. The Project area is located at remote and underdeveloped north-western part of Manang district. The road is currently earthen. The area has high potential in production of Potato, milk, Buck wheat, Barley and Apple. In this regard, the proposed rehabilitation of the road will enhance access of people to social services and market centers with significantly reduced travel time and cost, and will contribute in their socio-economic development. Access shall also attract other development infrastructures and open door to further development opportunities in the area.

1.4 Need and Objectives of the IEE Study

4. **Need:** An IEE study of the Proposal is a legal requirement according to the Environment Protection Act, 1997; and Environment Protection Rule, 1997 (Amendment 2007) of GoN; and according to the provisions of the Environmental Assessment Guidelines, 2003; and Safeguard Policy Statement, 2009 of ADB.

5. **Objectives:** The main objective of the IEE study is to identify the impacts from the construction and operation of the Proposal on the physical, biological, socio-economic and cultural environment of the Subproject 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, and the provisions of ADB. It follows methodology suggested in the approved Terms of Reference for IEE Study (please refer Annex 1). Data collection on physical, biological, socio-economic and cultural environment of the Subproject area was done in July 2009. Field survey, sample household survey, organization of Focus Group Discussions in the related VDCs was carried out and necessary information was collected. The DDCs officials, VDCs and Community Groups were also contacted to verify information to solicit their concerns. Based on the analysis of information the impacts have been predicted, mitigation measures prepared and monitoring plan has been developed.

1.6 Description of the Proposal

7. The proposed 35.22 km long earthen road in Manang District constructed in 2006 links the remote area of the District to its headquarter. The road is currently of earthen surface. This road starts from Chame of Chame Village Development Committee (VDC) and ends at Khangsar gate of Khangsa VDC. In Between the road passes through Pisang, Bhraka, Manang and Tanki Manang VDCs of the District .Widening, geometric correction and grade improvement, slope stabilization, side drains and construction of cross drainage structures is planned to be implemented under the proposed rehabilitation works of the road. The total project cost is estimated at average of NRs. 275448004 with NRs. 7820784 /km.

1.7 Construction Approach

8. The construction approach will be labour-based, environment-friendly and participatory (LEP) ensuring minimum damage to local environment. The important features of the 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.

1.8 Proposed Schedule for Implementation of Subproject

9. Following Table 1.1 shows the proposed implementation schedule of the Subproject:

Table 1.1: Subproject Implementation Schedule

SN	Activity	2008	2009				2010				2011	
		IV	I	II	III	IV	I	II	III	IV	I	II
1	**Detailed survey and design**											
2	**Preparation of resettlement plan**											
2.1	Life skill and income generation training											
3	**Environment Assessment and Monitoring**											
3.1	IEE report preparation and approval											
3.2	Implementation of EMP											
3.3	Environmental monitoring											
4	**Construction Work**											
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: Location of Chame-Khangsar Road Subproject in Manang District

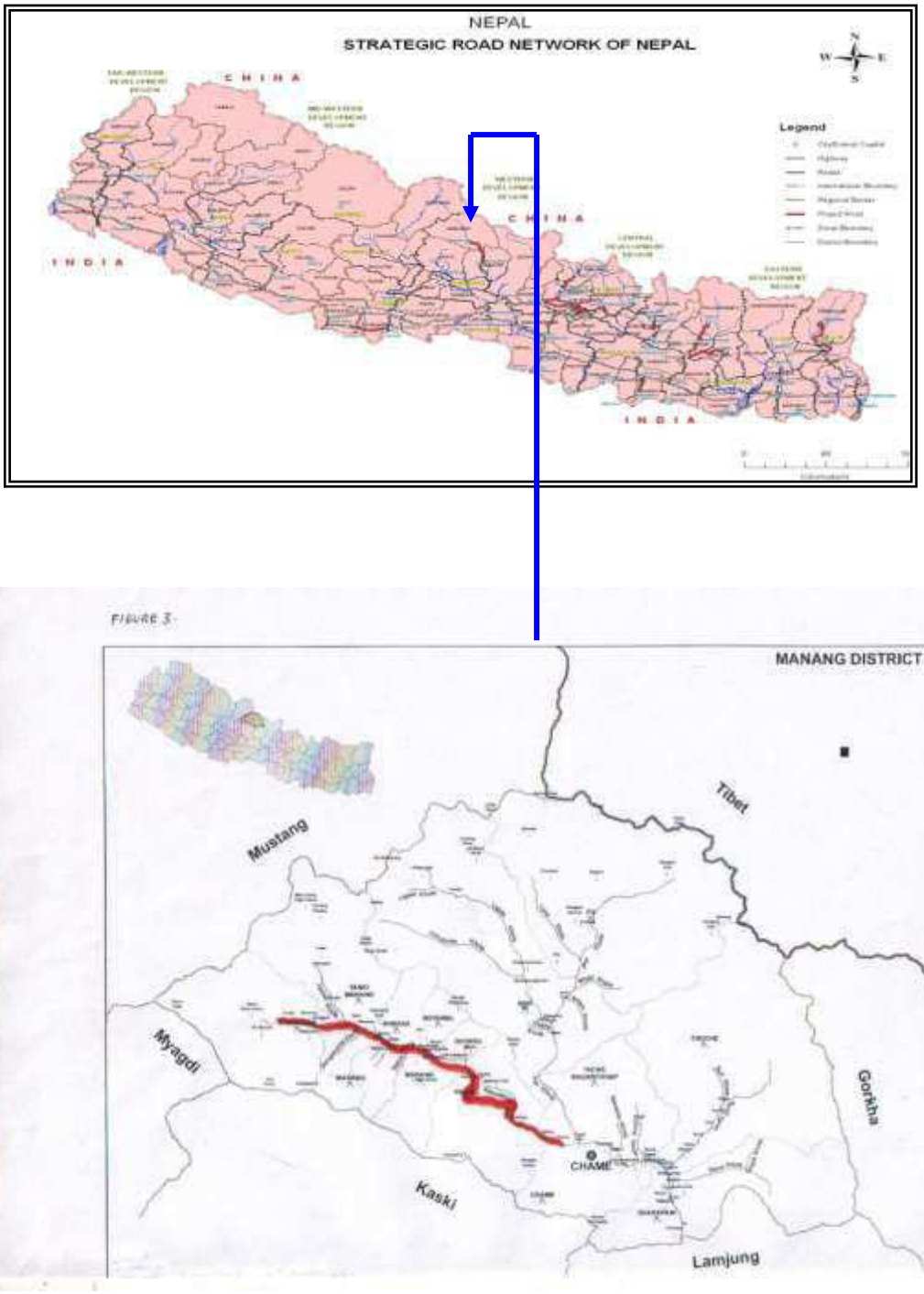


Figure 1.2: Alignment of Chame-Khangsar Road Subproject

1

PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

Public Consultation

10. In order to ensure the involvement of concerned stakeholders, following procedures were followed:

- Publication of Public Notice- a 15 days public notice was published on 16 Baishak 2066 in the Gorkhpatra national daily newspaper (see Annex V) seeking written opinion from the concerned VDCs, DDC, schools, health posts and related local stakeholders. A copy of the public notice was also affixed in the offices of the above mentioned organizations and *deed of enquiry* (*muchulka*) was collected (see Annex VI and Annex VII).
- Interaction with local communities and related stakeholders like District Forest Office, District Soil Conservation Office, District Agricultural Development Office and others were carried out during field survey to collect the public concerns and suggestions (see Annex VIII). Focus Group Discussions were conducted in all the five VDCs to collect and solicit their suggestions on protection of bio-physical and socio-economic environment in the Zone of Influence (ZOI) of the road. Summary of minutes of meeting is given in Annex IX and following Table 2.1.
- Draft IEE report was kept at information center of DDC, Manang and Chame,Pisang,Bhraka,Manang,Tanki Manang,and Kharsang VDCs for public disclosure. Information was also disseminated through person to person contacts and interviews and group discussions. Recommendation Letters for implementation of the Proposal were also obtained from all the concerned VDCs (see Annex X).

Table 2.1: Summary of FGD Meeting Conducted Under IEE Study

Location	Date	No. of Participants		Decision
		Male	Female	
DDC/DTO Office, Chame,	24 Baishak, 2066	8	4	1. FGD program disseminated information on the project to stakeholders. 2. Participants committed on providing land voluntarily for the road. 3. Cash compensation has been demanded for building structures and standing crop 4. Free distribution of seedlings has been demanded for private planting 5. Good drainage system in market areas, and protection of water sources has been demanded. 6. Project work should be careful to protect environment.
DTO, , Manang	28 Baishak, 2066	13	7	
Bhraka	27 Baishak, 2066	20	5	
Pisang	26 Baishak, 2066	17	8	
Tankimnang	28 Baishak, 206609	14	8	
Kharsng	30Baishak, 2066	10	5	

11. The approved IEE report is accessible to interested parties and general public through the websites of ADB and MoLD/DoLIDAR. The copy of approved IEE report has been distributed to following offices:

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

2. Review of Relevant Acts, Regulations and Guidelines

12. The IEE study has followed the provisions of following acts, regulations and guidelines of Government of Nepal and ADB to ensure conservation of environment during proposal implementation and operation.

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

3. Baseline Environmental Condition in the Subproject Area

13. Baseline information on the existing physical, biological and socio-economic and cultural environment of the zone of influence (ZoI) of the proposed Subproject is described in this Chapter.

3.1 Physical Environment

3.1.1 Topography

14. The elevation of the starting point of the road at Chame is 2620m and at the end of road at Khangsar gate 3850m. The road alignment passes through the upper valley slopes. The grade of the road varies from 5% to 16%. Major portion of the road passes along the south-west facing slope.

3.1.2 Geology and Soil Type

15. The road section comprises of different types of Metamorphic and sedimentary. Soil type along the alignment can be classified as alluvial, colluvial, residual, boulder mixed soil, and hard and soft rock. Following Table 4.1 presents the geological features recorded along the road alignment.

Table 4.1: Geological Features along the Road Alignment

Chainage	Location	Terrain slope	State of Land	Land Use Pattern	Geological Problem
0+000 - 0+700 Km	Chame	Moderate	Dry	Forest	
0+700 - 17+600 km	Pisang	Steep	Dry	Barren+Cultivated + Forest	
17+600 - 23+000 km	Manang	Steep	Dry	Cultivated+ Forest	
23+000 - 28+000 km	Bhraka	Steep	Dry	Barren	
28+000 - 31+000 km	Tankimanang	Moderate	Dry	Barren+Cultivated	Small scale landslide
31+000 - 35+220 km	Khangsar	Steep	Dry	Barren+Cultivated	Small scale landslide

Source: Field survey, July, 2009

3.1.3 Land Use

16. Land use pattern of the area through which the road passes through settlement,cultivated land, forest and barren as shown in Table 4.2.

