Environmental Assessment Document

Initial Environmental Examination

Grant Number: 0093 NEP

September 2010

Nepal: Rural Reconstruction and Rehabilitation Sector Development Program

Raja Rani-6 no. Budhabare Rural Road Subproject, Dhankuta District

Prepared by the Government of Nepal

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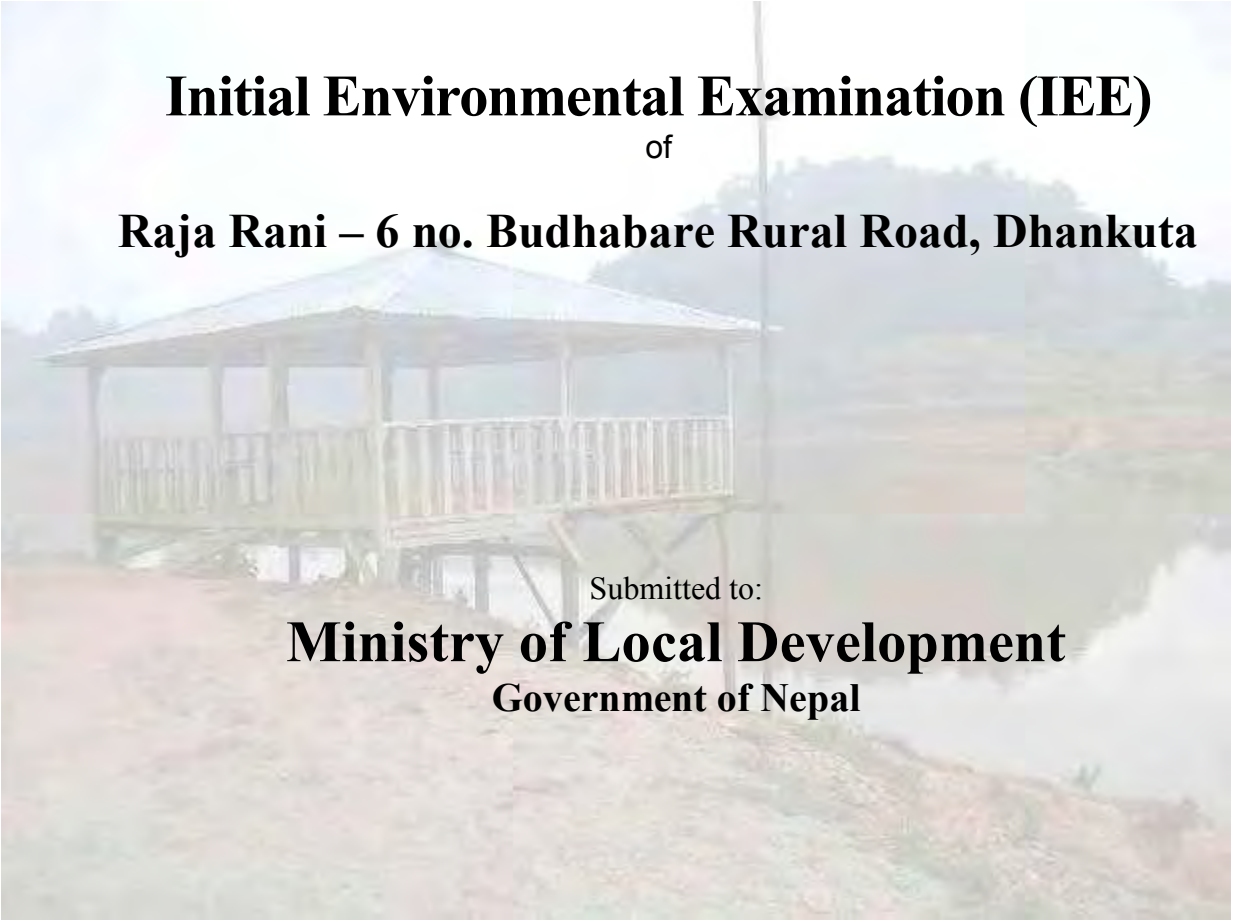
Government of Nepal
Ministry of Local Development
Department of Local Infrastructure Development and Agricultural Roads

Rural Reconstruction and Rehabilitation Sector Development Program
[ADB Grant 0093 NEP]



Initial Environmental Examination (IEE)

of

Raja Rani – 6 no. Budhabare Rural Road, Dhankuta

Submitted to:

Ministry of Local Development

Government of Nepal

Proponent:

District Development Committee/ District Technical Office

Dhankuta District

September, 2010

Prepared by:

District Implementation Support Team (DIST)

EastConsult (P.) Ltd. JV with B.N. Consultancy (P.) Ltd., SITARA & PARD Consult (P.) Ltd.

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ABBREVIATIONS

ADB	Asian Development Bank
Amsl	Above mean sea level
AP	Affected Person
BG	Building Group
Ch	Chainage
CBO	Community Based Organization
CDC	Compensation Determination Committee
CDO	Chief District Officer
CEA	Country Environmental Analysis
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
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 Advisor
EARP	Evironmental Assessment and Review Procedures
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management Section
EPA	Environmental Protection Act
EPR	Environmental Protection Rules
FGD	Focus Group Discussion
GAP	Gender Action Plan
GoN	Government of Nepal
GIS	Geographical Information System
Ha	Hectare
HH	Household
IEE	Initial Environmental Examination
IUCN	International Union for Conservation Nature
Km	Kilometer
LDO	Local Development Officer
LEP	Labour based, environment friendly and participatory
LEST	Livelihood Enhancement and Skill Training
M	meter
MoU	Memorandum of Understanding
MoE	Ministry of Environment
MoLD	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
REA	Rapid Environmental Assessment
RES	Rapid Environmental Screening
RIE	Rurl infrastructure Engneer
RP	Resettlement Plan
RRRSDP	Rural Reconstruction and Rehabilitation Sector Development Program
SAP	Social Action Plan
SDC	Swiss Agency for Development and Cooperation
SM	Social Mobilizer
TA	Technical Assistance
ToR	Terms of Reference
VDC	Village Development Committee
VICCC	Village Infrastructure Construction Coordination Committee
ZoI	Zone of Influence

NAME AND ADDRESS OF THE PROPONENT

The Name and Address of Proponent

The District Development Committee (DDC)/ District Technical Office (DTO), Dhankuta are the implementing agencies at the district level under RRRSDP and entrusted the consultant for the task of carrying out Initial Environmental Examination (IEE) Study of „Hille-Utterpani-Chhingtang Road Sub-project'.

A multidisciplinary team of experts conducted the IEE Study. The following personnel were deployed for the IEE Study:

Name of the Report Preparer:

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- Netra Bikram Thapa — Social Mobilizer
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EXECUTIVE SUMMARY IN NEPALI

राजारानी- ६ नं. वुधवारे सडकको प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन
कार्यकारी सारांश

पृष्ठभूमि :

नेपाल सरकारले लामो द्वन्दले गर्दा क्षति भएका गामीण पूर्वाधारहरुको पुननिर्माण र पुनर्स्थापना को लागि एशियाली विकास बैंक (ADB), स्विस सरकार (SDC), ब्रिटिस सरकार (DFID) तथा ओपेक फण्ड (OFID) को आर्थिक सहयोगमा संचालन गरिरहेको छ । प्रस्तावित राजारानी- ६ नं. वुधवारे ग्रामीण सडकको पुनर्स्थापना सोही कार्यक्रम अन्तर्गत संचालन गर्न लागिएको एक उप-आयोजना हो । २६.०७ कि.मी. लामो धनकुटा जिल्लामा पर्ने उक्त कच्ची सडकमा हाल सुख्खा मौसममा गाडीहरु चल्दछन् ।

प्रस्तावक :

प्रस्तावित सडक उप-आयोजनाको प्रारम्भिक वातावरणीय परीक्षणको प्रस्तावक जिल्ला विकास समिति र जिल्ला प्राविधिक कार्यालय, धनकुटा हुन् । प्रस्तावकको प्रारम्भिक वातावरणीय परीक्षण स्विकृत गर्ने सम्वन्धित निकाय स्थानिय विकास मन्त्रालय हो ।

उद्देश्य :

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

प्रस्तावको सार्न्दभिकता तथा अध्ययन प्रकृया :

प्रस्तावित सडकले धनकुटा जिल्लाको सुदुर दुर्गम भेगका वासिन्दाहरुलाई सदरमुकाम संगको पहुँच वढाउनेछ भने स्थानिय स्तरमा उत्पादन हुने तरकारी, फलफुल लाई वजार संग जोडी स्थानिय आय आर्जनमा अभिबृद्धि गर्नेछ । नोभेम्बर, २००९ मा फिल्ड सर्वेक्षणवाट लिइएका तथ्याङ्क तथा अन्य उपलब्ध तथ्याङ्कहरुको साथै सामाजिक तथा प्राविधिक टोलीवाट पुनर्वास कार्यको सर्भेक्षणको लागि संकलन गरेका तथ्याङ्कहरु केलाएर प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन तयार गरी निष्कर्ष तथा सुझावहरु दिइएका छन् ।यो प्रारम्भीक वाताबरणीय परिक्षण प्रतिवेदन नेपाल सरकारको वातावरण संरक्षण ऐन १९९७, वातावरण संरक्षण नियामावली १९९७ अनुसार तथा स्थानिय विकास मन्त्रालयबाट मिति २०६६/०३/०९ मा स्विकृत गरिएको यसै प्रस्तावकको कार्यसुचीमा उल्लेख गरीएको अध्ययन प्रकृया अनुसार तयार गरिएको छ साथै, एशियाली विकास बैकको इन्भाईरोमेन्टल एसिसमेन्ट गाइड लाइन २००३ र सेफगार्ड पोलिसी स्टेटमेन्ट २००९को समेत अनुसरण गरीएको छ ।

आयोजनाको विवरण :

प्रस्तावित सडकले धनकुटा जिल्लाको सुदुर दक्षिणपूर्वी दुर्गम भेगका वस्तीहरुलाई जिल्लाको सदरमुकाम संग जोड्दछ । यसको कूल लम्बाइ २६.०७ कि.मि. छ । हाल उक्त ग्रामीण सडकको पुरै सडक खण्डमा गाडी चल्छ । यो सडक चारवटा गाउँ विकास समितिहरू क्रमश राजारानी, वसन्तटार, मुडेबास र ६ नं. वुधवारे भएर जान्छ । सडकको कुल चौडाइ ५.० मि. हुनेछ भने मोडहरूमा आवश्यकता अनुसारको चौडाइ हुनेछ । यो आयोजनाको कूल अनुमानित लागत नेरु.११,६७,४४,९९४ रहेको र प्रति कि.मी अनुमानित लागत नेरु.४४,७८,१३६ लाग्ने देखिन्छ ।

विद्यमान वातावरणीय स्थिति :

यो सडक राजारानी गा.वि.स.को राजारानी वजार समुद्री सतहदेखि १५९० मी. उचाई बाट शुरु भएर अधिकतम समुद्री सतहदेखिको १८७९ मी. उचाईको सौर्य वजार भएर ६ नं. वुधवारे सम्म जान्छ । यस सडक खण्डमा विभिन्न प्रकारका चट्टानहरु पाईन्छन् । प्रायः एलुभियल तथा रेजीड्यूयल प्रकारका बालुवा र पाँगो मिसिएको माटोहरु सडक खण्डमा पाइन्छन् । सडक खण्डमा पर्ने पानीका मूख्य श्रोतहरुमा त्रिवेणी खोला र खस्रेनी खोला पर्दछन् । प्रस्तावित सडक क्षेत्रको वायु तथा पानीको स्तर सफा रहेको देखिन्छ साथै ध्वनि प्रदुषणको समस्या छैन । यो सडक प्रायः खेती गरिएको जमीन तथा वन र बस्तीहरु भएर जान्छ ।