Table 4.2: Summary of Land Use Pattern along the Road Alignment

Type of Land	Chainage		Length(m)	Existing Width(m)	Additional Width (m)	Existing area (ha)	Additional Area (ha)
	From	To					
Built up area	0+800	1+100	300	3.5	1.5	0.105	0.045
	5+500	5+650	150	5	0	0.075	0.000
	10+400	10+900	500	5	0	0.25	0
	15+360	15+560	200	5	0	0.1	0
	20+800	21+800	1000	5	0	0.5	0
	25+546	26+000	454	5	0	0.227	0
	27+050	27+500	450	5	0	0.225	0
Sub total						**1.482**	**0.045**
Forest land	0+000	0+800	800	3	2	0.24	0.16
	1+100	5+500	4400	3	2	1.32	0.88
	5+650	10+400	4750	4	1	1.9	0.475
	10+900	13+500	2600	3.5	1.5	0.91	0.39
	15+000	15+360	360	3	2	0.108	0.072
	15+560	20+000	4440	3	2	1.332	0.888
	21+800	25+166	4366	3	2	1.3098	0.8732
Sub total						**7.1198**	**3.3782**
Barren land	30+000	33+800	3800	2	3	0.76	1.14
						0.76	1.14
Cultivated	13+500	15+000	1500	3	2	0.45	0.3
	20+000	20+800	800	3	2	0.24	0.16
	25+166	25+546	380	3	2	0.114	0.076
	26+000	27+050	1050	3	2	0.315	0.21
	27+500	30+000	2500	3	2	0.75	0.5
	33+800	35+220	1420	3	2	0.426	0.284

Sub total				2.295	1.53
Total				**11.6568**	**6.4532**

Source: Field Survey, July, 2009

3.1.4 Climate

17. The road lies in the alpine/Cool temperature climatic region. Rainy season starts from June and ends in September. The meteorological record shows total average annual rainfall of 110 mm. Average minimum temperature of -10 °C and average maximum temperature of 22 °C is observed in the area. (*Source: District Profile of manang, 2058*)

3.1.5 Hydrology and Drainage System

18. There are 41 numbers of natural drainages with rivers at 2+876, 14+460 and 25+167. The summary of the cross drainages along the road alignment is given in Annex XIV.

3.1.6 Soil Erosion and Sedimentation

19. 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 areas but many small slides and erosions area are found along the road. There is approximately 30*10m and 80*10 landslide near Bhartang The locations are Ch 3+200, 12+700,4+500,7+500,12+230,18+200..

3.1.7 Existing Road Condition

20. The road is earthen. Average width of the road is 4m.

3.1.8 Air, Noise and Water Quality

21. The air, noise and water quality are not measured or tested, but are observed to be within acceptable limit. Dust emission during vehicle operation has been a nuisance which becomes more significant during dry and winter seasons.

3.2 Biological Environment

22. This alignment passes through protected area.

3.2.1 Vegetation

23. The forest is sparse with dominant species observed in the road alignment are Salla (*Pinus wallichina),*Apple*(Pyrus comunis),* Dhupi*(Picea Smithiana) ,*Bhojpatra*(Betula Utilis).* NTFPs are not significant.

3.2.2 Wildlife

24. Common wildlife including Musk deer,leopard,Snow leopard, wolf, wild dog,Jackle,Himalayn tahr Ghoral, serow and Barking Deer (*Muntiacus muntijak*) are the mammals and There is one types of types of birds found along the road alignment i.e crow.

3.2.3 Aquatic Life

25. Fish species found in water bodies are Asala (*Schizothorax plagiostomus*).Fish species are rarely found in the alignment area river. These fish species are mainly found in Marshyangdi Khola.

3.3 Socio-economic and Cultural Environment

3.3.1 Population, Household and Ethnicity

26. The demographic profile of the concerned VDCs is presented in following Table 4.3. Major castes in the area are Gurung,Lama,Ghale and Dalit.

Table 4.3: Demographic Profile of VDCs

VDC	Population			HH	Average HH Size
	Male	Female	Total		
Chame	500	365	865	173	5
Pisang	250	275	525	75	7
Bharka	121	107	228	38	6
Manang	390	372	762	127	6
Tanki Manang	221	367	588	84	7
Khangsar	92	130	222	37	6
TOTAL	1574	1616	3190	544	6.16

3.3.2 Main Occupation

27. The main occupation of the area is agriculture & livestock (26.83%), and business & commerce (73.17%).However, agriculture farming is not enough for subsistence due to small landholding size and low productivity. Therefore people also depend on seasonal labour in Nepal and India.

3.3.3 Market Centres and Business Facilities

28. Major settlements along the road alignment are Chame,Talekhau. Bhratang, Dhukurpokhari, Pisang, Humde, Mugje, Bhraka, Manang,Tanki Manang and Khangsar. Grocery shops exists in almost all settlements. According to survey data, 150 hotel and lodges, 34 restaurant / tea shops, 20 grocery shops, and 12 other shops (stationery, medicine, etc.) are present in the area.

3.3.4 Local Economy

29. The economy of the area is predominantly (27% of the population) agriculture-based, and some are harvesting forest products such as timber. Local people are gradually attracted towards cultivation of such as apple,Potato etc. Dairy production and selling it to the local market has been also another source of income for local farmers. Cultivation of fruits and vegetables for commercial purpose aiming market of Kathmandu valley seems to be increasing. Local people also do business activities in all settlement. Many people seasonally migrate to Kathmandu ,Lamjung, Gorkha and India during off-agriculture season to earn money for their livelihood.

3.3.5 Agriculture Pattern

30. Major crops grown in the Subproject area are rice,Buck wheat, maize, potato and barley. Cash crop farming is also increasing in recent days.. The area has appropriate climate and soil for farming of such as apple as cash crop.

3.3.6 Livestock

31. Due to lack of availability of good number of fodder trees and excessive cold , the Subproject area has less potentiality of cow and buffalo farming for dairy, but goat farming is done for meat. Currently, the existing road has facilitated selling of goat from all the Subproject VDCs.

3.3.7 Industry

32. Some local people are engaged in wine product of Apple, making furniture, dairy, Khuwa (butter) production, , and tailoring but here no any big industry is found. The area has high potentiality for agro-based industries.

3.3.8 Tourism Potential

33. The Subproject area has potentiality of eco-tourism development. Manang is famous for the tourism,so almost all settlement have attractive lodge and restaurant.

3.3.9 Health and Sanitation

34. People use water from dug well and spring. Open defecation is also prevalent. Major health problems observed in the area are gastric, water borne diseases, gout, respiratory diseases, and skin disease,. Sanitation awareness among local people is increasing and many of them have toilets in their

home, but there is no public sewerage system. People discharge their wastewater in the nearby natural streams.

3.3.10 Public Services and Infrastructures

Table 4.4: Infrastructure Facilities in the Project Area

Infrastructure Facilities	Details
Education	7 educational institutions ranging from primary level to college level exists in the area. There is a higher secondary school in Chame. 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 35 percent.
Health	6 health posts/sub health posts exists in various settlements
Communication	All of the settlements have telephone facilities mostly with CDMA connection.
Electricity	Solar system is used,no any national grid transmission system are available in sub project area
Water Supply	Piped drinking water supply is available to all settlements
Other Infrastructures	There is a Suspension Bridge, water mills;, diary firms and Veterinary Service Sub Centre are also available in the project area
Financial Institutions	There are 1 nos. of saving and credit cooperatives in ZoI .
Community Center	3 nos. in all VDCs.

Table 4.5: Public Services and Infrastructures along the Road Alignment

Type of Public Service and Infrastructure	Chainage/ Location	Distance from the Road	Remarks
Irrigation canal	1+170,13+800,21+200 25+450,27+100,29+900	Crossing the road, along the road	May damaged during road construction
Community structure	13+440	Adjacent	May damaged during construction
Tap Stand	10+415,10+510,10+680	Adjacent	May damaged during construction

3.3.11 Existing Traffic Situation

35. Animals are mainly used for commuting and transportation of milk and vegetables.

3.3.12 Land Holding Pattern

36. Land holding pattern within the ZoI of the road demonstrates that most of the population (26.47%) have 1-5 ropani (approximately 1 ha= 19.8 ropani) land while 24.26% households have 5-10 ropani ,10.49%HHs have 10-20 ropani,3.86%HHs have 20-50 ropani and 25.92% HHs have less than one ropani land. 9% households are landless (see Annex XI c.).

3.3.13 Food Security

37. About 34.94% of the households have enough food for only three to nine months, 11.58% for whole year, 34.96% for three months 9.38% households for less than three months category and 9.46% households are reported as food surplus ones. Food sufficiency condition is given in Annex XI d.

3.3.14 Migration Pattern

38. Few permanent migrations take place annually towards Kathmandu, and seasonal migration to Kathmandu,Gorkha, Lamjung and India during slack farming season from months of Mangsir to Poush (Nov-Jan).

3.3.15 Settlement and Market

39. Major settlements within ZoI are Chame,and Manang Housing pattern of these scattered settlements are mostly one to two storied. Some of them are also of thatch roof. RCC buildings have started to appear in the market centres.

3.3.16 Potential for Development

40. The potential of the Subproject area are as mentioned in Table 4.5 below.

Table 4.5: Development Potentialities in Various Sectors

SN	Sector	Devlopment potentiality
1	Agriculture	potato, vegetable farming, , 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 Chame,Pisang and manang Settlements.
3	Small and Cottage Industry	Apple, 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 chame and Manang.

Source: Field Survey, July, 2009

3.3.17 Religious, Cultural and Historical Sites

41. There are no significant sites of religious, cultural and historical importance in the ZoI.

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

4.1 No Action Option

43. This alternative assesses the consequences if the Proposal is not implemented. An earthen road currently exists. The road connects a remote and poverty ridden area with high potential in Appleand dairy productions. People have been selling the products to the markets of Besisahar. However, travel time and cost is high due to seasonal nature and earthen standard of the existing road. Rehabilitation of the road will decrease the cost as well as provide better access facility with enhanced opportunity for development of the area without any additional significant adverse impacts. The no action option may avoid environmental impacts, but only at the cost of poverty and underdevelopment of the area. Development is must for attaining poverty reduction goal of the government, and access facility is the basic infrastructure that facilitates overall development. Thus, this option is not relevant for the Proposal.

4.2 Proposal Alternatives

44. Construction of ropeway, airport and road could be the options for achieving the transportation and access. Ropeway primarily serves to transport goods and it normally does not provide facilities for human mobility except if it is built with cable car facility, which is very costly. In the current power crisis situation in Nepal, cable car cannot be operated efficiently at all time. Also, it does not connect and serve the settlements along the alignment. Hence this alternative is not relevant for the Proposal. Air connection is not feasible due to short distance and high cost beyond of reach of local people. The proposed road project is the best alternative for cheap and efficient transportation.

4.3 Alternative Alignment

45. The alignment of the road is an existing and fair weather earthen track with 4m width. Since this is an existing road, the proposed rehabilitation need minimum to acquire additional land and clearing of trees will be minimum. Hence, new alternative alignment is not feasible and the proposed existing alignment can be the best option.

4.4 Alternative Design and Construction Approach

46. The conventional road construction use contractors with heavy machineries and equipment, explosives, heavy concrete structures for retaining slopes and gravelled surfacing. Green road approach is normally referred as labour based, environment friendly and participatory (LEP) method which focuses to give least disturbance to local topographical settings and conserve the delicate mountain ecology. Under this approach, construction work is done manually by the local labour without using heavy machinery and explosives. Spoil disposal is minimized through balance in cutt and fill. Soft engineering structures are used as far as possible. Vegetation cover is maintained through application of re-plantation and stabilization of slopes is achieved through bio-engineering. Using local manual labor helps to inject money in local economy through the wages earned by the people. There will also be ownership feeling among the community towards the road.

47. The proposed road has been designed considering combination of both the LEP approach for works possible through manual labor (earth excavation, bio-engineering, gabion structures), and contractor-based approaches for works that require mechanized applications (gravelling or construction of RCC cross drainage structures).

4.5 Alternative Schedule

48. During the rainy season and Snowfall season (Dec-Feb), the construction work will be stopped. Rehabilitation and construction work will be carried out during the remaining months. The construction period is more appropriate from October to June due to dry weather.

5.6Alternative Resources

49. Stones and boulders for gabions and masonry are available in nearby quarries, whereas fine aggregates like sand has to be transported from other location. The proposed construction will optimally use the local labour force and local materials.

5. Identification of Impacts and Mitigation Measures

50. 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. The impacts have been predicted in terms of their magnitude, extent and duration. The possible impacts (positive and negative) in construction and operation phases are presented in the following sub-sections. Beneficial impacts maximization and adverse impacts mitigation measures are also suggested hereunder (see Table 7.2 in Chapter 7).

5.1 Mitigation Measures During Pre-construction phase

5.1.1 Route Selection

51. Since, this is an existing road and proposed for rehabilitation the same alignment shall be followed with required geometrical improvements and widening of the road to the specified width of 4m. Local conditions and requirement for private land acquisition and protection of forest will be taken into due consideration while designing the road rehabilitation work.

5.1.2 Detailed Survey and Design

52. The road design will follow the rural road standards of DoLIDAR. The works will be executed through labor intensive construction method as far as possible. Bio-engineering technique will be applied for stabilization of slopes. Land for lay-bys and other improvement works will be selected by avoiding private land. Due care shall be taken to avoid acquisition of houses.

5.1.3 Land and Property Acquisition, Compensation and Resettlement

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

5.2 Beneficial Impacts and Benefit Augmentation Measures

5.2.1 Construction Stage

5.2.1.1 Employment Generation and Increase in Income

54. *Impacts:* Employment opportunity for local people during construction of the road, without gender biasness, is 159897 person days, with 6110 for skilled and 153787 for unskilled labor. Efforts will be made to employ more than 40% women workers. The amount of money earned as wages will directly support various economic activities of the people, and assist to empower women and indigenous people. It will assist towards enterprise development with multiplier effect if wage is used for economic investments. This is one of the direct and significant impacts of the project but it is of short-term and local in nature.

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

5.2.1.2 Skill Enhancement

56. *Impacts:* Working in construction of the road is likely to enhance skills of local people in construction works. Trainings on construction and maintenance of structures will further enhance their skill. The skill and knowledge thus acquired will make them find employment opportunities in future projects. This impact is indirect, medium, local and long-term in nature.

57. *Measures:* Members of the Road Building Group will be given training on masonry, netting wires and construction of gabion wall, slope cutting, bioengineering works.

5.2.1.3 Enterprise Development and Business Promotion

58. *Impacts:* During construction period, different types of commercial activities will come into operation in order to meet the demand of workers. Since they will have good purchasing power, they will regularly demand for different types of food, beverage and other daily necessary items. Local shops and restaurants will be opened to meet these demands around the vicinity of *the* construction sites. This impact is direct, low significance, local and short term in nature.

59. *Measures:* Training in cooperatives, and promote use of local products by the construction crews.

5.2.1.4 Community Empowerment and Ownership

60. *Impacts:* During construction various road construction coordination committees and road building groups will be constituted in order to facilitate in implementation of the road. 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. This impact is indirect, low, local and short term.

61. *Measures:* The coordination committees will be constituted and training will be given to them.

5.2.2 Operation Stage

5.2.2.1 Improvement in Accessibility and Saving of Time and Transportation Cost

62. *Impacts:* Rehabilitation of road will enhance the access of people to social services, and quick transportation of goods. Travel time and cost will be cheaper. This impact is direct, high, regional and long term.

63. *Measures:* Proponent will undertake regular maintenance of the road.

5.2.2.2 Increase in Trade, Commerce and Development of Market

64. *Impact:* Improved access will increase economic activities and minor local markets like Chame,Pisang and Manang markets will grow. Productivity will increase due to cheaper transportation of agricultural inputs. Sale of farm and livestock products will increase in the bigger markets of Manang district. This will support the economy of rural area. The impact will be indirect, significant, local and long term in nature.

65. *Measures:* DDC/VDCs shall manage planned growth with required infrastructure facilities in the market areas. Agriculture extension services, market linkages and networking for better market price will be coordinated with district agriculture office.

5.2.2.3 Appreciation of Land Value

66. *Impacts:* Construction of road will lead to appreciation of land values due to availability of reliable access facility. This will uplift the economy of local people. Financial institutions may accept their land as mortagage for lending. The impact is indirect, medium, local and for long term.

67. *Measures:* Promotion of land development activities and control of encroachment within RoW. Awareness program shall be organized on use of high value land to get bank loans for setting up enterprise ventures.

5.2.2.4 Enhancement of Community Development Services

68. *Impacts:* Improved access will contribute in improvement of social services in the area such as education, health, government offices, saving and credits. Improved access will facilitate stay of extension workers, teacher, and doctor to their rural duty areas. This is indirect, significant, regional and long-term impact of the proposed project.

69. *Measures:* The access will be kept maintained so that other services will follow in the area.

5.2.2.5 Women and Indigenous People Empowerment

70. *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 institutes, women development office etc. Frequency of visit to such agencies will increase awareness level and empowerment. The impact will be indirect, significant, local and for long-term.

71. *Measures:* Assist to organize women groups, provide training and social mobilization, provide micro-finance and encourage cooperatives to undertake commercial scale farming activities.

6. 3 Adverse Impacts and Mitigation Measures

6.3.1 Construction Stage

72. The proposed road will be constructed according to LEP approach where manual works are possible; and contractor-based approach where the work cannot be done manually. The likely impacts on physical, biological, socio-economic and cultural resources of the proposed road area and respective mitigation measures are presented hereunder.

6.3.1.1 Physical Impacts

1. Change in Land Use

73. *Impacts:* Construction of road will convert 1.53 ha. of cultivated land, 1.14 ha.of barren land, 3.378 ha.of forest and 0.045 ha.of settlement areas into road structure. The impact will be high, direct, local and for long term.

74. *Measures:* Minimize use of fertile agriculture land and forest areas, private properties. Plantation of trees will be done to increase greenery in the area.

2. Slope Instability

75. *Impacts:* Removal of vegetation and open cuts with exposed soil to rain may cause soil erosion as well as landslide. As the road is an existing corridor, hill slopes will not be disturbed by new cuttings of slope. Major instability areas along the road alignment are at Ch 4+500,7+500,12+230, 18+200. The likely impact is direct, high to medium, site specific and short to medium term depending on cases.

76. *Measures:* The mitigation measures will be balance cut and fill; ensuring minimum cut slope depending upon the soil type; Re-vegetation of exposed areas; adoption of bio-engineering techniques; no construction work during rainy season; and use of soft engineering structures (dry wall, check dams) before disposing spoil. Recommended civil engineering structures and bioengineering measures necessary at various chainages for slope stabilization have been given in Annex XVII.

3. Spoil Disposal

77. *Impacts:* Unmanaged disposal of spoil may cause gullying and erosion, block drainages, damage farm lands, crops and forest, waterlogging and may threat settlements. The impact from spoil disposal will be direct, high, local and long term in nature.

78. *Measures:* Spoil will be safely disposed and managed at designated site with minimum environmental damage. Engineer will give approval for disposal site of spoil. Balanced cut and fill and re-use of excavated materials will be given emphasis. Spoil will be used to reclaim land or eroded areas. Disposal site will be provided with proper drainage, vegetation and adequate protection against erosion. Potential safe spoil management areas are given in Table 6.1.

Table 6.1 Potential Spoil Disposal Sites

SN	Chainages	Recommended Spoil disposal sites
1	0+250	Disposal site at lower side of the road
2	2+150	Lower part of Talekhu
3	3+200	Near Marshyangdi River(LB)
4	4+100	Near Marshyangdi River(LB)
5	4+850	Near Marshyangdi River(LB)
6	6+00	Near Marshyangdi River(LB)
7	6+500	Near Bhartang Bhir
8	7+100	Near Kholsi

9	8+500	Near Kholsi
10	9+800	Near Dhukarpokhari Bazar
11	11+900	lower side of road east of dhukarpokhari tal
12	13+400	Near chauwai Khola
13	16+000	Near kholsa
14	19+300	Humdre
15	29+400	Near Suspension bridge of manang
16	30+200	Near tanki Khola
17	32+400	Near Marshyangdi River
18	33+350	khangsar chaur

Source: field survey, July, 2009

4. Quarry/ Borrow Operation

79. *Impacts:* Potential adverse impacts are accelerated land erosion, landslides, disturbance in natural drainage patterns, water logging and water pollution. The likely impact will be direct, medium in magnitude, site specific in extent and short term in duration.

80. *Measures:* The mitigation measures will be quarry and borrow operation plan will be prepared and approved by Engineer; unstable sites, erosion prone area, forest area, settlements, fertile farm land will be avoided for quarry / borrow operation; quarry sites will be rehabilitated by providing appropriate civil engineering structures and bioengineering measures after the extraction is complete. Recommended quarry sites in the area are given in Table 6.2.

Table 6.2: Recommended Quarry Sites

SN	Chainages	Places of recommended quarry sites
1	0+050	Stone quarry at upper side of the road in a limited scale
2	2+250	Stone collection from Marshyangdi river and nearby sides
3	4+700	Stone collection from Marshyangdi river and from rocky portion of hill in a limited scale
4	6+690	Stone quarry at upper side of the road in a limited scale
5	7+000	Stone collection from Marshyangdi river and nearby sides
6	13+260	Stone collection from Chauwai khola and nearby sides
7	14+510	Stone collection from Ghatte khola and nearby sides
8	16+100	Stone quarry at upper side of the road in a limited scale
9	21+050	Stone collection from humdre khola and nearby sides
10	23+550	Stone collection from sabje khola and nearby sides
11	25+160	Stone collection from Marshyangdi river and nearby sides
12	29+200	Stone collection from Marshyangdi river and nearby sides
13	31+450	Stone collection from Marshyangdi river ,thoran khola and nearby sides
14	32+900	Stone collection from Marshyangdi river and nearby sides

Source: Field Survey, July, 2009

5. Air, Noise and Water Pollution

81. *Impacts:* Although the air quality of the project area is not measured, the air does not appear to be polluted. Dust will be major problem during both the construction and operation of the road. Impact on air quality will be direct, low, local, reversible and for short term.

82. The project area at present does not experience higher levels of noise pollution. 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, site specific, reversible and short term.

83. The water quality in the project area appears to be fairly clean and not polluted. During construction these waterbodies may be polluted by spoil and construction wastes. The impact will be direct, low, local, short term and reversible.

84. *Measures:* The mitigation measures will include 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; avoid disposal of excavated materials in the waterbodies; cover dry material or make it wet during transportation. Both the sides of the road alignment will be planted with trees, as far as possible which will act as sound and noise barrier.

6. Water Management

85. *Impacts:* Water from the roadside drain outlets may cause erosion and landslide affecting the stability of the road. Natural drainage may get blocked due to construction of road. The impact will be indirect, medium, site specific and medium term.