यस सडक खण्डमा पाइने मूख्य रुखहरुको प्रजातिहरुमा उत्तिस, कटुस, सल्ला, गोगन, बांस, चिलाउने,पैंयु,दुदीलो,लाम्पाते आदी पर्दछन् । मृग, दुम्सी, बँदेल, स्याल, वनबिरालो, बाँदर, लोखर्के आदि वन्य जन्तुका साथै काग,ढुकुर,सुगा, भँगेरा, कालिज, परेवा आदि पंक्षीहरु यस सडक खण्ड भएर जाने वनमा पाईन्छन् । यो सडक खण्ड संरक्षित क्षेत्र वा मध्यवर्ती क्षेत्रमा पर्दैन ।

यो सडक खण्डको प्रभावित क्षेत्र भित्र राजारानी वजार, देउराली, आईतवारे, सामेवा, ठाडा गाउँ, लाफा चोक, लाप्से, सौर्ये र वुधवारे वजार प्रमुख वस्तीहरु पर्दछन् । यस सडक खण्डमा जम्मा घरधुरी संख्या १२२१ र जनसंख्या ५९२२ रहेको छ र सरदर परिवार संख्या ४.८५ छ । यहाँ वसोवास गर्ने विभिन्न जात जातिका मानिसहरुमा मुख्य गरी राई, लिम्वु, क्षेत्री, ब्राहमण, तामाङ्ग तथा दलित (कामी) पर्दछन् । दलितहरु सवै वस्तीहरुमा छरिएर बसेका छन् ।

यहाँका बासिन्दाहरुको मुख्य पेशा कृषि र पशुपालन हो । यातायातको राम्रो सुविधा नभएको तथा पहाडी क्षेत्र भएकोले कृषि उब्जनीले मात्र पर्याप्त नहुने हुदा यहाका अधिकाशं मानिसहरु श्रम रोजगारीका अन्य पेशामा काम गर्ने तथा केही मानिसहरु सरकारी तथा अन्य संस्थामा काम गर्ने, थोरै मानिसहरुले व्यापार व्यवसाय गर्ने गर्दछन् । साथै जनसंख्याको उल्लेखनीय प्रतिशत मानिसहरु जीविकोपार्जनको सिलसिलामा काठमाडौं तथा भारत लगायत विदेशका विभिन्न ठांउमा रोजगारीको लागि जाने गर्दछन् ।

प्रमुख वातावरणीय प्रभावहरू

सकारात्मक प्रभाव :

आयोजना बाट तत्कालै हुने लाभमा स्थानीय स्तरमा रोजगारीको सिर्जना हुनेछ । आयोजना संचालनको लागी जम्मा १७५,११८ मानव दिन तथा करिव १४०,०९४ वरावरको अदक्ष र ३५,०२४ मानव दिन वरावरको दक्ष श्रमशक्तीको आवश्यकता पर्नेछ । आयोजना संग सम्वन्धित कार्यमा (रोजगारीमा) गरीव, तथा पिछडिएका स्थानीय जनताले प्राथमिकता पाउनेछन् । यस चरण मा हुने अन्य लाभहरुमा वन्द व्यापारको बृद्धि हुने अवसर, आयोजनाले प्रदान गरेको शीपमुलक तथा जनचेतनामुलक तालिममा तथा आयोजना निर्माण कार्यमा सहभागी भई स्थानीय जनताको शीप बृद्धि हुने अवसर पर्दछन् ।

सडक सञ्चालनका चरणमा सडकले प्रभावित क्षेत्रका वासिन्दालाई वजार, सामाजिक सेवा प्रदायक स्थान तथा देशका अन्य भागहरुसम्म पुग्न छिटो, छरितो तथा सुविधाजनक पहुँचको अवसर प्रदान गर्नेछ । सडक सुविधाको कारण मल तथा किटनाशक औषधीहरुको सस्तो तथा सुलभ आपुर्तिले कृषिको उत्पादकत्वमा अभिबृद्धि हुनेछ । यसले स्थानीय जनताको आय तथा खाद्य सुरक्षामा अभिबृद्धि हुनेछ साथै स्थानीय श्रोत साधनको उपयोग गर्ने साना कृषि उद्योगहरुको प्रवर्दन हुनेछ । पहुँच तथा यातायातको 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 ।

आयोजना कार्यन्वयनबाट पर्न सक्ने नकारात्मक प्रभावहरु :

सडक निर्माणको क्रममा भिरहरु काट्दा, खन्दा निस्किएको माटो तथा गेगर थुपार्दा, निर्माण सामग्री झिक्नलाई खानी सञ्चालन गर्दा त्यस क्षेत्रको भिरालो ठाउँहरुमा असर पर्न गई पहिरो तथा भु-क्षय हुन सक्ने सम्भावना रहन्छ । फोहर तथा खन्दा निस्किएका माटो, गेगर को उचित व्यवस्थापन हुन सकेन भने यसले भ-क्षय वढाउन तथा जल प्रदुषण गराउन सक्छ । सडक निर्माणको दौरानमा बाटो चौडाइ ५.०० मी. कायम गर्नको लागी ०.२५ हेक्टर जंगल क्षेत्र प्रयोग हुनेछ, तथा विभिन्न जातका गरी ८ वटा निजी रुख विरुवाहरु र वासँका जम्मा २६८ वटा वोटहरु काटिनेछन् । सडक निर्माण क्रियाकलापबाट जीवजन्तुलाई असर पर्ने तथा सडक निर्माण कार्यमा खटिएका कामदारहरुले वनका जीवजन्तुलाई जिस्क्याउने तथा तिनको शिकार गर्नसक्ने सम्भावना रहेता पनि ति न्युन हुनेछ । सडक निर्माणको दौरान ५ वटा घर,१ वटा पानी टैंकी र १ वटा प्राथमीक विघालयको घर र पर्खालमा असर पर्ने देखिन्छ ।

निर्माण कार्यको क्रममा श्रमिकहरु तथा स्थानीय जनतालाई स्वास्थ्य समस्या पर्न सक्छ तथा अप्रिय दुर्घटनाहरु घट्न सक्छन् । सडक सञ्चालनको चरणमा सवारी साधनको आवगमनबाट, वर्षायामको पानीबाट तथा स्थानीय भिरपहराहरुमा गाईवस्तु चराउदा वा रुख विरुवा काट्दा भिरपहराहरुमा अस्थिरता बढ्न गई पहिरो जान सक्छ । सडक किनाराका नाला बाट वगेको अनियन्त्रित पानीले सडक मुनिका खेतवारीमा भु-क्षय हुन सक्छ । सवारी साधनको बृद्धिले धुलो तथा ध्वनी प्रदुषण बढ्नेछ । त्यसैगरी सडकको सुधार संगै वन क्षेत्रसम्म भएको पहुँचको बृद्धिले वन सम्पदा तथा अन्य जन्तुमा चाप बढ्न गई वन सम्पदाको क्षय र जीवजन्तुलाई असर पर्न सक्छ । सडकको सुधार संगै बस्ती र वजारको अव्यवस्थित विस्तार हुने सम्भावना र सडक क्षेत्र मिच्ने प्रवृति देखिन सक्छ ।

प्रभाव न्यूनिकरणका उपायहरु :

यस आयोजनाहरुलाई वातावरण मैत्री वनाउनका लागी सकारात्मक प्रभावलाई वढावा गर्ने तथा नकारात्मक प्रभावहरुलाई नियन्त्रण या न्युनिकरण गर्ने थुप्रै उपायहरु यस प्रतिवेदनमा प्रस्तावित गरिएको छ । जनताले राजी खुशीले वाटोको लागी दिएको वाहेक आयोजनाले गरिवीका रेखामुनि परेका परिवारहरुको अधिग्रहण गर्ने सवै जग्गाको प्रचलित मुल्य अनुसार क्षतिपुर्ति दिनेछ । सडक LEP (श्रम मुलक वातावरण मैत्री सहभागीता मुलक) तथा निर्माण मेसीन तथा औजार प्रयोग गरी निर्माण गरिने छ । आयोजनाले प्रभावित जनतालाई निर्माण कार्यमा रोजगारीमा तथा शिपमुलक तालिममा प्रथमिकता दिनेछ । आयोजना निर्माणको क्रममा जग्गा फँडानी गर्दा, जमिन काट्दा, खानी सञ्चालन गर्दा, खन्दा निस्किएका माटो, गेगर थुपार्दा तथा अन्य संवेदनशील कार्य गर्दा त्यस क्षेत्रको वातावरणलाई सुरक्षित राख्न विशेष ध्यान दिनेछ । निर्माण कार्यको क्रममा श्रमिकहरुको बिमा गरिने छ तथा सुरक्षाका सम्पूर्ण सामग्री श्रमिकहरुलाई प्रयोगमा ल्याउन दिइने छ । वन, जीवजन्तुको संरक्षण गर्न तथा सामाजिक अक्षुणतालाई कायम राख्न यस चरणमा जनचेतनामुलक कार्यक्रमहरु तथा तालिमहरु सञ्चालन गरिनेछ । निर्माण कार्यको क्रममा श्रमिकहरुको बिमा गरिने छ तथा सरक्षाका सम्पर्ण सामाग्री श्रमिकहरुलाई प्रयोगमा ल्याउन दिईने छ । निर्माण स्थलहरुमा प्राथमिक उपचारको सामग्रीहरुको व्यवस्था गरिने छ । काटिएका निजि रुख विरुवाहरुको क्षतिपुर्ति वापत १:१ को अनुपातमा बृक्षारोपण गरिनेछ। वृक्षारोपणमा संरक्षित प्रजातिकाहरुलाई प्राथमिकता दिइनेछ । सडक सञ्चालनका क्रममा सडकमा देखिएका अस्थिरताहरुलाई नियमित रुपमा मर्मत संभार गरिनेछ । सडकमा तथा सडकको कारण नजिकैको खेतवारीमा पानी जम्मा हुन नदिन उचित निकासको व्यवस्थापन गरिनेछ । सडक दुर्घट्नाबाट वचावत गर्ने उपायहरु अवलम्वन गरिनेछ ।

वातावरण व्यवस्थापन योजना :

यस प्रतिवेदनमा वातावरण व्यवस्थापन योजना अन्तर्गत 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	५०,०००/-	आयोजनाको बजेटमा समावेश गरिने ।
२.	अभिमुखीकरण तालिम	१००,०००/-	आयोजनाको बजेटमा समावेश गरिने ।
३.	नाईके को तालिम (RBG)	५०,०००/-	आयोजनाको बजेटमा समावेश गरिने ।
४.	श्रमिकहरुको विमा	१००,०००/-	BoQ मा समावेश गरिने ।
५.	बायो-इन्जिनियरिङ्ग र सडक छेउ वृक्षारोपण	३४,००,३४०/-	BoQ मा समावेश गरिने ।
६.	पुनर्वास तथा जग्गा अधिग्रहण	३४,७२,७७८/-	पुनर्वास योजनामा समावेश गरिने ।
७.	पुननिर्माण तथा अन्य	५००,०००/-	BoQ मा समावेश गरिने ।
८.	क्षतिपुर्ती वृक्षारोपण	१६,०००/-	आयोजनाको बजेटमा समावेश गरिने ।
९.	एच. आई. भी. रोकथाम तथा अन्य चेतनामूलक कार्यक्रमहरु जस्तैः युवा साक्षरता, स्थानीय विद्यालय सहयोग आदि	९३५,०००/-	सामाजिक योजना तथा आयोजनाको बजेटमा समावेश गरिने ।
१०.	पेशागत स्वास्थ्य सुरक्षा तथा जानकारीमूलक सूचनापाटी	५५०,०००/-	BoQ मा समावेश गरिने ।
११.	अनुगमन तथा मुल्यांकन	२००,०००/-	आयोजनाको बजेटमा समावेश गरिने ।
	जम्मा :	**९,३७४,११८/-**	

निष्कर्ष :

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

EXECUTIVE SUMMARY IN ENGLISH

Background

Government of Nepal is receiving financial aid from ADB, SDC, DFID, OFID under Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP) in order to finance in the reconstruction and rehabilitation of the rural infrastructure which were damaged due to long conflict affected districts in the country. The Proposed Upgrading of Raja Rani-6 no. Budhabare Rural Road is one of the Sub Projects under RRRSDP, which is proposed by Dhankuta district for rehabilitation. At present, the road is fair weather. Total length of the road is 26.07 km.

Project Proponent

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

Objectives

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

Relevancy of the Proposal and Study Methodology

The proposed Subproject will provide access to district headquarter, living in rural area of Dhankuta district. As a result socio-economic condition of people living in that area will enhance as local products like vegetables, fruits will get access to market.

The findings and conclusions of the report are based on the analysis of the information collected from the field during November, 2009 by undertaking a walk-through environmental survey along the proposed route and secondary information supplemented by information collected by the social and technical teams working on the resettlement survey and detail survey. The IEE report has been prepared according to the Environmental Protection Act, 1997 and Environmental Protection Rules, 1997 (second amendment 2007) of the Government of Nepal and Environmental Assessment Guidelines, 2003, Safeguard Policy Statement, 2009 of ADB. This report is based on the Terms of Reference (ToR) approved on 2066/03/09 by Secretary level decision of Ministry of Local Development (MoLD).

Project Description

The proposed road links with far south-eastern part of the remote community of Dhankuta district with the district headquarter. The total length of the road is 26.07Km. The road alignment is already opened and motorable. The road passes four village development committees namely Raja Rani, Basantatar, Mudebas and 6 no. Budhabare. The average width of the road is 5.0 m and geometry will be improved as per design required. The total project cost is NRs. 11,67,44,994.00 and per km cost is NRs. 44,78,136.00.

Existing Environmental Condition

The road starts from Raja Rani Bazaar of Raja Rani VDC at 1590m a.m.s.l. and passes through Saurye at 1879m a.m.s.l and ends at 6no. Budhabare Bazaar. The road alignment is composed of various kinds of rock. Generally, alluvial, residual and clay mixed sandy soil are found along the road alignment. Main water bodies found across the road alignment are Tribeni Khola and Khasreni Khola. Ambient air and water quality of the proposed project area is observed to be good and there is no noise pollution. The road mainly passes through cultivated land, forest and settlements. The dominant tree species found in the road alignment are Alnus nepalensis (Uttis), Castanopsis indica (Katus), Schima wallichii (Chilaune), Pinus roxburghii (Salla), Sauravia nepauensis (Gogan), Dendrocalamus strictus (Bans), Ficus nerifolia (Dudhilo), Prunus cerasoides (Painyu), and Lampate. Muntiacus muntjack (Deer), Hiystrix indica (Porcupine), Sus scrofa (Bandel), Macaca mulatta (Monkey), Felis chaus (Jungle Cat), Canis aureus (Jackle) and Ratufa spp. (Squirrel) are the major wild animals reported in the nearby forest of proposed road area. Similarly, major birds found in the project area are Corvus splendens (Crow), Passer domesticus (Sparrow), Lophura lencomelana (Kalij Pheasant), Columba livia (Pigeon), Streptopelia spp. (Dhukur), Psittacula kramen (Suga) etc. in the project area. The road does not fall under any protected or buffer zone area.

The major settlements along the ZoI of the proposed road alignment are Raja-Rani, Deurali, Aetabare, Samewa, Thadagaun, Lapha chowk, Lapse, Sauyre and Budhabare bazaar. The total household within ZoI along the road corridor is 1221, total population number is 5922 persons and average family size of 4.85. Diverse ethnic groups such as Rai, Limbu, Chettri, Brahmin, Tamang and occupational caste (Kami) live along the ZoI of road alignment. Occupational caste households are distributed in almost all the settlements.

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

1. MAJOR ENVIRONMENTAL IMPACTS

Beneficial Impacts

The immediate benefit from this road Subproject is employment opportunities. The implementation of Sub-project require total 175,118 person days and about 140,094 person days of unskilled and 35,024 person days of skilled manpower. The project will give priority to the poor, ethnic minorities and disadvantaged local people for employment opportunity. Other beneficial impacts include enhancement of local business, development in skills of local people from skill developing training, awareness raising training and involvement in the construction of the project.

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

Adverse Impacts

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

During road widening and construction required 0.25 Ha of forest area and different type of tree total 8 nos will have to be cleared from private land and 268 nos of bamboo tree will 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. 5 houses, one water tank and compound wall and building of a primary school is affected during road construction.

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.

2. MITIGATION MEASURES

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

compensated by planting of trees in the ratio of 1:1 in private land. 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	50,000.00	To be included in project cost
2	Enhancement in Technical Skills	100,000.00	To be included in project cost
3	Training to Naike of RBGs	50,000.00	To be included in project cost
4	Insurance of RBG workers	100,000.00	To be included in BoQ
5	Bio-engineering/ Road Side Plantation	34,00,340.00	
6	Resettlement and Land Acquisition	34,72,778.00	To be included in Resettlement plan
7	Restoration or relocation of affected infrastructures, Spoil management, Reinstate of quarry, stockpiling etc.	500,000.00	To be included in BoQ
8	Compensatory Plantation cost	16,000.00	To be included in project cost
9	Social Action Plan (Health / HIV AIDS / STD prevention awareness; other awareness program such as adult literacy'; support to local school etc.)	935,000.00	To be included in Social plan
10	Occupational health and safety, Information signboard	550,000.00	To be included in BoQ
11	Monitoring	200,000.00	To be included in project cost
	Total	9,374,118.00	

Conclusion and Recommendation

The IEE study of the proposed Raja Rani-6 no. Budhabare road sub-project reveals that the identified environment impacts will be seen in limited small areas and mainly during construction period. The implementation of proposed mitigation measures for identified adverse impacts will minimize as well as mitigate the adverse impacts on environment. The Resettlement Plan and compensation to the affected households should be ensured. The implementation of measures as described in environmental management plan will mitigate the negative impacts on physical, biological, socio-economic and cultural environment. Therefore, this IEE is sufficient for approval of the proposed sub-project, and recommended for implementation with incorporation of mitigation measures and environmental monitoring plan. Therefore, the proposed Subproject does not require Environmental Impact Assessment.

CHAPTER – 1

1. INTRODUCTION

1.1 Background

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

1.2 Name and Address of Proponent

2. Name of Proposal: Upgrading of Raja Rani – 6 no. Budhabare Rural Road Subproject
Name of Proponent: District Development Committee, District Technical Office
Address of Proponent: Dhankuta District, Nepal
Telephone No.: 977- 026-520920
Fax No.: 977- 026-521481

1.3 Relevancy of the Proposal

3. The sub-project area has high potential for the production of vegetables, ginger and fruits. The proposed road will enhance access of the rural people to market and social services and will significantly uplift their socio-economic status and sustainable livelihood. Better access in turn will also doors to new development opportunities. The IEE study of rural road, is a legal requirement as per the GON provision in article 3 of Environmental Protection Act (EPA), 1997 and rule 3 of Environmental Protection Rules (EPR), 1997 (amended in 2007); Environmental Assessment Guidelines, 2003 as well as ADB guideline and Safeguard Policy Statement, 2009.

1.4 Objectives of IEE study

4. The main objective of the IEE study is to identify the impacts on physical, biological, socio-economic and cultural environment of the sub-project area from the implementation and operation of the Proposal. It recommends practical and site-specific environmental mitigation and enhancement measures, as well as environmental monitoring plan.

1.5 Methodology Adopted

5. The IEE study has followed the provisions of the EPA, 1997 and EPR, 1997, the provisions of ADB and approved ToR[1] for IEE Study by MoLD. Necessary information were collected and gathered through literature review and field level survey as stipulated in the TOR[1] and analyzed likely environmental impacts on physical, biological, socio-economic and cultural issues of the proposed rural road. For the collection of environmental features related to bio physical environment, maximum 100 meter distance observable from the centre of the road alignment was taken as an influence area and socio-economic and cultural environment was taken of ZoI (one and

[1] The TOR was approved on 22nd June 2009 (2066/03/08 B.S) by the secretary level decision of the MoLD.

half hour walking distance from the centre line of the road) information of the Subproject area. Secondary information was collected published and unpublished reports and interpretation of maps and photographs, review of the various Initial Environment Examination reports on similar projects and other pertinent literatures was done in order to determine a frame of reference to the project. At the sametime, the relevant laws and regulations were also reviewed to refresh the procedures that have to be pursued during the study. Primary level of information were collected through questionnaires, checklist, data sheets, walk-over survey and own perception of IEE team judgment.

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

1.6 Description of the proposal

7. The proposed Raja Rani – 6 no. Budhabare Road is 20 km away from Bhedetar and altogether 54 km far from Dhankuta Municipality in Eastern Development Region of Nepal. It starts from Raja Rani Bazaar of Dhankuta District and ends at ward no. 6 Budhabare Bazaar. Major settlements along the road alignment are Raja-Rani, Deurali, Aetabare, Samewa, Thadagaun, Laphachowk, Lapse, Saurye and Budhabare bazaar. Other minor settlements are Phuwarok, Poroksing, Tinghare, Bhanjyang, Dandagaun, Mathillotole, Sarogaun, Todke Pangmitole, Gotametole, Tiefitting Pakha, DinglaTole, PokhariTole, Sallabotetole etc. The road passes through Raja Rani, Basantatar, Mudebas and 6 no. Budhabare VDCs. It is one of the important roads, which goes to junction point of Ilam, Panchthar and Dhankuta districts and links itself to East-West highway via. Dharan-Dhankuta Lokmarga. It is a very useful road for the people of remote south-eastern parts of Dhankuta including the remote VDCs of adjoining Panchthar, Morang and Ilam districts. This Sub-project after all will have wider scope on overall development of the Dhankuta district. The proposed rural road has been selected as per the decision made by the DPCC and DDC with prioritizing on District Transport Master Plan (DTMP). This road falls in both ridge and river Alignment. Agriculture lands, Private forest and community forest are found to the both sides of the road. There are some existing sharp horizontal curves, hairpin bends and high gradient beyond 12%. Since the road will be widen to 5.0 m land new to be acquired along the road corridor for switchback, lay-byes, extra widening in curves, as well as for mass balancing and safe disposal for the excess excavated material. The total length of the road as per ToR was 27.1 km but after detailed survey the alignment length is changed to 26.07km (see **Map 1.1** and **Map 1.2**). The total cost of road upgrading is estimated as NRs. 11,67,44,994.00 and shown in **Appendix-III**.

8. Salient feature of the Road Subproject

1. Name of the Sub-Project	: Upgrading of Raja Rani – 6 no. Budhabare Rural Road Sub-project
2. Location	
2.1 Development Region	: Eastern Region.
2.2 Zone	: Koshi
2.3 District	: Dhakuta
2.4 Geographical Location	
2.4.1 Start Point	: Raja Rani Bazaar
2.4.2 End Point	: Ward no. 6 of Budhabare VDC
2.5 Geographical Feature	
2.5.1 Terrain	: Mid-Hills, Rolling & Mountain
2.5.2 Landuse pattern	: Settlement, Agricultural land, Barren, Forest etc
2.5.3 Altitude	: Raja-Rani bazaar - 1,590m a.m.s.l (minimum) and Saurye Bazaar – 1,879m a.m.s.l (maximum)
2.5.4 Climate	: Cool-temperate Climatic Zone
2.5.5 Soil	: Hard soil
3. Classification of Road	: District Road (Rural) Class A
4. Length of Road	: 26.07km
5. Standard of Pavement	: Gravel