86. *Measures:* The mitigation measures will be to provide adequate numbers of drainage structures in order to have minimum interference with natural drainage pattern of the area; channelize surface water discharge from side drains; do not block or divert water away from natural watercourse; adopt outward road slope as per green road standard to minimize water accumulation. Details about necessary structures required to mitigate the water induced adverse impacts are as given in Annex XIV.

7. Location of Camp Sites

87. *Impacts:* Camp will not be required if works are carried out by RBGs. However, contractor, if used, will establish camp if he bring labors from outside the area. Siting of camp may cause encroachment of forest, agriculture land, alteration of drainage, solid waste and waste water problems. Impact will be direct, medium significance, site specific and short-term.

88. *Measures:* The mitigation measures will be use of local labors to avoid camp; rent local house instead of camp to keep labors; siting camp away from productive lands and forest areas; pay compensation for using private farm or lands for storage or camp; fuel and chemical storage areas will be on paved surface with surrounding catch drain to protect soil from leakage. Appropriate camp sites have been observed at 4+660 near pisang, and at 26+395 near Manang.

8. Crusher Plants

89. *Impacts:* The crusher plant operation may cause dust and noise pollution. Impact will be direct, high significance, site specific and short-term.

90. *Measures:* The mitigation measures will be to procure gravel from market as far as possible; if crusher plant is necessary, it will be located far from settlement and sensitive ecological areas; all measures to reduce dust and noise nuisance will be ensured; operation will be done only in day time.

6.3.1.2 Biological Impacts

1. Loss or Degradation of Forests and Vegetation

91. *Impacts:* Total of 3.378 ha of forest will be permanently lost and 650 trees will be removed (see Annex XII). Major species to be cleared include salla (624), and Apple (26). The impacts on vegetation/forest resources have been considered to be direct, high in magnitude, site specific in extent and long term in duration, whereas loss of other forest resources will be low, local and long term.

92. *Measures:* The loss of trees can not be minimized; however, it can be compensated by replantation. Following the 'Work Procedure for Providing the Forest Land for Other Use, 2063' of Government of Nepal (cabinet decision of 10.11.2063 B.S.), Proponent will manage a nursery to grow tree sapling and plant them in 1:25 ratio for each cleared tree. Trees will be planted on both sides of the road.

2. Impact on Wildlife Due To Loss of Habitat and Hunting

93. *Impacts:* The proposed area is not a significant habitat of wildlife and bird species. However, there are forest areas around the ZoI where common species of wildlife exists. Construction work may disturb these wild animals and birds. Workers may harass or kill wildlife. However, there are community forests and people are aware to protect trees and wildlife. The impact will be indirect, low, local and short term in nature.

94. *Measures:* The mitigation measures to be adopted will include limiting work within road width; tree shall not be cut unless absolutely necessary; construction activities near forest area will be managed to avoid disturbance to the wildlife habitat; workers shall be strictly discouraged from collecting fuelwood or hunting/harassing of wildlife.

3. Impacts on Flora and Fauna (as listed in CITES and IUCN Red Data Book)

95. *Impacts No impact on flora and fauna.* The impact will be indirect, medium, local and for short term.

.

6.3.1.3 Socio-economic Impacts

1. Loss or Degradation of Farm Land and Productivity

96. *Impacts:* There will be permanent loss of 1.53 ha of agricultural land due to road rehabilitation. This may reduce annual production of Potato,Apple, and Barley. Dust settling on crop and vegetation will also affect production. This impact is expected to be of high in magnitude, local in extent and long term in duration

97. *Measures:* Minimize acquisition of productive land; compensate for loss of property; compensate for loss of standing crops and temporary use of agriculture land; plant trees along both sides of the road to act as dust and noise barrier. Tree planted along RoW will protect settlement and crops from dust.

2. Loss of Private Properties

98. *Impacts:* The proposed road alignment will damage twenty three private properties among them eleven are houses. The location and detail of these are presented in Annex XV. The impact will be direct, high significance, site specific, and long term.

99. *Measures:* A Resettlement Plan will be prepared to address acquisition and compensation issues through the Compensation Determination Committee under chairmanship of the Chief District Officer.

3. Impact on Community Infrastructure

100. *Impacts and Measures:* The community infrastructure that requires reconstruction / rehabilitation during construction works, and the mitigation measures are as presented in following Table 6.3.

Table 6.3: Impact on Community Infrastructure and Mitigation Measures

Infrastructure	Location	Distance from the Road	Potential Impact	Mitigation Measure	**Remark**
Chhorten+Mane	0+005 to 1+180			Damaged during road construction, required to reinstate.	
Chhorten+Mane	5+550 to 5+555	Crossing the road	Crossing the road	May damaged during road construction, required to reinstate.	
Chhorten+Mane	10+680 to 10+700	Adjacent	Adjacent	Relocation required.	
Chhorten+Mane	21+100 to 21+200	Adjacent	Adjacent	May damaged during construction	
Chhorten+Mane	27+900 to 27+905	Adjacent	Adjacent	May damaged during construction.	
Irrigation Canal	1+170,13+800,21+200, 25+450,27+100,29+900	Crossing the road	Crossing the road	May damaged during construction	
Tap stand	10+415,10+510,10+680	Crossing the road	Crossing the road	May damaged during construction	
Community building	13+440 to 13+480	Adjacent	Adjacent	May damaged during construction	

4. Health and Safety Matters

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

102. *Measures:* Make mandatory the use of helmets, safety belts, masks, gloves and boot by workers depending on nature of work; sprinkle water at high dust sites; provide clean drinking water at sites and camp; pit toilets at sites and camp; first aid facilities at sites and camp with training to use them; provide

group accidental insurance for workers. Awareness generation to local people and workers on HIV AIDS and other communicable diseases.

5. Decline in Aesthetic Value

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

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

6. Impacts on Cultural, Religious and Archeological Sites

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

6.3.2 Operation Stage

6.3.2.1 Physical Environment

1. Road Slope Stability and Management

106. *Impacts:* Destabilization of slope (quarrying stones or soil, animal grazing, irrigated cultivation, opening of branch roads), poor maintenance of road, blockage of drains can lead to slides and slope failure. Sensitive areas for possible slope stability problems are the areas of steep cut; and surroundings of streams at 1+400, 3+590 6+120, 10+620, 25+190 and 30+100. The impact will be direct, medium local and long term nature.

107. *Measures:* The mitigation measures to be adopted include immediate clearance of slides and restoration of slopes; clear drainages; restoration of rill and gully formation; and conservation of soil.

2. Impact Due to Air, Noise and Water Pollution

108. *Impacts:* Dust will be generated from the gravel road and vehicles emit gaseous pollutants. 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. Thus, the impact will be direct, low, local and long term.

109. Noise during operation of road will increase. However, due to low traffic volume, the impact due to noise pollution will be direct, low, local and long term.

110. The disposal of spoil and household wastes, washing of vehicles in water bodies may degrade the water quality. The impact will be direct, low, local and long term.

111. *Measures:* Measures to be adopted will include plantation of trees on both sides of road as far as possible; restrict horn near forest, health posts, schools and settlements; provide speed limit for vehicle at sensitive areas.

6.3.2.2 Biological Environment

1. Depletion of Forest Resources

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

113. *Measures:* The mitigation measures recommended are support District Forest Office and VDCs to encourage and support local community in controlling illegal harvesting of forest resources; awareness *programs* organized to educate local people on the importance of forest conservation. Improved access will facilitate easy transportation of LPG Gas and kerosene to replace use of firewood.

2. Disturbance to Wildlife and Illegal Hunting

114. *Impacts:* Although there are no significant habitats of wildlife in the ZoI, they may be disturbed due to the frequent movement of vehicle and blowing of horn in the forest area. Poaching or illegal hunting of wildlife may occur due to easy access. The impact will be indirect, low, local and long term in nature.

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

6.3.2.3 Socio-economic and Cultural Impacts

1. New Settlement and Market Center Development

116. *Impacts:* Expansion of settlement area and market can be observed at Chame,Pisang,and manang. Encroachment of RoW may take place. This will reduce road capacity, increase road accidents, and adversely impact road. The impact will be direct, medium, local and long term in nature.

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

2. Change in Social Behavior

118. *Impacts:* Access facilities may bring social nuisance like increase in alcohol consumption, gambling, prostitution, and may increase girl traficking. The impact will be indirect, medium, local and long term in nature.

119. *Measures:* Support awareness raising programs and strengthen communities against such nuisances.

3. Road Safety Measures

120. *Impacts:* Movement of vehicles and inadequate road safety measures may invite accidents. The impact will be direct, medium, local and long term in nature.

121. *Measures:* The mitigation measures to be adopted will be applying appropriate road safety measures with the help of 3-Es i.e. Engineering, Enforcement and Education; and required safety signs will be used along the road.

6. Environmental Management Plan

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

6.1 Institutions and Their Roles

Table 7.1: Concerned Institutions 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 Executing 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

123. 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 manual construction works. Contractor will be appointed for works requiring higher skill and mechanized support.

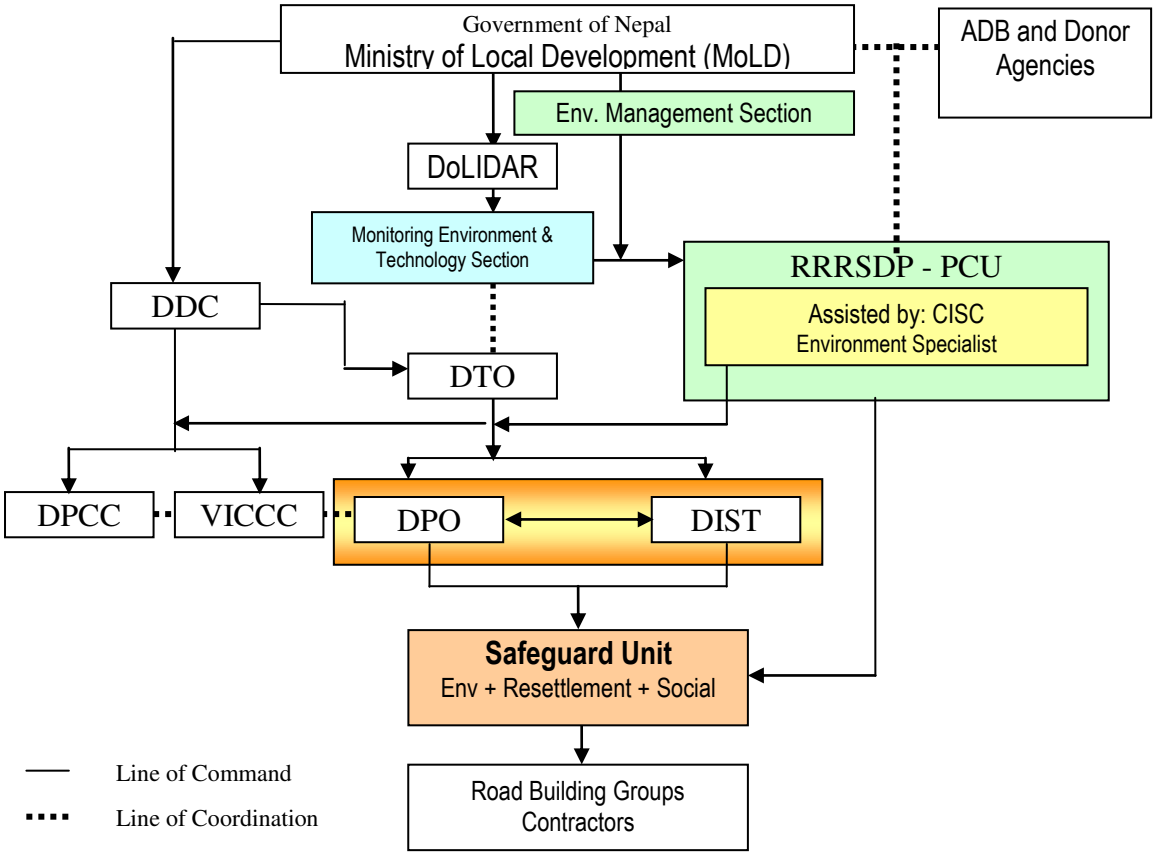
6.2 Reporting

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

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

126. 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



6.3 Environmental Management Plan

127. 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 EMP compliance. Overall implementation of the EMP will be the responsibility of the Proponent. Framework for implementing environmental management plan is shown in Table 7.2.