6. Construction Period : 270 Days
7. Existing Traffic : 20 vehicles per day
8. Design speed : 30 km/hr
9. Maximum Grade : 12%
10. Minimum radius of Horizontal curve : 10m
11. Major Settlements:
    - 11.1 Major Settlements : Raja-Rani, Deurali, Aetabare, Samewa, Thadagaun, Lapha chowk, Lapse, Sauyre and Budhabare bazaar.
    - 11.2 VDCs along the Road alignment : Raja Rani, Basantatar, Mudhebas, 6 no. Budhabare
    - 11.3 Total no. of Household : 1221 HHs (within ZoI along the road corridor)
    - 11.3 Total population : 5922
12. Cross Section
    - 12.1 Right of way : 10m (5m each side)
    - 12.2 Formation Width : 5 m
    - 12.3 Carriageway width : 3.5 m
    - 12.4 Lane : Single
    - 12.5 Surface types : Gravel
13. Approximate Volume of works
    - 13. 1 Earth work in excavation (cum) : 1,19,452.42 Cum
    - 13. 2 Dry Stone Causeway for water management
        - (i) Dry Stone Causeway (nos.) : 92
        - (ii) Stone pitching (cum) : 775
    - 13. 3 Pipe Culverts (nos.) : 15
    - 13. 4 Retaining structure
        - (i) Dry Masonary Retaining wall (cum) : 763.41
        - (ii) Stone masonry work (cum) : 1555.55
        - (iii) Gabion wall (cum) : 8,294.00
14. Project cost
    - 14.1 Total Cost : NRs. 11,67,44,994.00
    - 14.2 Cost per km : NRs. 44,78,136.00
    - 14.3 Bio-engineering/Roadside plantation cost : NRs. 34,00,340.00
15. Material Availability
    - 15.1 Stone quarry : Sufficient about an interval of 3000 m along the alignment (i) from Lhapse-6 to Saurye-9(ii) Korna and (iii)Deurali area.
    - 15.2 Sand quarry : (i)Dhapper Khola, Saurye (ii) Charuwa, Atthase, Basantatar-5,6 and (iii) Chisau Khola, Budhabare (if insufficient).
16. Total Employment generation : 175,118
    - 16.1. Skilled : 35,024
    - 16.2. Unskilled : 140,094

1.7 Construction Approach and Activities

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

1.8 Proposed Schedule for Implementation of Sub-project

10 Following table shows the proposed implementation schedule for Raja Rani – 6 no. Budhabare road sub-project:

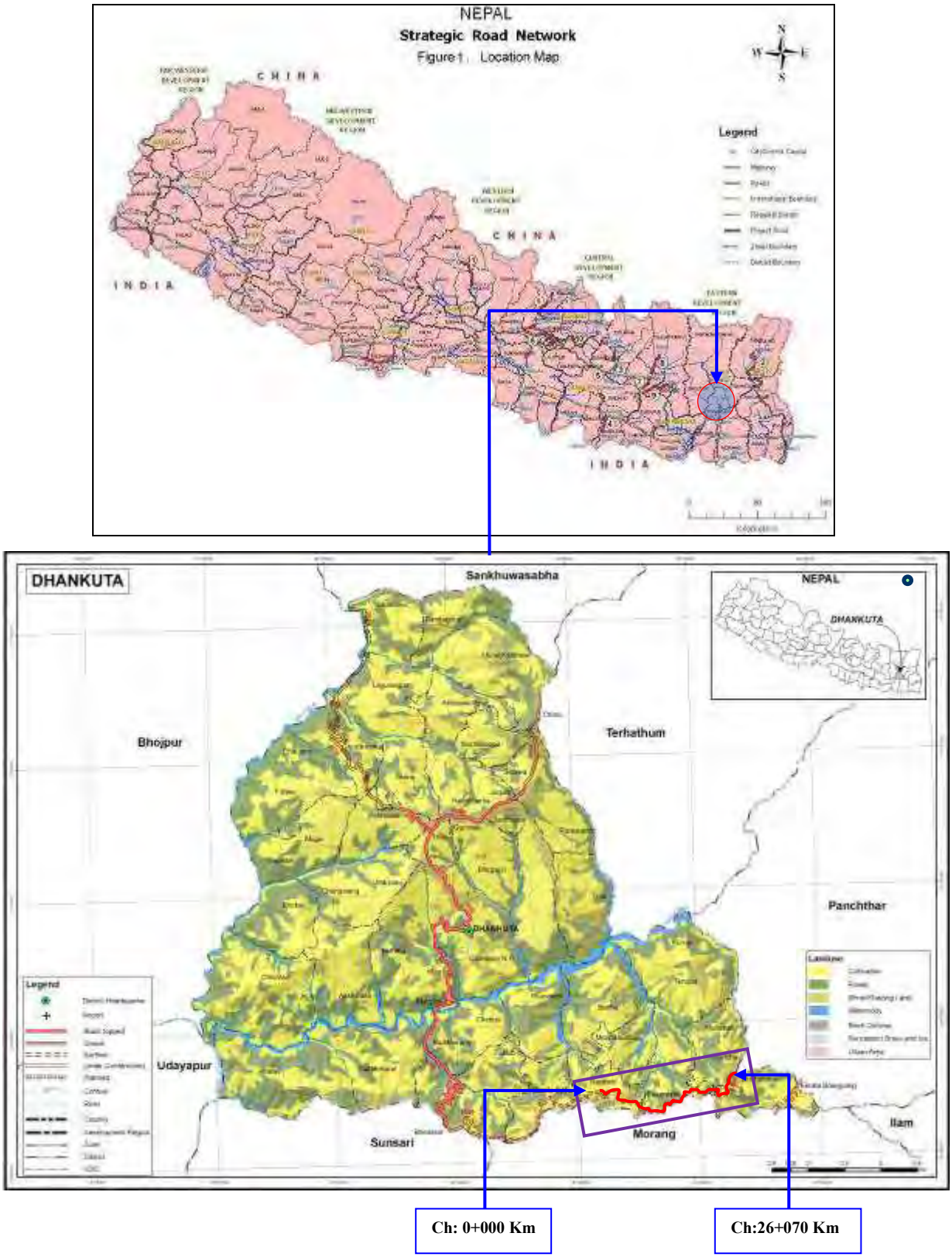
Table 1.1: Sub-project implementation schedule

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

Note:

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

Map of Nepal



Map 1.1: MAP OF NEPAL AND DHANKUTA DISTRICT SHOWING THE LOCATION OF PROPOSED UPGRADING ROAD ALIGNMENT FROM RAJA RANI TO 6 NO. BUDHABARE

Location Map

LEGEND

- Settlements along road corridor
- Landslides
- Rocky area
- Stone Quarry
- Gumba/Mane
- Temple
- School/ College
- Lake/Ponds

Map1.2: TOPO. MAP SHOWING THE EXISTING FEATURES IN THE ALIGNMENT OF RAJA RANI – 6 NO.BUDHABARE ROAD SUB PROJECT

CHAPTER - 2

2. PUBLIC CONSULTATION AND INFORMATION DISSEMINATION

2.1 Public Consultation

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

- Publication of notice- a 15 days public notice was published on 17th Ashad of 2066 B.S (1st July 2009) in the Rajdhani, a national daily newspaper (**see Appendix-V**) seeking written opinion from concerned VDCs, DDC, schools, health posts and related local organizations. A copy of the public notice was also affixed in the above mentioned organizations and deed of enquiry (muchulka) was collected (see **Appendix-VI** for deed of inquiry and **Appendix-VIII** for the names of organizations).
- IEE team also carried out interaction and group discussion with local communities and related stakeholders such as District Development Committee, District Forest Office, Rara Samaj Sewa Sangstha, Village Development Offices, District Soil Conservation Office, District Agricultural Development Office and others during field survey to collect the public concerns and suggestions (see **Appendix-Xa**). FGDs were held at major settlements along the ZoI of the road (refer **Tables 2.1**and **Appendix-Xb**).
- Recommendation letters were also obtained from the concerned VDCs (see **Appendix-XI**). After reviewing draft IEE report and incorporating the suggestions from the concerned stakeholders, Final IEE report will be prepared and sent to PCU for approval from MoLD and ADB.

Table 2.1: Summary of FGD and Consultantion meetings

Location	Date	No. of Participants		Issues and Suggestions	Decision
		Male	Female		
Rara Samaj Sewa Sangstha, Raja Rani- 6	2066/07/27B.S. (13/11/2009)	5	1	1. FGD program has disseminated issues and information about the project related works. 2. Compensation must be provided for project-affected families for their land and property, proper drainage system. 3. Community infrastructures should be protected and restored, if damaged. 4. Group awareness and training programmes to be conducted. 5. Safety measure signs should be kept in the school area and other appropriate sites(speed breaker and signboard). 6. Supplementary infrastructure such as drinking water and irrigation schemes should be supported. 7. Local people should be given priority in employment opportunities. 8. Emphasis to promote agricultural production and training for income generating activities for sustainable livelihood. 9. Drinking water source/tank at Saurye, Budhabare -8 must be preserved during road construction. 10. Special measures should be taken to protect the existing road condition by constructing system outlets and proper storm water drainage at Thadagaun, Basantatar-1. 11. Tree plantation and Bioengineering works need to be emphasized at landslide occurring places including Thadagaun area.	• Related issues such as compensation and restoration of public and private properties, construction of storm water drainage, bioengineering, awareness and on the job training, priority to local people for employment, safety signs along the road; have been addressed in the mitigation and benefit enhancement measures. • Supplementary infrastructure such as drinking water cannot be included in this subproject and will be provided by RRRSDP's other supplementary infrastructure project.
Samewa Bazaar, Basantatar-1	2066/07/28B.S. (14/11/2009)	11	1		
Shreee Kalika Primary School, Basantatar-2	2066/07/28B.S (14/11/2009)	9	1		
Lapha Chowk, Mudebas-1,2	2066/07/28B.S (14/11/2009)	7	1		
Saurye Bazaar, 6 no. Budhabare-9	2066/07/28B.S. (14/11/2009)	12	1		
VDC Building, 6 no. Budhabare	2066/07/29B.S. (15/11/2009)	18	1		

2.2 Information Dissemination

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

1. District Development Committee, Dhankuta
2. District Technical Office, Dhankuta
3. District Project Office, Dhankuta
4. District Implementation Support Team, Dhankuta
5. Raja Rani, Basantatar, Mudebas and 6 no. Budhabare VDCs
6. Ministry of Local Development, Environment Management Section
7. Department of Local Infrastructure Development and Agricultural Roads
8. Project Coordination Unit, RRRSDP
9. Asian Development Bank, Nepal Resident Mission

CHAPTER – 3

3. REVIEW OF RELEVANT ACTS, REGULATIONS AND GUIDELINES

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

Table 3.1 Review of Environmental Acts, Regulations and Guidelines

S.N.	Environmental Acts, Regulations and Guidelines	Description of Requirements
1	Environmental Protection Act, 2053 BS (1997 AD), GoN	Any development project, before implementation, shall pass through environmental assessment, which may be either IEE or an EIA depending upon the location, type and size of the projects.
2	Environmental Protection Rule 2054 BS (1997 AD) (amendment, 2007), GoN	The EPR and its schedules clearly provide various step-wise requirements to be followed while conducting the IEE study. It also obliges the Proponent to timely consult and inform the public on the contents of the proposal.
3	Forest Act, 2049 BS (1993 AD) (amendment, 2007), GoN	Requires decision makers to take account of all forest values, including environmental services and biodiversity, not just the production of timber and other commodities. It includes several provisions to ensure development, conservation, management, and sustainable use of forest resources based on approved work plan.
4	Forest Rules, 2051 BS (1995 AD), GoN	Elaborates legal measures for the conservation of forests and wildlife. Expenses incurred for cutting trees and transportation shall be borne by proponent.
5	Batabaraniya Nirdesika (Nepal; MoLD), 2057, GoN	The directive is focused in the practical implementation of small rural infrastructures through the minimization of environmental impacts. This directive includes the simple methods of environmental management in the different phases of the project cycle.
6	National Park and Wildlife Conservation Act, 2029 BS (1973 AD), GoN	Addresses for conservation of ecologically valuable areas and indigenous wildlife. The Act prohibits trespassing in park areas, prohibits wildlife hunting, construction works in park area, damage to plant and animal, construction of huts and house in park area without permission of authorized person. It lists 26 species of mammals, 9 species of birds, and 3 species of reptile as protected wildlife.
7	Local Self Governance Act 2055 BS (1999 AD) (1999) and Regulation 2055 BS (1999 AD), GoN	Empowers the local bodies for the conservation of soil, forest and other natural resources and implements environmental conservation activities
8	Land Acquisition Act, 2034 BS (1977 AD) and Land Acquisition Rules, 2026 BS (1969 AD), GoN	Specifies procedural matters on land acquisition and compensation
9	National Environmental Impact Assessment Guidelines, 1993 (2050 BS), 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.
10	APPROACH for the Development of Agricultural and Rural Roads, 1999 (2055 BS), GoN	Emphasizes labor based technology and environmental friendly, local resource oriented construction methods to be incorporated actively in rural infrastructure process.
11	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

S.N.	Environmental Acts, Regulations and Guidelines	Description of Requirements
		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.
12	Reference Manual for Environmental and Social Aspects of Integrated Road Development, 2003 (2060 BS), GoN	Suggests stepwise process of addressing environmental and social issues alongside the technical, financial and others.
13	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
14	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.
15	Resettlement Policy Framework	It establishes the resettlement and compensastion principles, organizational arrangements and design citeria to be applied to meet the needs of the people who may be affected by the project activitie resulting due to land acquisition, loss of shelter, assets or livelihoods, and/or loss of access to economic resources.
16	Guideline for Road Corridor and Alignment Selection	This also indicates articulately the environmental consideration in alignment selection. This document provides the process and methods for environmentally feasible road corridor selection.
17	Guidelines for Environmental Management in Road Sector, 1999	This guideline for Environmental Management in Road Sector, 1999 articulately indicates the process of conduction EIA and IEE for road sector. The guideline also presents the environmental impacts in terms of physical, biological, social, economic and cultural aspects and developing mitigation measures. This specifically deals with the management of quarries; borrow pits, material stockpiling and spoil disposal, camp operation, earthworks and slope stabilization, and environmental pollution. It is the main set of operational guidelines that must be compiled with.
18	Safeguard Policy Statement, 2009, ADB.	ADB's Safeguard Policy Framework consists of three operational policies on the Environment, Indigenous people and Involuntary resettlement. It requires that (i) impacts are identified and assessed early in the project cycle, (ii) plans to avoid, minimize, mitigate or compensate for the potential adverse impacts are developed and implemented and (iii) affected people are informed and consulted during project preparation and implementation.
19	The Interim Constitution of Nepal, 2063 (2007).	Has provision of right regarding environment - Every person shall have the right to live in clean environment.
20	The Labor Act, 2048 BS (1992 AD)	Regulates the working environment and deals with occupational health and safety.
21	Public Road Act, 1974	In order to ensure the construction and operation of the road projects smoothly, the Public Road act, 1974 has been enacted by government of Nepal. Section 3 of the Act empowers government to prohibit the construction of permanent structures (buildings) in the prescribed distance from the road. The DOR may acquire temporarily the land and other property adopting compensatory measures during the construction, rehabilitation and maintenance of the public road (Sections 14 and 15). The Act obliges the DOR to plant trees on both sides of the road and handover it to the local bodies (VDC or Municipality) for their management (Section 16). The Act also empowers the DOR to operate quarries and borrow pits and other facilities during the road construction (Section 17). In a nutshell, the Act facilitates the construction of this road and acquires land and property for the extraction of construction materials and development of other facilities through the compensation as negotiated and as well as maintain greenery along the roadside.
22	DFID Environmental Guide, 1999	This is a short guide to planning and managing the environmental screening and appraisal of DFID activities.

S.N.	Environmental Acts, Regulations and Guidelines	Description of Requirements
		The Guide is meant to provide an easy-to-read summary of the steps involved in environmental screening and appraisal. It contains checklists and flowcharts to help one to assess all the main issues at each stage. It does not contain all the answers, but it helps to find out where to get more detailed advice on the study process. The Guide summarises and complements the Manual of Environmental Appraisal (the green folder) of DFID. The purpose of this guide is to help "main-stream" environmental issues within all development activities of DFID and helps to achieve DFID's poverty elimination goal by maximising the sustainability of the programme and projects. The Guide, and particularly section 6 and Section 8, was reviewed and provisions applied wherever applicable while preparing this IEE Report.
23	RAP Guidelines for Initial Environmental Examination, 2001	The RAP Guidelines for IEE, 2001 clearly indicates the objectives and process of condition of IEE in terms of project screening, preparation of Terms of Reference, desk review, field work, data analysis and interpretation (identification, prediction and analysis of impacts), mitigation measures, monitoring plan and reporting.
24	Guideline for Road Corridor and Alignment Selection, RAP,2002	This also indicates articulately the environmental consideration in alignment selection. This document provides the process and methods for environmentally sound road corridor selection.
25	Tenth Plan, 2002	The tenth plan has, inter alia, adopted a strategy of developing, constructing and expanding strategic road network, promoting private sector's participation in road network development and maintenance, and making arrangement for study, technology, environmental management and road security. It has prioritized to link all district headquarters and major commercial centers, and avoid or minimize adverse environmental impacts (NPC, 2002).
26	Water Resources Act, 1992	Water Resource Act, 1992 of clauses 3, 7, 18, 20, 22 and 24 implies state ownership of any surface/ground water bodies of Nepal. It embodies that Government of Nepal can fix, monitor and formulate regulations pertaining to water quality standard, pollution tolerance level and development of water resource. It prohibits any action that may pollute water resource surpassing the threshold value.
27	Aquatic Animals Protection Act, 1961 and first amendment, 1998	The AAPA, 1961 provides legislative protection of the habitats of aquatic species. Section 3 confirms the punishment to any party introducing poisonous, noxious or explosive materials into water sources, or destroying any dam, bridges or water system with the intent of catching or killing aquatic life. Section 4 empowers the government to prohibit catching, killing and harming certain kinds of aquatic animals through notification in the Nepal Gazette.
28	Soil Conservation and Watershed Conservation Act, 1982	Soil Conservation and Watershed Conservation Act, 1982 empowers Government of Nepal to declare any area as a protected watershed area. The Act outlines the essential parameters necessary for proper watershed management (including both rivers and lakes). It prohibits activities such as excavation of soil, sand, boulders, diversion/storage of water and logging that trigger soil erosion/landslide. It is also authorized to implement land use planning system, shift any existing settlement, industry and acquire necessary lands in the conserved watershed area.
29	Green Roads in Nepal, Best Practices Report: An Innovative Approach for Rural Infrastructure Development in the Himalayas and Other Mountainous Regions, 1999 (2055 BS), GoN	Focuses on participatory, labor based and environment friendly technology with proper alignment selection, mass balancing, proper water management, bioengineering and phased construction

CHAPTER- 4

4. EXISTING ENVIRONMENTAL CONDITION

4.1 Physical Environment

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

4.1.1 Topography

15. The proposed road alignment passes through different valley ridges, moderate hill slopes and cultivated terrains of the Midhills in eastern Nepal. The elevation of the starting point of the road at Rajarani Bazaar is 1590m and at the end of road at 6 no. Budhabare Bazaar is 1634m. The highest elevation of the road alignment is 1879m at Saurye Bazaar.

Table 4.1: Physiographic region of the road alignment

Road	Physiographic Region by length				Total (Km)
	Terai	Siwalik	Middle Mountain	High Mountain	
Raja Rani – 6 no. Budhabare		-	26.07	-	26.07

Source: LRMP, 1984

4.1.2 Geology and soil type

16. Geographically the proposed road falls under the Lesser Himalayas, which is the range of rock composition of low to medium grade metasedimentary rocks and boarded in between two well known tectonic elements, the Main Boundary Thrust (MBT) and the Main Central Thrust (MCT). The sub-project area somehow falls within the major three zones viz. Mahabharat Formation, Mid hills and Quaternary Sediments of the Eastern Nepal. Some moderate and minor landslide areas are found along the alignment.

17. In general, soil type can be classified as soft, hard, white clay and boulder mix soil are found along the road alignment. The detail topography, altitude and soil type along the road alignment are presented in the **Appendix-XIII**.

Table 4.2 Geological features along the road alignment

Chainage	Location	Terrain slope	State of Land dry/wet	Land Use Pattern	Geological Problem
Ch: 5+500 – Ch: 5+650 km	Korna, Raja Rani-4	Moderate (Ascending)	Moist	Forest	Landslides: (35X20), (5X8) (25X40), (6X8)
Ch; 8+900 km – Ch: 11+850 km	Thadagaun, Basantatar-1	Steep (Ascending)	Moist	Cultivated, Barren and Forest	Rock Cutting area Landslides: (30X15); (20X10); (15X8); (5X8), (30X20), (25X15), (5X6)
Ch:16+600 - 16+850 km	Lapse Chowk, Mudebas-1	Moderate (Ascending)	dry	Forest	Landslides: moderate (20X30), (25X10);(40X30)
Ch: 19+420 km	Thulo muktara, 6 no. Budhabare	Steep (Decending)	Moist	Forest	Rock falling (8X5)
Ch: 20+680 km	Bhandare Khola, 6 no. Budhabare	Moderate (Decending)	Moist	Cultivated and Forest	Exposed Rock
Ch: 21+600 - 21+950km	Sano Muktara, Sengdag, 6 no. Budhabare	Steep (Decending)	dry	Cultivated and Forest	Landslides: (10X15); (10X5) with narrow and exposed rock
Ch:22+200 km – 23+550km	Raja Pokhari, Rani Pokhari, 6 no. Budhabare	Moderate (Decending)	Moist	Cultivated land (Dry old swampy valley area)	-
Ch: 23+700 km – 26+070km	Thada gaun, Chisang Khola, 6 no. Budhabare	Moderate (Decending)	dry	Cultivated, Barren and Forest	Landslides affects houses of upper road side at some places; three moderate Kholsi (stream) crossings

Source: Field Survey, November, 2009

4.1.3 Land use

18. As the proposed sub-project is located in hilly ecological regions, landuse along road alignment passes through ridge with moderate slope. The existing road mainly passes through cultivated and forest land. Although, overall landuse pattern and its zone of influence include primarily, cultivated (irrigated, un-irrigated), community forest and barren land.

19. Details of land holding and use pattern mentioned in **Appendix-**XI**Ic** have been summarized in **Table 4.3** below:

Table 4.3: Summary of land use pattern along the road alignment with 5m formation width

Land use	Along the road alignment			
	Total Length (m)	Existing Average Width (m)	Average Additional Width (m)	Additional Area (ha)
Cultivated land	8,645	3.5	1.5	1.3
Barren land	1,000	3.5	1.5	0.15
Patches of Forest (community and government)	11,424	3.5	1.5	1.71
Government forest	5,000	3.5	1.5	0.75
Total	**26,069**			**3.91**

Source: Field Survey, November, 2009

4.1.4 Soil Erosion and Sedimentation

20. The road alignment passes through hilly region. The stability of slopes along the road corridor depends upon slope angle, the material constituting the slope, rock discontinuities and hydrological condition. Proposed alignment does not pass through major landslides or erosion prone area, but some moderate and small slides are found along the road corridor. The approximate locations of landslide and slope instability areas are Ch:5+650, 8+900, 11+500, 16+600 - 16+850 and 19+420km. Besides this, at Ch 5+500 there is exist soft soil where landslide may occur during monsoon and post-monsoon season. However, road alignment section from Ch: 21+600 to 21+950 km of Budhabare (between ward no. 5 and 7) has minor-scale landslides, sediment deposit and gully erosion.

4.1.5 Climate

21. The climate of the sub-project site is temperate in nature at lower altitudes and cool temperate further higher places, which is characterized by cold, dry winter, warm and humid rainy seasons. Generally, rainy season starts from June and ends in September. The meteorological record shows unevenly distributed monsoon rain with the total annual average rainfall of 1,615 mm. The maximum temperature of the area rises to as much as nearly 32° C during summer. The minimum goes down to 5° C in winter (Source: District Profile of Dhankuta, 2058).

4.1.6 Hydrology and Drainage System

22. There are some seasonal and permanent streams along the road alignment namely Samewa khola(Ch: 10+250 km), Tribeni Khola (Ch; 12+150km), Khaseni khola (Ch:13+800km), Kali Gairi (Ch: 15+200 km), Rati Khola (Ch: 16+850km), Halale Khola(Ch:17+150km), Bandare Kholsa (Ch:20+450km), Raja Khola(Ch: 23+750km), Chishang Khola(Ch: 25+120 km).

4.1.7 Air, Noise and Water Quality

23. The air quality observed was good and expected to be within national ambient air quality standards of Nepal. The proposed road alignment does not have any sources of noise nuisance. Although, noise and dust emission during vehicular movement in the existing road is a natural phenomenon and it is more significant during dry season. Some settlements close to road alignment have noise disturbance in some extent during vehicular movement. Likewise, water quality seems to be good. There is no defecation problem around the drinking water sources along the road alignment. However, during the monsoon season the water could be slightly polluted.