Table 7.2: Likely 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	Maximize manual work through local, poor, vulnerable and women. Training in income generation and skill enhancement. Skilled6110 nos, unskilled 153787	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	Training in cooperatives, and promote use of local products by the construction crews.	Contractor/ RGB	DIST/ CISC/PCU
Construction coordination committee and RBG program	Community Empowerment and Ownership	Increase in income and ownership.	IN	L	L	ST	Coordination committees will be constituted and training will be given to them.	DPO/DIST	DDC/DTO / CISC/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 in the market areas. Agriculture extension services, market linkages and networking for better market price.	DPO	DDC/VDC
Operation of Road	Appreciation of Land Value	Improvement in local economic condition	IN	M	L	LT	Promotion of land development activities and control of encroachment within RoW. Awareness program shall be organized on use of high value land to get bank loans for setting up enterprise ventures.	DDC/DPO	DDC/VDC
Operation of Road	Enhancement of Community Development Services	Ease of access to social service and raise in quality service	D	H	L	LT	Keep road maintained to ensure access facility that will attract development of other social services facilities	Local people, DDC, VDC	DDC, VDC
Operation of Road	Women and Indigenous People Enhancement	Poor, indigenous and women will have easy and frequent access to social services (education, health, community development, bank,training, CBOs and	IN	H	L	LT	Assist to organize women's groups, provide training in enterprise development, organize cooperatives, provide micro-financing to undertake production of commercial products, provide market services.	VDC / DDC	VDC / DDC

Activity	Effect	Related Beneficial Impacts	Type of Impact *)				Benefit Augmentation Measures	Responsible Agencies	
			Nat	Mag	Ext	Dur		Executing Agency	Supporting Agency
		networking)							

Table 7.3: Likely 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										
Physical Environment										
Construction of Road, site clearance	Change in land use	Loss of agricultural land (1.53 ha.); forest area (3.37 ha.), barren land (1.14 ha.). Cause production loss, loss of property, loss of forest area.	D	H	L	LT	IR	Minimize use of fertile land, forest, settlement areas.	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 site selection and management of spoil at designated areas approved by Engineer; provision of proper drainages, toe walls; Proposed spoil disposal sites are 0+250, 2+150,3+200,4+100,4+850,6+000,6+500,7+100 8+500, 9+800,11+900,13+400, 16+000, 19+300,29+400,30+200,32+400 and33+350.	DDC/DTO	DIST/VICCC/ VDC
Site clearance, excavation	Slope Instability (at Ch 4+500,7+500,12+230, 18+200)	Erosion, landslide, loss of property.	IN	M	SS	MT	Re	Civil structures with bio-engineering application (Such as Grass plantation, Tree/Shrub plantation, Brush layering, Palisades, Bamboo plantation, Live checkdam construction etc.) shall be used to stabilize the slopes. Drainage management (Catch drain, rip-rap drain, checkdam etc.)	DDC/DTO	DIST
Construction of Road	Water Management, generation of large volume of surface runoff	Erosion, landslide, damage to farmland	IN	M	SS	MT	Re	Proer drainage structures and proper spoil disposal, Avoid blockage or diversion of natural channels due to construction of road and disposal of spoils.	DDC/DTO	DIST
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	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, settlement, forest areas. Locate crusher plant away from these areas; cover material during transportation.	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	D	L	L	ST	Re	Proper spoil management, and prevention of leakage and spills of construction chemicals, restriction in urination and defecation in open areas	DDC/DTO/ Contractor/RBGs	DIST/VICCC
Cutting of slopes	Quarry/borrow operation and its potential effect on instability, landslide	Change in river regime, instability, land slide; damage to forest, farmland and property; water pollution	D	L	L	ST	Re	Proper selection and management of quarry sites, rehabilitation of quarry/borrow sites after completion of work. Recommended quarry sites are Ch 0+050, 2+250, 4+700,6+690,7+000,13+260,14+510,16+100,21+050,23+550,25+160,29+200,31+450 and 32+900	DDC/DTO/ Contractor/RBGs	PCU/CISC/DIST/ VICCC
Construction of road	Location of Camp Sites, Storage Depots	Encroachment of forest, agriculture land, solid waste,and waste water may cause pollution	D	M	SS	ST	Re	Locate camp site away from productive land and forest area (potential sites at 4+660 and 26+395); use local labor and local houses as camp; pay compensation to land owner of camp area; proper storage of chemical and materials.	DPO assisted by DIST/ Contractor	DIST/VICCC
Operation of heavy equipments	Crusher Plants	Dust and Noise pollution and health risks to workers	D	H	SS	ST	Re	Locate site away from farm and forest area; away from settlement and sensitive habitat; do not operate at night; water sprinkling facility to reduce dust.	DPO assisted by DIST/ Contractor	DIST/CISC/PCU
Biological Environment										
Clearance of vegetation necessary for road formation	Loss or Degradation of Forests and Vegetation (3.38 Ha, and 650 nos tree)	Loss of green cover; loss of environmental benefits from vegetation, disturbance in ecological function (dust and noise absorbance, aesthetic value etc	D	H	SS	LT	Re	Cutting of tree only in formation width, compensatory plantation of local species of tree at 1:25+30% ratio	DDC/DTO/DFO	DFO/CFUGs/DIST/VDC
Construction activity	Impact on Wildlife Due to Loss of Habitat and Hunting	Killing and harrasing of wildlife; 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
Construction activity	Impacts on Flora and Fauna	Loss of biodiversity	IN	M	L	ST	Re	Minimum site clearance, discouraging workers for collecting fuel wood from forest or hunting/harassing faunas	DDC/DTO/DFO	DF/CFUGs/DIST
Social-economic Environment										

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
Acquisition of land for maintaining road width*	Loss or Degradation of Farm Land and Productivity (1.53 Ha)	Reduced production, hardship, food shortage	D	H	L	LT	IR	Minimize productive land acquisition through alignment selection, Compensation for affected people	DDC/DTO	CFC[2] 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[3]/DIST
Demolition of structures along road alignment	Impact on Community Infrastructure	Loss of services (see table 6.3)	D	M	SS	ST	Re	Restoration or relocation of affected infrastructures: Tap Stand (10+415),(10+510),(10+680),community building (13+440),irrigation crossing 1+170,13+800,21+200,25+450,27+100,29+900	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	IR	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	DDC/DTO / Contractors	DIST/CISC
Construction of Road	Decrease in aesthetic value	Disturbances in working areas and scar on topography	D	L	L	ST	RE	Cover the road alignment by planting tree on both sides; manage working areas.	DPO in assistance by DIST / Contractors	PCU / CISC / Users Committee / VDC
Operation Stage										
Physical Environment										
Quarrying, operation of construction equipments	Road Slope Stability and Management	Slides and slope failure , Disturbance to traffic flow, pollution of water bodies, impacts on agriculture land, loss of vegetation.	D	M	L	LT	Re	Regular maintenance of slope protection structures, Selection of healthy upland farming techniques	DDC/DTO/VDC	DoLIDAR , DFO, District Watershed and Soil Conservation Office

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

[2] 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
										(DWSSC)
Operation of vehicles, Inadequate drainage	Air, Noise and Water Pollution	Disturbance to students, patients, wildlife, effect to nearby agriculture land and crops	D	L	L	LT	R	Speed limit for vehicles, no horn signs, use vegetation barrier; Regular maintenance of drainage.	DDC/DTO	DoLIDAR/Local administration
Biological Environment										
Road operation	Depletion of Forest Resources	Loss of timber, forest resources and benefits	IN	M	L	LT	R	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	R	Warning traffic signal, Awareness training to driver to limit speed and horn use	DTO/ CFUGs	DDC/CDO / DFO
Social-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	R	Awareness program, enforcement of law, planning of land development, plantation of trees.	DDC/DTO	CDO / VICCC
Operation of Road	Change in Social behavior	Social and cultural conflicts	IN	M	L	LT	R	Awareness, Enforcement of law and order, Provision of training for skill	DTO	DDC/DoLIDAR
Operation of Road	Road Safety Measures	Increase in accidents	D	M	L	LT	R	Appropriate road safety measures, Safety signs along the road.	DTO	DDC/DoLIDAR

* Legend *Value in parenthesis is level of significance*:

Nature- IN= Indirect; D= Direct
Magnitude- L= Low ; M= Medium ; H= High ;
Extent- SS= Site Specific ; L= Local; R= Regional ; N= National ; CB=Cross-boundary
Duration- ST= Short Term ; MT= Medium Term ; LT= Long term
Re=Reversible; IR= Irreversible

6.4 Mitigation Cost

128. The estimated cost for benefit 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 safety gears, accidental insurance of BGs, bio-engineering measures, tree plantation, land slide rehabilitation will be incorporated in the project cost. 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	8022757.00	To be included in project cost
2.2	RBG Insurance	400,000.00	To be included in project cost
2.3	Information Signboard (6 nos)	50,000.00	To be included in BoQ
2.4	Compensation for properties		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 / Re-forestation	550000.00	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.		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,)	250,000.00	To be included in BoQ
	Sub-Total (2)	**9,772,757.00**	
	Total	**9,972,757.00**	

6.5 Implementation of Mitigation Measures

129. The mitigation measures will be integrated into project design and tender documents so that the mitigation measures will automatically become part of the project implementation and operation. Mitigation measures will be included as separate items in the Bill of Quantities, and monitoring will be done based on these. The Proponent and the contractor will be bound by the parameters identified in the IEE Report and specific mitigation measures spelled in the contract. The final acceptance of the completed works will not occur until all the environmental clauses have been satisfactorily implemented.

130. The contract agreement document will explicitly mention the penalising action to be taken against failure to comply with EMP requirements.

6.6 Environmental Monitoring

6.6.1 Monitoring Responsibility

131. The Proponent will develop in-built monitoring mechanism to safeguard environment during construction and operation stages. The DPO will be supported by DIST in the district, and PCU will be supported by CISC at center to ensure effective monitoring and undertaking corrective actions, as required. A Safeguard Unit will be established in DPO. The social, resettlement and environment specialists / officers from DPO/DIST will work in cooperation under the Safeguard Unit. They will undertake Subproject level monitoring under supervision and coordination of Specialists from PCU/CISC.