4.1.8 Existing Road Condition

24. The proposed road starts from Raja Rani Bazaar, through Deurali, Aitabare, Samewa, Thadagaun, Lapha chowk, Lhapse, Saurye and ends to Budhabare Bazaar. Raja Rani Bazaar is situated 20km east from Bhedetar and links with Dharan-Dhankuta- Basantapur Highway. The existing road passes through many existing horizontal curves, and a few hairpin bends. During the field visit, the gradient is seems quite moderate until Lapse, but Muktara (Ch: 17+750km), Sano Muktara (Ch: 20+650Km), Sengdag (Ch: 20+850 km), Raja pokhari (Ch: 22+350km) areas have some high gradient. The road mainly passes through agricultural land, private and community forests in the vicinity with mainly agricultural land, exposed hard and soft rocky area, boulder mix soil zones and different settlements.

25. This road Alignment generally passes through valley plain with ridges and riverbanks. It is boulder mixed earthen road having width varies from 2.20 m to 3.50 m. As the alignment passes through hard rock strata and made of cutting stone surface so some portion of the alignment is narrow. There are some existing sharp horizontal curves, hairpin bends and high gradient beyond 12%. The sharp horizontal curves and about 50 m length of the road is found high gradient which need to be improved. Soft soil, hard soil, white clay, boulder mix soil and soft rocks are found in the proposed road alignment. There is no bridge in this section.

26. The proposed road is already in operation with movement of light vehicles and mini trucks/tractors with available of daily bus service till Raja Rani from Dharan and Dhankuta. Although the proposed road is linked with Dharan-Dhankuta- Basantapur highway through Bhedetar, it cannot be smoothly operated during rainy season.

4.1.9 Existing Traffic Situation

27. There is frequently movement of mini truck/pick-up and motorcycles with daily two-bus services in operation from Dharan and Dhankuta upto Raja Rani Bazaar. Due to high gradients at some places, there is no bus services upto Budhabare Bazaar and movement of other vehicles are also less. Nevertheless, the movement of light vehicals also reduces during rainy season as the slippery condition and narrow road at some section.

4.2 Biological Environment

28. This alignment does not pass through any protected area. The road mainly passes through cultivated land, private and community forest and settlement areas.

4.2.1 Vegetation

29. The dominant forest and fodder species reported in the road alignment are Alnus nepalensis (Uttis), Castanopsis indica (Katus), Schima wallichii (Chilaune), Pinus roxburghii (Salla), Sauravia nepauensis (Gogan), Dendrocalamus strictus (Bans), Ficus nerifolia (Dudhilo), Prunus cerasoides (Painyu) and Lampate. Other main species found within ZoI of the sub-project are Juglans regia (Okhar), Engelhardia spicata (Mauwa), Thysanolaena maxima (Amliso). Some Herbal and NTFP species such as Chutro, Chiraito, Ban Kagati, Phatkeri are also found in the subproject area.

30. The road alignment passes through government/community forest in different locations.

31. Among the flora found in the subproject area Juglans regia (Okhar), is listed as protected plant species and forest products according to the Forest Rules 2051 B.S., which is categorized into timber trees banned for felling, transportation and export for commercial purposes. Detailed of trees cutting from community forest and private forest during the road construction are given in **Appendix-XXI**.

Trees on private land

32. Local people have planted Uttis, Tejpat, Lapsi trees in some patches of their private land.

CommunityForest

33. There are mainly five community forests (CFs) along the proposed road alignment, which are listed in the **Appendix-XXII**. The concerned CFUGs are ready to remove the affected trees from their forest during road construction. However, they are expecting negotiable compensation for the tree clearance.

4.2.2 Wildlife

34. Muntiacus muntjac (Mriga- Barking Deer), Lepus nigricollis (Ban Kharayao- Wild hare), Hystix indica (Dumsi -Porcupine), Felis chaus (Ban Biralo- Jungle Cat), Panthera pardus (Nigale Chituwa- Leopard), Martes flavigula (Malsanpro), Ratufa spp.(Lokharke), Vulpes Montana (Nyauri Musa), Macaca mulatta (Monkey), Sus scrofa (Bandel) are the wild animals reported in the forests of proposed road area. Similarly, birds are Streptopelia spp. (Dhukur), Lophura lencomelana (Kalij pheasant), Columba livia (Pigeon), Gallus gallus (Jungle fowl), Corvus splendens (Kag), Passer domesticus (Bhangero) and Psittacula kramen (Suga). However, none of these wild lives is endangered species. The road does not fall under any National Park, buffer zone and protected area. Among the fauna present in the forest area along the road alignment, Martes flavigula (Malsanpro) is listed in CITES Appendix III, Ratufa spp.(Lokharke) is listed in CITES Appendix II and Panthera pardus (Nigale Chituwa-Leopard) is listed in CITES Appendix I.

4.2.3 Aquatic life

35. Aquatic species are in water bodies i.e. Raja Rani Tal, Raja and Rani Pokhari, streams and kholas along the road alignment are Gangata, Gaddera and Ashalafish.

4.3 Socio-economic and Cultural Environment

4.3.1 Population, Household and Ethnicity

36. The alignment covers four VDCs namely: Rajarani, Basantatar, Mudebas and 6 no. Budhabare. Major settlements within ZoI of the project are Raja Rani Bazaar, Deurali/Aitabare, Samewa, Thadagaun, Lapha chowk, Lhapse, Saurye and Budhabare bazaar. The total population and distribution of the concerned VDCs is 5,922 persons in 1221 households and average family size of 5.14 (see also **Appendix-XIIa)**.

Table 4.4: Demographic Features with Population Distribution

S.N.	Influenced VDCs/MC	Total HHs	Population distribution by sex			Population distribution by percentage		
			Male	Female	Total	Male (%)	Female (%)	Total (%)
1	Raja Rani	431	1146	1087	2233	51.3	48.7	100
2	Basantatar	292	633	570	1203	52.6	47.4	100
3	Mudebas	228	553	516	1069	51.7	48.3	100
4	6 no. Budhabare	270	760	657	1417	53.6	46.4	100
	Total	**1221**	**3092**	**2830**	**5922**	**209.2**	**190.8**	**400**

Source: Field /ZoI HH survey, November, 2009

37. Major ethnic groups are Rai, Chhetri, Limbu, Magar, Tamang, Brahamin, Newar etc. as given in **Table 4.5**.

Table 4.5: Ethnicity and Population Composition

S.N.	Caste / Ethnic Group	Percentage (%)	Presence of Caste/ Ethnicity in VDCs			
			Raja Rani	Basantatar	Mudebas	6 no. Budhabare
1	Rai	27.55	**yes**			
2	Chhetri	19.85	**yes**	**yes**		
3	Limbu	14.16	**yes**	**yes**		
4	Magar	10.34	**yes**	**yes**	**yes**	**yes**
5	Tamang	6.28		**yes**	**yes**	**yes**
6	Brahmin	5.49				**yes**
7	Newar	4.57	**yes**			**yes**
8	Kami	3.81	**yes**			**yes**
9	Damai	2.08	**yes**			**yes**
10	Sarki	1.24				**yes**
11	Gurung	1.17	**yes**			**yes**
12	Bhujel	1.15	**yes**			
13	Majhi	0.52				**yes**
14	Others	1.76				

Source: Field Survey, November, 2009

4.3.2 Main occupation

Table 4.6 Main occupation of the household in the major settlements

S.N.	Settlement Name	Number of HH in (in percentage)			
		Agriculture & Livestock	Labour & Porter	Business/ Commerce	Employees
1.	Raja Rani Bazar(Raja Rani)	32.6	19.5	19.5	28.2
2.	Deurali /Aitabare(Basantatar)	57.3	7.8	10.1	24.7
3.	Samewa(Basantatar)	90.7	3.5	4.1	1.5
4.	Thadagaun(Basantatar)	60.4	9.3	1.3	28.8
5.	Laphachowk(Mudebas)	19.08	77.8	1.02	2.04
6.	Lhapse(Mudebas)	37.7	51.8	5.6	4.7
7.	Saurye(6no.Budhabare)	60.15	6.2	4.6	28.9
8.	Budhabare(6no.Budhabare)	58.53	8.29	17.07	16.09
	Average (%)	**52.0**	**23.0**	**8.0**	**17.0**

Source: Field survey, 2009 and District Profile 2066

38. The main occupations of all people residing within the ZoI of the proposed road alignment are agriculture and bussiness. Most of the households (HHs) in the settlements are involved in agriculture and livestock (52%) along with other occupation. However, farming is not enough for subsistence due to small landhoding size and lack of irrigation and market facilities. Therefore, people are carrying out other economic activities like labour and porters (23%), working in service/employees (17%), and business (8%).

39. Details of occupation of the people in the ZOI area according to major economic activities are shown in **Appendix-XII a.**

4.3.3 Market Centres and Business Facilities

40. There are only small grocery shops and tea stalls available in the almost all settlements in the road alignment. Daily commodities are found only in the main market centres ie.Raja Rani, Samewa, Saurye and Budhabare Bazaar. These market centres have nominal hotels to stay. Necessity of sewerage/drainage and pipeline water system has been felt in the main market centres.

4.3.4 Local Economy

41. The economy of the area is predominantly agriculture based. Local people are gradually attracted towards cultivation of cash crops such as vegetables, fruits, ginger, tea etc. Selling of citrus fruit and vegetables to the Raja Rani market has been another source of income for local farmers. Due to closeness to Dharan-Dhankuta-Basantapur Highway and regular bus service from Raja Rani, selling of fruits and vegetables in a commercial manner seems to have gained momentum. More and more people are engaged in agricultural activities for their daily needs. Rural people have also been increasingly engaged in business and service activities at urban market centers ie. Dharan, Itahari, Biratnagar etc. Many People seasonally migrate to different parts of India and even abroad to earn money for better livelihood.

4.3.5 Agriculture pattern

42. Major cash crops that are grown are mustard, green vegetables, alainchi, ginger, potato, tomato, amliso (broom grass), etc. The area has appropriate climate and fertile soil for farming of citrus fruits such as orange, bimiro, nibuwa, lemon, etc.

Table 4.7 Types and total area of cultivable land

S.N.	VDCs	Total HHs	Types of cultivable land (Ropani)		Total area (Ropani)
			Khet(low / irrigated land)	Pakho (upland)	
1	Raja Rani	431	740	7897	8637
2	Basantatar	292	108	3548	3656
3	Mudebas	228	38	3280	3318
4	6 no. Budhabare	270	807	5033	5840
	Total	**1221**	**1693**	**19,758**	**21,451**

Source: Field survey and ZoI Household survey, 2009 *Note: 1 Ropani equivalent to 500m^2

4.3.6 Livestock

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

4.3.7 Industry

44. There are not any major industries but some local people are engaged in weaving of bamboo products, making of souvinear weaving and tailoring. The area has the potentiality of agro-based industries such as processing of tea, export of alinchi and ginger; juice and candy production as well as furniture and local handicraft products.

4.3.8 Trade and Commerce

45. Salt, sugar, packed/ fast food items, spices, and clothes etc.are some of daily important commodities. Similarly, major items of export are amliso, alainchi, vegetables, fruits, timber and bamboo products etc. whereas cereal crops such as rice, maize are both export and import items. There will be extension of trade and development of other market centres at various places in the coming days with the upgradation of the road.

4.3.9 Tourism related services

46. Since the sub-project and its surrounding area have potentiality of attractive tourism spots, more lodge, restaurant and resorts are expected to be established. Local people may engage themselves in various kinds of tourism related activities such as guide, cook, porter, promotion of handicrafts and other local selling products. The cultural sites like Mawarak, Pawarok (Devsthal), Pathivara Temple, Lingmadevi Temple are situated in the sub-project area so Religious tourism will be increased in the coming days. The touristic places like Samlolumlung ,

Basantatar and Meklajung Tourist area are famous for sight seeing and sun rise, Raja Rani Tal is also attractive destination in the district.

47. The proposed road has its touristic, social and economic importance in the district. There is a beautiful Rani Tal, which is 300m away from the starting point of the road and lies beyond the RoW. There is also famous Maharaja temple at 6 no. Budhabare VDC, which has historical and religious value. The ZoI of this road lies within major settlements of Raja Rani, Basantatar, Mudebas, and 6 no.Budhabare VDCs.

4.3.10 Health and Sanitation

48. Major health problems associated with local people are respiratory diseases, gaeneco related diseases, gastric, water borne diseases, diarrhoea, malnutrition, typhoid, tapeworm etc. Although they have temporary toilet facility and no proper sewerage system, but environmental awareness is increasing amongst the local people in settlement areas.

4.3.11 Public Services

49. Details about public services and infrastructures according to the settlements are shown in **Table 4.8.**

Education

50. The proposed sub-project area consists of educational institutions ranging from primary level to higher secondary level. In majority of the settlements, have primary and secondary schools. Shree Jal Kanya Primary school (Korna, Raja Rani-4), Kalika Primary School (Aitabare, Basantatar-2), Shree Singa Devi Higher Secondary school (Basantatar-2),Thada gaun Primary School(Thada gaun, Basantatar-1), Mudebas Lower Secondary School(Lapha chowk, Mudebas-1,2), Shree Jor Ganesh primary school (Phedachong, Budhabare-9), Meklajong primary School (Shyangdang, 6 no.Budhabare) are located along RoW, nearby and surrounding area of the sub project. During the field study, it was remarked that local people realizes about the importance of education in their life and most of them sent their children to school. However, literacy rate of girls' enrollment in school is more encouraging than that of boys.

Health Facility

51. In health sector, there are altogether two health posts/sub healthposts in the settlement along road alignment. For serious health problem, people go to district hospital at Dhankuta, B.P.Memorial hospital, Dharan or Kathmandu.

Communication

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

Transportation facilities

53. The main means of transportation in the area are mini truck/pick-up, tippers that generally carry vegetables, fruits and other local products from the rural area. However, opening of existing road before some years ago has provided better accessibility to people for the supply of daily commodities and selling of agricultural products. More people will get the benefits from access to local market centre through efficient transportation facilities.

Electricity

54. The poorer and deprived peoples in the ZoI area have still no electricity facility but the area is connected with national grid. At Thadagaun, Basantatar-1 alone twenty HHs do not afford for electricity facility. There is some household with installation of solar home system of alternative energy facilties within the ZoI of the road sub-project.

Water Supply

55. Drinking water facility available is inadequate to all the settlements. At some settlements, water from spring sources is conveyed through gravity flow to water collection tanks and distributed to the general public. During the field visit, it was noted that public taps with collection tanks are located nearby right of way or at common places to serve households as much as possible.

Irrigation

56. No systematic irrigation facility has been observed in ZoI of the sub-project area. However, some irrigation canals passes through the road alignment.

Other Infrastructures

57. There are residential houses, schools, water supply pipelines, shops and office buildings along the road alighment.

Table 4.8: Affected houses /Public Services and Infrastructures during Road Construction

S. N.	Chainage/ Location	Fully affected Houses/ Public Service and Infrastructure	Partially affected Houses/ Public Service and Infrastructure	Distance from the Road	Remarks
1	Ch: 0+220 – 0+227km, Ch: 0+230–0+240km, Raja Rani Bazaar	2 Houses		Within formation width	Require relocation
2	Ch : 5+000km Korna,Raja Rani- 4		Shree Jal Kanya Primary School	Within formation width	Compound Wall and one building is affected
3	Ch:5+040-5+051 km, Mudebas	1 House			Require relocation
4	Ch:12+650 km Mudebas-2		Sajha Bhawan	Within Row	Require Supporting wall
5	Ch:15+150 km Mudebas-1		Singa Devi Higher Secondary School	Within Row	Not affected
6	Ch:16+850 km Kali gairi, Rati Khola, Budhabare-9	Saurye Drinking water supply tank		Within formation width	Require relocation
7	Ch: 18+450km Thulo Muktara		Water supply pipeline	Within Row	Not affected
8	Ch:20+900km B handare Khola		Water Supply pipeline, Tap	Within Row	Not affected
9	Ch: 26+000-26+010km, Ch: 26+000-26+010km, 6 no. Budhabare	2 Houses		Within formation width	Require relocation

Source: Field Survey, November, 2009

Industries

58. Cottage and other industries are not well developed within the ZoI. Many people have skills of weaving bamboo baskets; woolen cloths etc. and these skills can be commercialized to increase their income.

Financial Institutions

59. There are few saving and credit cooperatives found in settlements within ZoI of project concerned VDCs.

Community Development Facilities/Organizations

60. There are various community users structures within ZoI of the project of which Sajha Bhawan is located within RoW at Ch: 12+650km. Several community based organizations, Building, youth clubs, women's group, NGOs and water/forest users groups are active in ZoI of the sub-project.

4.3.12 Land holding pattern

61.

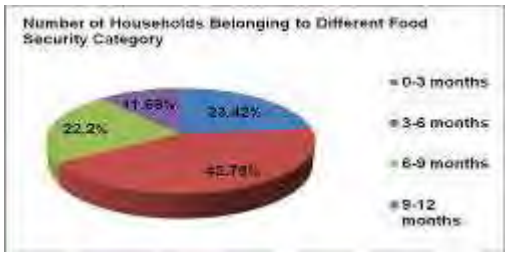
Land holding pattern within the ZoI of the road demonstrates that (0.16%) households have less than one ropani land (approximately 1 ha= 19.8 ropani), (7.7%) households have less then 5 ropani land, (23.51%) households have 5-10 ropani land, (34.56%) households have 10-20 ropani land, (24.57%) households have 20-50 ropani land and (9.5%) households have more than 50 ropani of land.Details about land holding pattern is given in **Appendix-XII c**.

Source: Field Survey, November, 2009

4.3.13 Food Security

62.

About 23.42% of the households have enough food for upto three months, 42.75% of the households have enough food for 3-6 months, 22.2% have food sufficient for 6-9 months and 11.63% households have food sufficient for 9-12 months. Food sufficiency condition is given in in **Appendix-XII d**.



Source: Field Survey, November, 2009

4.3.14 Migration pattern

63. Permanent migration takes place to a limited scale towards Kathmandu during insurgency period. Nowadays, seasonal migration takes place from the settlement of road alignment. Majority of them migrate during slack season to Kathmandu, Dharan and various parts of eastern India to work as a labourer. Most of the young generation also frequently go abroad to Malyasia, Dubai, Qattar and Saudi Araibia due to lack of employment opportunities at the local level.

4.3.15 Settlement Pattern

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

4.3.16 Potential Development area

65. Many of the places, areas and settlements within ZoI of the project have the potentialities in various sectors.

Table 4.9: Development Potentialities in Various Sectors

S.N.	Sector	Development potentiality
1	Agriculture	Ginger, orange, tomato, alaichi, amliso (broom grass), potato, vegetable farming, timber (uttis) production, dairy production within the whole ZoI
2	Tourism Promotion	Raja- Rani lake, Sun rise from Pin danda, Basantatar, Largest pipal tree of the Asia at Danda Bazaar, sightseeing of nature, observation of Magar, Limbu culture
3	Small and Cottage Industry	Bamboo products, furniture, dairy industry, biscuit industry
3	Trade and business	Development several rural market centres at various places along the road alignment and main market centres at Rajarani, Deurali/Aitabare'Samewa, Thadagaun, Lapha chowk,Lhapse, Saurye, Budhabare

Source: Field Survey, November 2009

66. This road is in operation since the last few years and has resulted in the growth of houses and commercial establishments along both sides of the road. After the construction of road, it is possible to explore natural resources like forest, natural minerals, water resource, and medicinal-herbs, agricultural products like different crops and fruits and vegetables. Local people are also planning to create a lake by blocking the water of Khasreni Khola, Mudebas-2 to promote tourism and income generating activities. It will facilitate not only on an effective control of the excessive use of resources but also enhance local understanding on resources management and its sustainable use in a limited period due to road accessbility.

4.3.17 Religious, Cultural and Historical Sites

67. The following historical and religious sites are within ZoI of the proposed project area (within RoW and outside the road alignment) as given in **Appendix-XVI.** Religious Stone(Saurye); Raja Rani Tal; Mangtumsing Danda, Raja Rani – 6; Pathivara Temple, Deurali Bazar, Basantatar, Lingmadevi Temple, Mudebas, Mawarak , Pawarok (Devsthal) – Raja Rani 6 and 9; Samlolumdung, Raja Rani - 3 , 4 etc.could be developed as historical and touristic centres after the rehabilitation of the proposed road.

68. Religious sites mentioned above are frequently visited for worship by the local residents as well as outside visitors. The people belongs in the eight settlements of the sub-project area are Hindu, Kirat and Buddhist. Among them Hindu and Kirat are major groups in the road alignment area. Particular ethnic/caste groups perform different religion and cultural activities. The Chhetri and Brahmin mainly celebrate Dashin, Tihar, Maghe Sakranti festival whereas Tamang, Magar celebrates cultural festival in according to the Buddhist religions.

CHAPTER- 5

5. PROJECT ALTERNATIVES

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

5.1 No Action Option

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

5.2 Proposal Alternatives

71. Construction of other supporting roads could be the options for achieving the transportation and access. Considering other project alternatives, the proposed road project can be the best option to serve the home to home services. Upgrading of the Raja Rani – 6 no. Budhabare Road will link the project area with East-West highway via. Dharan-Dhankuta Lokmarga as well as Illam and Panchthar districts.

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

5.3 Alternative Alignment

73. The alignment of the Raja Rani-6 no. Budhabare road is an existed earthen road. This road is in operation as a fair weather road and since this is the existing road and proposed for the rehabilitation, requirement to acquire land and cutting trees will be minimum than in new alignment opening. Hence, new alternative alignment is not feasible and the proposed road can be the best option.

5.4 Alternative Design and Construction Approach

74. The conventional road construction use contractors with heavy machineries and equipment, explosives, heavy concrete structures for retaining slopes, and bituminous surfacing. Labour based, Environment friendly and Participatory (LEP) method focuses on phased construction with balanced cut and fill; manual work and use of hand tools and small equipment rather than heavy machinery; bio-engineering for slope stabilization; avoid blasting; use soft engineering structures; use of contractors only in the works that cannot be done through manual labor.

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

5.5 Alternative Schedule and Process

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

5. 6 Alternative Resources

77. The physical resources consumed for the construction of the proposed road will mainly include boulders for gabions and stone for dry masonry wall. Stones are easily available in nearby areas of various sections of the road whereas fine aggregates like sand has to be transported from other locations. The construction materials like sand can be brought from sources outside the road alignment from Leuti Khola, Dhankuta and Gachhe Khola, Border of Morang. The proposed construction will optimally use available local materials to the extent possible for construction. Skilled, Semi-skilled and Unskilled local labor should be used as far as possible.

CHAPTER – 6

2 IDENTIFICATION OF IMPACTS AND EVALUATION OF IMPACT/ MITIGATION MEASURES

78. Several impacts have been identified based on site observation, field survey and information obtained from the stakeholders and a few were identified on value judgment. Most of the identified impacts have been quantified to the extent possible. The impacts have been predicted in terms of their nature, magnitude, extent and duration.

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

6.1 Measures to be adopted during Pre-construction phase

6.1.1 Route Selection

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

6.1.2 Detailed Survey and Design

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

6.1.3 Land and Property Acquisition, Compensation and Resettlement

82. 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 framework of resettlement plan also allows land donations in cases where the donation is made freely in public and without coercion, does not affect household food security and where adequate income restoration support exists for the household. The proponent commit that the voluntary contribution will be accepted if the following criteria are met:

- The donation is unforced and not the result of community pressure
- Donated land <20% agricultural holdings of the family
- Food sufficiency of the family is above 9 months
- Full income restoration measures are in place

83. Land taken previously for the existing alignment will not be compensated for but any new land will be obtained through donation under the accepted criteria and acquired by paying compensation for those who comes outside the donation criteria. The structures and crops will be compensated at replacement cost and the lost trees will be compensated at the cost of harvesting (felling and sectioning) and transportation from the site to home. Being a governmental agency, the Proponent will assist to form Compensation Determination Committee (CDC) under the Chairmanship of Chief District Officer. The Chief of Land Revenue Office, DDC representative, DTO will be members in the CDC and other representatives from DFO, DADO, Survey Office, VDC and affected person will be invited if needed. The Committee will decide the rates applicable for compensating different types of houses, land, trees and crops in accordance to established market rates. A separate Resettlement Plan has been prepared to address land and property acquisition as well as compensation issues. As per this Plan, Land donation agreement papers have been produced for the loss of land under the 20% of total holding. The compensation for trees has been calculated based on the replacement cost principle. Compensation payments for trees, land and structures will be disbursed by cheque/cash. The concerned households whose land will be acquired for the project were informed about the land donation process and entitlements. Finally, the Memorandum of Understanding (MoU) will be prepared and households donating the land will be signed in a written agreement with DDC. If the owner of land could not be contacted an equivalent amount shall be kept separately in the DDC fund until the process is complete.