132. MoLD/DoLIDAR will be responsible for central level monitoring of EMP compliance. A provision of NRs. 50,000 will be allocated for the periodic monitoring by the center.

133. The Safeguard Unit at Subproject level shall submit monthly monitoring report to the PCU, who will forward a copy to ADB, NRM. Total cost of environmental monitoring (field visits, observation, review of reports and report preparation), excluding the cost of personnel, is estimated at 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**

134. Thus, total environmental monitoring and management cost is NRs.10, 172,757.00 excluding cost of resettlement and bio-engineering.

6.6.2 Types of Monitoring and Monitoring Parameters

135. There will be basically two types of monitoring:

a. Compliance Monitoring – that verifies whether the EMP provisions are properly implemented in the field. The framework for compliance monitoring is given in the Table 7.6.

b. Impact Monitoring - that confirms the result of implementing mitigation measures. The framework for impact monitoring is given in the Table 7.7.

Table 7.6: Compliance Monitoring for Chame-Khangsar Road Construction Works

Parameters/Issues	Responsible Implementing Agency	Verifiable Indicators	Verification Methods	Schedule	Responsible Monitoring Agency
Final alignment selection as per IEE /EMP recommendation	DPO / DIST	Alignment incur minimum requirements to acquire land from forest, agri. land, and minimum nos. of tress to clear.	Look the alignment on topo map with landuse resources; verify it by walkthrough along final road alignment	preconstruction phase	PCU / CISC; DoLIDAR
Land and property acquisition and compensation Voluntary land acquisition	Proponent with assistance of DIST	Cadastral records, Land and properties acquisition procedures; Procedures followed during voluntary donation of Land; Preparation of inventory of structures likely to be affected Payment of compensation	Public consultation, photos; geo-referencing; Check inventory against cadastral records and discuss with land owners Check record of pending compensation	pre-construction phase before construction begins	CFC / PCU (CISC) / DOLIDAR / MoLD
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	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. Protection of wildlife and sensitive habitats, forests; and Use of fuelwood for heating and cooking.	Site inspection; Discussion with local people; Records; Photos; Sampling and laboratory tests.	During construction period and include in monthly report	DPO / DIST at district and PCU/CISC at center
Protect environment from air & noise pollution	Contractor / RBGs	Dust level and noise level at work sites, major settlements and sensitive spots like health centres and schools; Crusher operated during night	Visual observation, Observation of good construction practices and disssion with residents and workers; DIST to measure air/noise level at sensitive spots.	Once in a month during construction; measurement once during peak construction	DPO / DIST at district and PCU/CISC at center
Protect water bodies from pollution	Contractor / RBG DPO / DIST	Visual observation, observation of open defecation and pit toilets at work sites/waste management/spoil disposal around water sources; Parameters like pH, hardness, DO, Turbidity for drinking water.	Site inspection, test of site-selected samples of local streams water using standard field kit, record of waterborne disease	Observation once in a month during construction; Upon demand for testing with field kit	DPO / DIST at district and PCU/CISC at center
Use of local labour, particularly vulnerable groups and women	DRCC / VWRCC / RBGs / Contractor	Percentage of employment of local labour, especially vulnerable groups and women and their wage rate.	Verification from records	During the entire period where labour work is contracted	DPO / DIST at district and PCU/CISC at center
Awareness and orientation training on road construction locally employed	DPO / DIST	Training programmes for skill development, occupational safety and environmental protection associated with road	Training records, assess feedback from participants	Beginning of construction and	DPO / DIST at district and PCU/CISC at

Parameters/Issues	Responsible Implementing Agency	Verifiable Indicators	Verification Methods	Schedule	Responsible Monitoring Agency
labourers		construction works; employment generation skill		during construction	center (DTO)
Compliance to occupational health and safety matters	DPO / 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.	Spot checks at work sites, accident records, safety equipement at site; discussion with workers	throughout construction stage	DPO / DIST at district and PCU/CISC at center
Vegetation clearance	Contractor; DPO / DIST	Actual number of trees felled during construction works	Record, inspection and interview with local people and CFUGs	Before construction work	DPO / DIST at district and PCU/CISC at center; CFUGs
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	Record verification, interview with local people and CFUGs	Once a month during construction	DPO / DIST at district and PCU/CISC at center / CFUGs
Restoration, rehabilitation, reconstruction of all infrastructure services disrupted or damaged during the construction work	Contractor / RBG / DIST	Continued services by the facilities and functional public life	Site observation; Public Consultation Meetings	Once in 15 days during construction	DPO / DIST at district and PCU/CISC at center
Clean up and reinstatement of the construction sites (camps, quarries, borrow pits)	Contractor	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	At end of construction period	DPO / DIST at district and PCU/CISC at center

Table 7.7: Impact / Effect Monitoring for Chame-Khangsar Road Construction Works

Parameters /Issues	Verifiable Indicators	Verification Methods	Location	Schedule	Responsible Implementation and Monitoring Agency
Slope stability and erosion	Slope failures & their causes; Fresh gullies and erosion; Success/failure of bio-engineering solutions	Site observation, photos discussion with people and technicians	At landslide areas and sites where bio-engineering failed	Continuously during construction and operation	DIST during construction; Proponent / DPO / Soil Conservation Office during operation
Disposal of Spoils and construction wastes	Damage to forest and agriculture land, blocked drainage, hazard to downhill residents and agricultural lands	Site observation and interviews, photos	At specific locations where such sites occur	During construction at monthly basis	DPO / DIST at district and PCU/CISC at center
Quarrying of construction materials	Erosion, changes in river regime, bank cutting, landslide due to quarrying on slope	Site observation, photos	Quarry site areas	During construction at monthly basis	DPO / DIST at district and PCU/CISC at center
Disruption of drainage system	Blocked drainage, waterlogging, slope cutting and erosion by water	Observation, photos	Site specific areas	During construction at rainy season	DPO / DIST at district and PCU/CISC at center
Loss of farmland , houses and properties	Decline in productivity; Quality of life of compensated people	Observation, and interview with stakeholders	Construction areas	During construction in quarterly basis	DPO / DIST at district and PCU/CISC at center / VWRCC
Water quality	Water borne disease; adverse impact on aquatic life	Record of disease, measurement of water sample using standard field kit; impact to fish in streams	Construction sites; local streams	During construction at quarterly basis	DPO / DIST at district and PCU/CISC at center
Air quality	Dust level increase	Discussion with people at sensitive locations	At construction sites and at sensitive spots (schools, health post, market and settlements)	During construction at dry season	DPO / DIST at district and PCU/CISC at center
Change in economy	Nos. of new houses built; shops opened; New enterprises by local people	Discussion with local people	Project Area	Yearly during construction phase	DPO / DIST at district and PCU/CISC at center
Occupational safety and hazard	Type and number of accident occurred during construction	Records and interview with labourers	Project Area	During construction	DPO / DIST at district and PCU/CISC at center
Social conflict and nuisance	No of social conflicts between project and people; new 'Bhatti' and prostitution proliferation.	Observations, interview with local people	Project Area	During construction	DPO / DIST at district and PCU/CISC at center / VDC
Ribbon settlement	RoW encroachment	Records, observations	Project Area	During operation	DDC/CDO

7. Conclusion and Recommendation

8.1 Conclusion

136. The IEE study of the proposed Chame-Khangsar road Subproject passes through environmentally sensitive area, but it have minimal adverse impact associated with loss of forest and agricultural land. Most of the adverse impacts predicted are of low significance and short term as well as reversible. The rehabilitated road will provide better access to market and social services, and is expected to enhance productivity and improving quality of life of the people. Local people will get direct employment opportunity as workers during construction works, which will contribute in improving their income. The beneficial impacts from the implementation of the proposed road are more significant and long term in nature against the adverse impacts most of which could be avoided or minimized or compensated.

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

8.2 Recommendation

138. The proposed road project is recommended for implementation with incorporation of mitigation measures and environmental monitoring plan.

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

140.The better access product of Apple is more significant for supply from Manang district to Besisahar and Pokhara.

References

- ADB, 2003 Environmental Assessment Guidelines**.** Asian Development Bank, Manila, The Philippines
- ADB, 2007, Summary Initial Environmental Examination, RRRSDP Project, ADB TA 4919 NEP, Final Draft Report
- Center I, 1997 “Environmental Impact Assessment, Mac-Grw Hill Inc. USA”
- DDC Profile of Manang District
- Department of Roads, 2002, Reference Manual for Roadside Bioengineering
- Department of Roads, 2002, Site Handbook for Roadside Bioengineering
- Department of Roads, 2003, Reference Manual for Environmental and Social Aspects of Integrated Road Develoment
- Department of Roads, GEU. 1996 “Bio-Engineering Information”
- Department of Roads, GEU. 1997 “Environmental Impact Assessment Guidelines for the Road Sectors”
- DoLIDAR 1999 APPROACH for the Development of Agricultural and Rural Roads. Department of Local Infrastructure Development and Agricultural Roads, 1999
- DoLIDAR Green Road Approach Manual
- DRILP 2006 Environmental Guidelines (Draft), Decentralized Rural Infrastructure and Livelihood Project, GoN, DoLIDAR.
- GoN 2006 Environmental and Social Management Framework. Road maintenance and Development Project, Department of Roads, Ministry of Physical Planning and Works, November 2006
- GoN/DoLIDAR, 2007 Environmental Assessment and Review Procedures for RRRSDP (Draft)
- GTZ, SDC, 1999 Green Roads in Nepal, Best Practices Report – An Innovative Approach for Rural Infrastructure Development in the Himalayas and Other Mountainous Regions.
- GTZ/SDC, 2000 Green Road: Best Practices
- ICIMOD, 1998 Access Improvement and Sustainable Development, Rural Road Development in Nepal, Durga P. Poudyal
- RRRSDP, 2008 Project Administrative Memorandum

ANNEXES

Annex I: Terms of Reference

Annex II: Rapid Environmental Assessment (REA) Checklist

Rapid Environmental Assessment (REA) Checklist

Instructions:

- This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: Nepal / RRRSDP

Name of the sub Project: Chame-Khangsar

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Sitting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site		✓	
▪ Protected Area	✓		
▪ Wetland		✓	
▪ Mangrove		✓	
▪ Estuarine		✓	
▪ Buffer zone of protected area		✓	
▪ Special area for protecting biodiversity		✓	
B. Potential Environmental Impacts Will the Project cause…			
▪ Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		✓	
▪ Encroachment on precious ecology (e.g. sensitive or protected areas)?		✓	

SCREENING QUESTIONS	Yes	No	REMARKS
▪ Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?		✓	
▪ Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		✓	
▪ Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?		✓	
▪ Noise and vibration due to blasting and other civil works? ▪ dislocation or involuntary resettlement of people		✓	
▪ Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?		✓	
▪ Hazardous driving conditions where construction interferes with pre-existing roads?		✓	
▪ Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?		✓	
▪ Creation of temporary breeding habitats for mosquito vectors of disease?		✓	
▪ Dislocation and compulsory resettlement of people living in right-of-way?		✓	
▪ Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials and loss of life?		✓	
▪ Increased noise and air pollution resulting from traffic volume?		✓	
▪ Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?		✓	

Source: field survey, July, 2009

Annex III: Abstract of Cost

Office of District Development Committee
District Technical Office/District Project office
Manang
Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP)
Cost Estimate on Engineering Basis

Road: Chame-Khangsar
Chainage: 0+000 to 26+500

SN	Description of works	Unit	Quantity	Rate	Amount	Remarks
1	General					
1.1	Insurance works		L.S.		400,000.00	
1.2	Occupational health safety		L.S.		250,000.00	
1.3	Site office for supervising team		L.S.		100,000.00	
1.4	VICCC operation and management cost		L.S.		85,000.00	
1.5	Environmental monitoring cost		L.S.		200,000.00	
1.6	Transportation means for supervisors		L.S.		200,000.00	
1.7	Compensatory Plantation cost	no	16250	40	550000.00	
2	**Site Clearance**		L.S.		701,600.00	
3	**Pipe culverts**	no	2			
1.1	Nos. of Hume pipe required	Rm	27	4621.22	124,772.94	
1.2	Concreting for base of hume pipe	m³	24	8913	213,912.00	
1.3	Stone Mosonary for base of hume pipe	m³	90.75	5733.6	520,324.20	
4	**Side Drain**					
2.1	E/W excavation (Hard Soil)	m³	9356.64	240	2,245,593.60	
2.2	Stone Mosonary (1:4)	m³	8712	5733.6	49,951,123.20	
5	**Retaining structure**				0.00	
3.1	Dry Masonary Retaining wall	m³	851.57	5733.6	4,882,561.75	
6	**Road way**				0.00	
4.3	back filling and compaction	m²	82008.38	2502.9	205,258,774.30	
7	**Causeway**				0.00	
5.1	Stone pitching (20 cm depth)	m3	6350	277.1	1,759,585.00	
	Total Cost Excluding Bridge				267,425,246.99	
	Cost per Km Excluding Bridge				7,592,993.95	
8	**Bridge (15*5 m)**	Rm	15	750000	11,250,000.00	
9	**Bridge (18*5 m)**	Rm	18	750000	13500000	
10	**Bridge (17*5 m)**	Rm	17	750000	12750000	
	Total Cost Including Bridge				131,791,847.78	
	Cost per Km Including Bridge				4973277.275	
10	**Bio-engineering(3% of project**				8022757.41	

	cost)					
11	**Grand total**				275,448,004.40	
12	**Cost per Km**				7,820,783.77	

Annex IV: RRRSDP Environmental Field Checklist

A. GENERAL SOCIO-ECONOMIC SITUATION OF THE INFLUENCE AREA[4]

1. Overview of settlements in the zone of influence (Zol) area

VDC	Name of Settlement	Household and Population	Caste/ethnic distribution	General Comment

***** Use the same codes as in strip map and topographical map.

2. Economic activities/main occupation

VDC	Settlement	Number of HH and Percentage of Population engaged in					
		Agriculture & Livestock	Labor & Porter	Business/ Commerce	Cottage Industry	GO/NGO Employees	Others (specify)

3. Existing services and infrastructures

S N	Service/Infrastructure Category	Settlement Code											
		A	B	C	D	E	F	G	H	I			
1	**EDUCATION**												
1.1	Campus (no.)/Higher secondary Students (no.)												
1.2	High School (no.)/ Lower secondary Students (no.)												
1.3	Primary School (no.) Students (no.)												
2	**HEALTH**												
2.1	Hospital/health centre (no)Capacity (beds)												
2.2	Health Post (no.) Sub-Health Post (no.)												
3	**COMMUNICATION**												
3.1	Telephone/fax												

S N	Service/Infrastructure Category	Settlement Code											
		A	B	C	D	E	F	G	H	I			
3.2	Mobile/CDMA												
3.3	Post Office												
4	**ELECTRICITY SUPPLY**												
4.1	from Micro-hydro												
4.2	from Mini-hydro												
4.3	from National Grid												
4.4	from Solar System												
4.5	from Diesel Generator												
5	**BUSINESS & COMMERCE**												
5.1	Hotels & Lodges (no.)												
5.2	Restaurant & Tea Stall (no)												
5.3	Grocery Shops (no.)												
5.4	Other Shops (no.) (e.g. stationery, medicine, tailoring, etc.)												
6	**DRINKING WATER SUPPLY SCHEMES**												
6.1	Gravity-Flow Scheme (capacity)												
6.2	Tube-wells (no.)												
6.3	Spring/Dug-wells (no.)												
7	**IRRIGATION SCHEMES**												
7.1	Surface Irrigation (ha.)												
7.2	Groundwater (ha.)												
8	**OTHER INFRASTRUCTURES**												
8.1	Micro-hydro scheme (no. & capacity.....kw)												
8.2	Water Mill (no.)												
8.3	Suspension Bridges (no.)												
8.4	Wooden Bridges (no.)												
8.5	Other Bridges (specify)												
9	**INDUSTRY**												
9.1	Weaving Industry (no.)												
9.2	Rice & flour Mills (no.)												
9.3	Other Industries (specify)												
10	**FINANCIAL INSTITUTIONS**												
10.1	Bank (no.)												
10.2	Cooperative												
11	COMMUNITY USE												
11.1	Ghat (no.)												
11.2	Hatia/Bazaar (no.)												
11.3	Playground (no.)												
11.4	Community Centre (no.)												
11.5	Others (specify)												

A._____ B. _____ C. _____
D. _____ E. _____ F. _____
G. _____ H. _____ I. _____

4. Land holding pattern

Land holding Pattern	Settlement Code (HH No.)										Remarks
	A ( )	B ( )	C ( )	D ( )	E ( )	F ( )	G ( )	H ( )	I ( )		
Landless											
less than 1 ropani)											
1 to 5 ropani											

5 to 10 ropani											
10 to 20 ropani											
20-50 ropani											
> 50 ropani											

A._____ B. _____ C. _____
D. _____ E. _____ F. _____
G. _____ H. _____ I. _____

5 Food grain availability

SN	VDC	Settlement	Number of HHs having food sufficiency for					Total HHs
			Surplus (Sufficient for > 12 months)	Sufficient for whole years	Sufficient for 6 months	Sufficient for 3 months	Hand to mouth existence	
1								
2								
3								
4								
5								

Source:

6 Major existing agriculture production (denotes the most dominant by 1, second dominant by 2 and so on).

S. No.	Type of Agriculture Production	Settlements									
		A	B	C	D	E	F	G	H	I	
1.0	**CEREALS**										
1.1	Rice										
1.2	Wheat										
1.3	Maize										
1.4	Millet										
1.5	Junelo										
1.6	Phaper										
1.7	Others (list)										
2.0	**CASH CROPS**										
2.1	Oil Seeds										
2.2	Beans/Dal										
2.3	Tobacco										
2.4	Potato										
2.5	Vegetables										
2.6	Fruits										
2.7	Tea/Coffee										
2.8	Amliso										
2.9	Sericulture										
2.10	Others (list)										
3.0	**LIVESTOCK & FISHERIES**										

3.1	Cattle (cows & buffaloes)										
3.2	Horses, Mules										
3.3	Yak										
3.4	Goat										
3.5	Sheep										
3.6	Rabbit										
3.7	Pig										
3.8	Fisheries										
3.9	Poultry										
3.10	Bee-keeping										
3.11	Others										

A._____ B. _____ C. _____
D. _____ E. _____ F. _____
G. _____ H. _____ I. _____

7. Migration for employment

(a) No. of HHs from where at least one person (may be HH head) is away from home for more than 6 months.

Settlement (No. of HH)									
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**

(b) Seasonal migration in search of work.

Month	No. of Total HH	Destination	Purpose

8. Dominant off-farm occupation in the settlement in descending order

_____

B. DEVELOPMENT POTENTIAL ACCORDING TO SETTLEMENT

B.1. Areas which have significant potential for development, for instance, high agricultural production, tourism development, local mines, etc. (indicate these areas in map/sketch).

S. N.	Name of Area	Description of Development Potential

B.2. Scope of the proposed linkage in view of promoting socio-economic development (communication, agricultural production, education and health).

S. No.	Sectors to get direct benefit	Describe how it will benefit

C. Historic and Cultural Resources Within The Settlement

Type of Resource	Name/specification	Affecting activities	Location from project

Annex V: Public Notice

Annex VI: Deed of Enquiry (*Muchulka*)

Annex VII: Name of the Organizations

Name of the Organizations (notice pasted and deed of inquiry obtained)

SN	Name or Organization	Address
1	Chame Youth Club	Chame,Manang
2	Pisang VDC	Pisang,Manang
3	Chame VDC	Chame,Manang
4	District Forest Office	Chame,Manang
5	Agricultural Development Office	Chame,Manang
6	District Health Office	Chame,Manang
7	District Development Committee	Chame,Manang
8	Bharaka VDC	Bharaka,Manang
9	Khangsar VDC	Khangsar,Manang
10	Manang VDC	Manang,Manang
11	Annapurna Conservation office	Manang,Manang
12	Tanki Manang VDC	Tanki Manang,Manang

Source: Field Survey, July, 2009

Annex VIII: List of Persons Consulted

List of persons consulted

S.N.	Name	Address	Occupation
1	Sarki Gurung	Pisang-8	Social worker
2	Kamchha, Chhiringwongel Gurung	manang-8	Business
3	Karma Ghale	Manang-9	Farmer
1	Karma Chhenden Lama	Manang-3	Business
2	Karma Chheten Lama	Manang-9	Social Worker
1	Ngima Gurung	Manang-6	Teacher
2	Kanchha ,Dhawa Gurung	T.Manang-5	Social Worker
3	Khando Gurung	Pisang-8	Social Worker
1	Bhujung Gurung	T.Manang-7	Social Worker
2	Kwisang Rang Dol Lama	Manang-9	Business
3	Dharke Lama	T.manang-7	Business
1	Pema Chhiring Gurung	Manang-9	Business
2	Kaile Gurung	Pisang-8	Teacher

Source: Field Survey, July, 2009

Annex IX: Summary of Meeting With Local People

Date	Place	Type of Participants	No.	Issues raised
1/28/2066	DDC/DTO Office, ,Manang	Administrative Officer, Staffs,	12	Discussed mainly on the project
1/24/2066	DTO, Chame,	District Engineer, Engineer,local people	20	Discussed mainly on the project, project modalities of ADB, Role of DTO and local bodies.
1/27/2066	Bhraka	Local farmers and project affected families	25	Cash compensation should be provided for land and crop and free distribution of seedlings for private planting
1/26/2066	Pisang	Businessmen, CFUG members, teacher, farmer, social worker,	25	Road must be constructed, compensation of land and crop is not a priority; mitigation measures could be implemented to minimize the environmental impacts.
1/28/2066	Tankimnang	Businessmen, CFUG members, teacher, farmer, social worker	22	Road should be built as soon as possible, mitigation measures should be implemented to minimize the environmental impacts.
1/30/2066	Kharsang	Project Affected Families, local People	15	Road should be rehabilitated, mitigation measures should be implemented to minimize the environmental impacts.

Annex X: Recommendation Letters from VDCs

Annex XI

Annex XI a: Distribution of households by major occupation
Annex XI b: Summary of public services & infrastructures
Annex XI c: Land holding pattern of settlements within ZoI
Annex XI d: Number of households belonging to different food security category

Annex XIa: Distribution of Households by Major Occupation

SN	VDC	Settlement/ Code	Number of HH and Percentage of Population engaged in					
			Agriculture & Livestock	Labour & Porter	Business/ Commerce	Cottage Industry	GO/ NGO Employees	total
1	Chame	Chame	53		120			173
2	Pisang	Talekhu	4		5			9
		Bhratang	0		3			3
		Dhukurpokhari	3		12			15
		Pisang	17		31			48
3	Bhraka	Mugje	3		5			8
		Bhraka	4		26			30
4	Manang	Humde	5		40			45
		Manang	7		75			82
5	Tanki manang	Tanki manang	30		54			84
6	Khangsar	Khangsar	20		27			47
	Total		146		398			544
	Average		26.83		73.17			100

Source: field survey, July, 2009

Annex XIb: Summary of Public Services & Infrastructures

Settlement Name/ Public services and Infrastructure	School (no)	Health post (no)	Post office (no.)	Communication(no) CDMA/MOBILE	Hydro power (no)	Solar (no)	Shops/lodge (no)	Water supply (no)	Irrigation (KULO)	Mill (no)	Bridge (no)	Community organization (no)	Fin. Institution (no)	Community CENTRE	Industry (no)
Chame	2	1	1	23	1	11	35	1	-	-	1	2	1	1	-
Talakhu	-	-	-	6	-	3	4	1	-	-	-	-	-	-	-
Bhartang	-	-	-	-	-	2	2	1	-	-	-	-	-	-	-
Dhukarpokhari	-	-	-	-	-	5	15	1	-	-	-	-	-	-	-
Pisang	1	1	-	3	-	7	25	1	-	1	-	1	-	-	-
Mugjhe	-	-	-	2	-	3	5	-	-	1	-	-	-	-	-
Bhraka	1	1	-	2	-	5	12	1	-	-	-	1	-	-	-
Humde	1	1	-	3	1	8	30	1	1	-	-	1	-	-	-
Manang	1	1	-	7	-	8	25	-	-	-	-	1	-	1	-
Tanki Manang	1	1	-	2	-	6	15	-	-	-	-	1	-	1	-
Khangsar	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-

Annec XI c: Land Holding Pattern of Settlements Within ZoI

Land holding Pattern	Settlement Code (HH No.)											Total	percentage %
	A (173)	B (9)	C (3)	D (15)	E (48)	F (8)	G (30)	H (45)	I (82)	J (84)	K (47)		
Landless	13	-	-	2	6	-	4	10	5	4	5	49	9.00
less than 1 ropani)	50	-	-	4	8	-	5	12	12	30	20	141	25.92
1 to 5 ropani	50	2	-	6	8	3	12	8	23	20	12	144	26.47
5 to 10 ropani	40	3	3	2	24	3	5	8	25	12	7	132	24.26
10 to 20 ropani	17	4	-	1	2	2	4	4	10	10	3	57	10.49
20-50 ropani	3	-		-	-	-	-	3	7	8	-	21	3.86
Total												544	100

A. Chame B. Talekhu C. Bhartang D. Dhukurpokhari

E. Pisang F. Mugje G.Bharka H. Humde
I. manang J. Tanki manang K. Khangsar

Annex XI d: Number of Households Belonging to Different Food Security Category

Settlement Name	Surplus	Sufficient for whole year	Sufficient for 3-9 months	Sufficient for three months	Less than three months	Total
Chame	12	8	68	72	13	173
Talekhu	-	2	2	5	-	9
Bhratang	-	-	3	-	-	3
Dhukurpokhari	1	2	6	4	2	15
Pisang	4	6	20	10	8	48
Mugje	-	2	3	3	-	8
Bhraka	3	4	14	5	4	30
Humde	2	4	15	14	10	45
Manang	16	12	24	25	5	82
Tanki manang	11	16	23	30	4	84
Khangsar	3	7	12	20	5	47
Total	52	63	190	188	51	544
Percentage	9.56	11.58	34.94	34.56	9.38	100

Source: Field survey, 2009

Annex XII : List of Trees to be Removed

S.N	Total no. of trees	Local Name	Scientific Name	Location	Chainage	Remarks
1	55	sallo	*Pinus wallichina*	Chame-7	0+000 to 1+000	
2	336	sallo	*Pinus wallichina*	Talekhu	1+500 to 10+000	
3	198	sallo	*Pinus wallichina*	Humde,manang	10+635 to 19+000	
4	35	sallo	*Pinus wallichina*	Humde,manang	19+500 to 23+510	
5	26	Apple	*Pyrus comunis*	Bhratang	5+000 to 5+600	
	650					

Source: field survey, July, 2009

- *Detail about the loss of tree and their cost will be included in the resettlement plan.*

Annex XIII: Photographs

Annex XIV: Summary of Cross Drainage Structures

SN	Chainage	Name of the river	Terrain	Type of Cross Drainage	Width of river(m)	Soil type
1	0+666	Kholsi	Mountains	DSC	10	OR
2	0+700	Kholsi	Mountains	DSC	6	OR
3	2+876	Kholsi	Mountains	DSC	7	OR
4	7+540	River	Mountains	Bridge	15	OR
5	4+800	Kholsi	Mountains	DSC	25	OR
6	10+100	Kholsi	Mountains	DSC	7	OR
7	10+280	Kholsi	Mountains	DSC	7	OR
8	10+360	Kholsi	Mountains	DSC	10	OR
9	10+950	Kholsi	Mountains	DSC	10	OR
10	12+760	Kholsi	Mountains	DSC	10	OR
11	12+776	Kholsi	Mountains	DSC	10	OR
12	13+330	Kholsi	Mountains	DSC	10	OR
13	14+460	River	Mountains	Bridge	18	OR
14	14+511	Kholsi	Mountains	DSC	10	OR
15	14+582	Kholsi	Mountains	DSC	10	OR
16	14+450	Kholsi	Mountains	DSC	10	OR
17	14+520	Kholsi	Mountains	DSC	10	OR
18	15+260	Kholsi	Mountains	DSC	10	OR
19	16+452	Kholsi	Mountains	DSC	10	OR
20	19+240	Kholsi	Mountains	DSC	10	OR
21	19+531	Kholsi	Mountains	DSC	10	OR
22	19+600	Kholsi	Mountains	DSC	10	OR
23	20+720	Kholsi	Mountains	DSC	10	OR
24	20+780	Kholsi	Mountains	DSC	10	OR
25	25+027	Kholsi	Mountains	DSC	10	OR
26	21+200	Kholsi	Mountains	DSC	10	OR
27	24+090	Kholsi	Mountains	DSC	3	OR
28	25+066	Kholsi	Mountains	DSC	5	OR
29	25+167	River	Mountains	Bridge	17	OR
30	27+059	Kholsi	Mountains	DSC	5	OR
31	27+325	Kholsi	Mountains	DSC	5	OR
32	28+012	Kholsi	Mountains	DSC	5	OR
33	28+305	Kholsi	Mountains	DSC	5	OR
34	28+470	Kholsi	Mountains	DSC	25	OR
35	28+064	Kholsi	Mountains	DSC	5	OR
36	29+323	Kholsi	Mountains	DSC	5	OR
37	30+500	Kholsi	Mountains	DSC	5	OR
38	32+870	Kholsi	Mountains	DSC	10	OR
39	34+875	Kholsi	Mountains	DSC	10	OR
40	33+245	Kholsi	Mountains	DSC	10	OR
41	31+265	Kholsi	Mountains	DSC	10	OR

Source: Field survey, July, 2009

Annex XV: Affected Houses and Structures along the Road Alignment

S.N	Type of structures	NO. Occupation	Chainage	Location	Dist.from CL of Road	Remarks
1	residential house	4 Farmer	5+570 to 5+600	Bhratang	2m	impact
2	Residential House	1 Farmer	10+380 to 10+400	Dhukurpokhari	4m	impact
3	Residential House	1 business	10+440 to 10+500	Dhukurpokhari	3m	impact
4	Residential House	2 Farmer	10+630 to 10+750	Dhukurpokhari	3m	impact
5	Residential House	1 Farmer	25+500 to 25+600	Mugje	4m	impact
6	Residential House	2 Farmer	27+190 to 27+220	Bhraka	2m	impact
7	Chhorten+Mane	2 business	0+005 to 1+180	Chame	4m	impact
8	Chhorten+Mane	2 Farmer	5+550 to 5+555	Bhratang	3m	impact
9	Chhorten+Mane	1 Farmer	10+680 to 10+700	Dhukurpokhari	2m	impact
10	Chhorten+Mane	1 business	21+100 to 21+200	Humde	2m	impact
11	Chhorten+Mane	1 business	27+900 to 27+905	Bhraka	2m	impact
12	Wall	1 business	10+415 to 10+500	Dhukurpokhar	4m	impact
13	Wall	1 Farmer	27+180 to 28+000	Bhraka	3m	impact
14	Sheed	1 Farmer	5+520 to 5+540	Bhratang	2m	impact
15	Sheed	1 business	13+290 to 13+300	Pisang	2m	impact
16	Sheed	1 business	20+800 to 20+820	Humde	4m	impact
17	Private Toilet	1	1+190 to 1+195	Talekhu	3m	impact
18	Private Toilet	2 Farmer	1+272 to 1+276	Talekhu	4m	impact
19	Community building	1 Farmer	13+440 to 13+480	Pisang	3m	impact

Source: field survey, July, 2009

Detail about the loss of structures along the road alignment and their cost will be included in the resettlement plan.

Annex XVI: Structure for Slope Stabilization

SN	Chainages	Civil structures/Mitgation Measures	Bio-engineering Measures
1.	10+020-10+030	Breast wall	
2.	10+040-10+060	Breast wall	
3.	10+060-10+080	Breast wall	Tree, Shrub plantation
4.	10+080-10+100	Breast wall	Tree, Shrub plantation
5.	10+100-10+120	Breast wall	
6.	30+485	Gabion wall	Tree, Shrub plantation,
7.	30+500	Gabion wall	Tree, Shrub plantation,

8.	30+513	Gabion wall	
9.	30+533	Gabion wall	
10.	30+588	Gabion wall	Tree, Shrub plantation, Brush layering
11.	30+614	Gabion wall	Tree, Shrub plantation, Brush layering
12.	30+625	Gabion wall	Tree, Shrub plantation, Brush layering
13.	30+636	Gabion wall	
14.	30+656	Gabion wall	
15.	30+673	Gabion wall	
16.	30+692	Gabion wall	Tree, Shrub plantation,
17.	30+707	Gabion wall	
18.	30+727	Gabion wall	
19.	30+800	Gabion wall	
20.	30+820	Gabion wall	
21.	30+964	Gabion wall	
22.	30+970	Gabion wall	
23.	30+984	Gabion wall	
24.	31+008	Gabion wall	Tree, Shrub plantation, Brush layering
25.	31+030	Gabion wall	
26.	31+082	Gabion wall	
27.	31+093	Gabion wall	
28.	31+099	Gabion wall	
29.	31+104	Gabion wall	Tree, Shrub plantation, Brush layering
30.	31+113	Gabion wall	
31.	31+119	Gabion wall	
32.	31+133	Gabion wall	
33.	31+145	Gabion wall	
34.	31+159	Gabion wall	
35.	31+168	Gabion wall	Tree, Shrub plantation, Brush layering
36.	31+175	Gabion wall	
37.	31+195	Gabion wall	
38.	31+205	Gabion wall	
39.	31+246	Gabion wall	

Source: Field Survey, July, 2009