6.2 Beneficial Impacts and Benefit Augmentation Measures

84. The development efforts particularly the development of transportation network will have multifold beneficial impacts. Road projects are generally intended to improve the economic and social welfare of the people. The largest beneficial impacts will be on the physical and socio-economic environment as given below:

6.2.1 Construction Stage

Employment Generation and Increase in Income

85. Impacts: A major direct beneficial impacts of the road is the creation of employment opportunity to the local community. There will be total employment generation of 175,118 person days, with 35,024 person days for skilled and 140,094 person days for unskilled labor. According to ZOI Survey, out of total HHs, 746 HHs comprised of potential laborers within the ZoI along the road corridor comprising 2213 potential laborers. The number of skilled and semi skilled manpower about construction works like mason, gabion wire knitting, dry and retention wall making were found in negligible numbers. However, the majority of the identified laborers were non-skilled. The amount of money earned by the wages will directly enhance the operation of various economic activities and enterprise development in the area. There will be positive impacts creating income-generating activities with other economic activities in a chain manner. This is one of the direct and significant impacts of the sub-project but short-term and local in nature.

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

Skill Enhancement

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

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

Enterprise Development and Business Promotion

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

90. Measures: Training in cooperatives, and promote use of local products by the construction crews. (SAP) Social Action Plan's enterprise development trainings (Agriculture and off-season vegetable farming; livestock promotion, bio-bricket making; NTFP cultivation, harvesting, processing, marketing; Dhaka weave; Bamboo craft etc.) under project activities would give local people as an opportunity to became a skilled personnel and helps them to uplift their economic condition. A harmony relationship among the local people and project staff and contractors should be created by providing necessary enterprenourship development training programmes in the sub-project area.

Community Empowerment and Ownership

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

92. Measures: Various coordination committees (DPCC, VICCC and RBG) will be constituted and training will be given to them.

Women and Indigenous People Empowerment

93. Impacts: The ethnic group of the project area does not include indigeneous people. Women in particular will get benefit more from improved access to the market centers and various service providing agencies such as health centers, banks, training institutions, women development office etc. Frequencies of visit to such organizations will increase women's knowledge and awareness level. Thus, the project will have indirect, significant, local and long-term impact in ZoI.

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

6.2.2 Operation Stage

Improvement in accessibility and saving of time and transportation cost

95. Impacts: Once the sub-project is completed, the people living within the road corridor will have easy access to market centres of Dhankuta, Dharan, Itahari, Biratnagar etc. and will enhance the transaction of goods and services. It takes one day walking distance from 6 no. Budhabare to reach Raja Rani Bazaar on existing road, but after operation of this road the travel time will reduce upto one and half hour. At present the road is partially well widen by recently carried out maintenace work from Saurye bazaar to Lamo Danda done by Deep Jyoti Youth Club, Muktara, Budhabare-8. People after reconstruction of this road. The local pedistraient, students, patients and officials from concerned VDCs will be more benefited due to fast mobility and safe access to market places compare to earlier scenario due to regular transport facility. The efficiency of road trips in specific time will greatly enhance the socio-economic condition of sub-project area. This is the direct, most significant, regional impacts and will have long-term benefits.

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

Increase in Trade, Commerce and Development of Market centers

97. Impact: There is a possibility of increased economic opportunities and significant growth and extension of the minor settlement markets along the road corridor. Market centres will develop at Raja Rani, Samewa, Saurye, Budhabare Bazaar, Deurali/Aitabare, Samewa, Thadagaun, Lapha chowk, Lhapse The farmers will be more encouraged to increase agricultural production due to market accessibility. Similarly, there will be diversification in occupational pattern of local people and non-farm employment will grow to those who are till now mainly dependent on subsistence farming. This will lessen pressure on local natural resources. The impact will be indirect, low, local and long term in nature.

98. 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 by providing Small business and Micro Enterprise Development Training under Livelihood Enhancement Skills Training (LEST) programs of Social Action Plan (SAP) and coordination with district agriculture office.

Appreciation of Land Value

99. Impacts: The construction of road leads to appreciation of land values particularly near the market and settlement areas due to the availability of reliable transportation facilities. There will be rapid increase in the commercial production of agricultural crops due to road accessibility, which is also a major factor to raise the land value. Mainly the land price will increase in Raja Rani, Samewa, Saurye, Budhabare Bazaar, Deurali/Aitabare, Samewa, Thadagaun, Lapha chowk, Lhapse by twice. This activity would likely uplift the economic condition of the local people. The impact is indirect, medium, local and long term in nature.

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

Increased Crop Productivity and Sale of Farm Products

101. Impacts: Due to easy and cheaper availability of agricultural inputs and technologies, productivity will be increased along the road corridor. The selling goods of farm and livestock products mainly increased in the settlements along the road corridor like Raja Rani Bazaar, Deurali/Aitabare, Samewa, Thadagaun, Lapha chowk, Lhapse, Saurye and Budhabare bazaar settlements, which are potential areas for the production of vegetables, fruits and cash crops such as ginger, alainchi, amliso etc. Operation of road will further commercialize the subsistence agriculture of these areas. This will further improve the rural economy. This is the indirect, significant, local and long term impacts from the proposed road.

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

Enhancement of Community Development Services

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

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

6.3 Adverse Impacts and Mitigation Measures

6.3.1 Construction Stage

105. The proposed road will be constructed according to LEP approach and Contractor Approach. The works will be executed through LEP approach as far as possible and there will be use of contractors approach with only minimum use of light machineries applied for side drain works, pavement, drilling, cutting and excavation of rocks for the essential works. Bio-engineering technique will be applied for stabilization of slopes. Therefore, there will not be severe damage to environment compared to conventional construction approach. However, it is likely to occur following impacts on physical, biological, socio-economic and cultural resources of the proposed road area and respective mitigation measures are suggested.

Physical Impacts

Change in Land Use

106. Impacts: Changes of land use due to the construction of road are mainly conversion of agriculture and barren land as well as nominal forest into built up area. Cultivated land of 1.3 ha. will be permanently lost during road construction. Similarly, 0.15 ha. of barren land and 0.75 ha.of government forest area will be permanently lost due to road construction work. The changes in land use will have impact on loss of cultivated land, which will directly reduce the agricultural production. The impact from changes in land use will be high, direct, local and long term in nature.

107. Measures: Plantation of local tree species (Siris, Painyu, Salla, Khainyu, Tanki) in about 4500 numbers along RoW on both sides of the road, applying additional protective measures that the remaining land will not be lost due to erosion and temporary vegetation clearance on work site and material storage yards, spoil sites shall be revegetated after the completion of road construction. The proponent is also legally bounded for the compensation of tree clearance and damaged crop are included as a separate BOQ item in the contract document. Compensation will be given for affected private properties.

Change in Air Quality, Water and Noise Pollution

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

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

110. Measures: The mitigation measures include use of face mask by the workers during the time of high dust generation; frequent sprinkling water during surface of the road by contractor; use of ear muffles to protect from noise pollution during rock breaking and quarrying and avoiding the disposal of excavated materials in the water bodies. Plantation of local tree species (Siris, Painyu, Salla, Khainyu, Tanki) in about 4500 numbers along RoW on both sides of the road which act as noise and dust barrier.

Road slope stability and management

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

112. Sensitive areas for possible road slope stability problems are:

- Sensitive areas of high gradiant places such as Thadagaun (Ch:11+550), Muktara (Ch: 17+750km), Sano Muktara (Ch: 20+650Km), Sengdag (Ch: 20+850km) and Raja pokhari (Ch: 22+350km),
- Landslide prone areas Ch: 5+650, 8+900, 11+500, 16+600 - 16+850 and 19+420km; Besides this, at Ch 5+500 there is exist soft soil; minor-scale landslides - Ch: 21+600 to 21+950 and Ch: 23+700 – 26+070 km of Budhabare (between ward no. 5 and 7)
- Connection point of road alignment with other branch roads
- Road alignment along the irrigated agricultural land

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

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

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

Stock piling of construction materials

115. Impacts: It is general tendency of the contractors to stockpile the constructions materials like gravels, rock aggregates, bricks, cement, etc nearest to the site, which could be in agricultural land, forest land or other private property. Similarly, these materials may be washed away by monsoon rain causing water pollution. Since the proposed alignment passes through mostly cultivated land, the construction materials will be stock piled near by the cultivated land. The agriculture production of these lands will be lost during the construction period or as long as the materials occupies the land. The impact will be direct, medium, local and short term.

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

Operation of Quarries and borrow pits

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

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

119. Recommended quarry sites are given in **Table 6.1**.

Table 6.1: Recommended Quarry sites

S.N.	Chainages	Description	Name of VDC	Places of quarry sites	Remarks
1.	Ch:15+150 – 15+850km	Bolders/ Aggregates	Mudebas-6	Lhapse, Mudebas-6 to Saurye-9	Stone quarry in a large quantity
2.	Ch: 16+000 - 16+150km		Mudebas-6	Darlami tar	
3.	Ch:4+790 - 4+810km		Basantatar-1	Chapleti	
4.	Ch:7+900 - 8+650km		Basantatar	Deurali	Stone quarry in excessive scale
5.	Ch:19+900 - 20+350km		6 no. Budhabare	Budhabare-9	Stone quarry in a max. quantity
6.	Ch;5+000 km		Raja Rani	Korna	Stone quarry
7.	Ch:3+800 -3+950km		Raja Rani		Stone quarry
8.	Ch:25+350 km	Sand	6 no. Budhabare	Chisyang Khola-Budhabare-3	Sand collection from Chisyang Khola
9.	Ch:17+750 – 17+8+450km			Muktara	Sand quarry is available
10.	Ch: 10+990 - 11+160km	Gravel	Mudebas	Samewa-Thadagaun	Gravel quary
	Quarry and deposit sites in the vicinity:				
11.	Dhapper Khola- Saurye				Sand collection from Dhapper Khola
12.	Bhangtar-6				Sand quarry is available
13.	Charuwa Athase -Basantatar-5,6				Sand deposit is available in excessive quantity

Source: Field Survey, November, 2009

Spoil Disposal

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

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

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

Table 6.2 Safe Spoil Disposal Site

S.N.	Chainage	Location	Remarks
1.	Ch: 0+000 -0+200km	Raja Rani	Waste Disposal
2.	Ch: 10+250 -11+700km	Samewa, Thada gaun	Spoil Disposal

Source: Field Survey, November, 2009

Water Management

122. Impacts: The concentrated water from the road outlet causes erosion and landslide eventually affecting the stability of the road itself. Roads usually generate large volumes of concentrated surface runoff. As part of road construction, side and crossdrains will also be constructed. The impact will be indirect, medium, site specific and medium term.

123. Measures: In order to avoid, the intensive water flow through the outlets affecting the stability associated with erosion and sedimentation, the following mitigation measures are adopted:

- adequate and appropriate numbers of drainage structures need to be provided in order to minimise interference and impact on natural drainage pattern;
- avoid surface water discharge into farmland and divert water away from natural course if it is absolutely necessary;
- cross drainage shall be provided to facilitate irrigation ; and,
- avoid blockage or diversion of natural channels due to construction of road and disposal of spoils and adopt outward road slope as per green road standard to minimize water accumulation.

124. Details about necessary structures required to mitigate the water induced adverse impacts are as given in **Appendix-XVIII and Appendix-XIX**.

Location of Camp Sites, Storage Depots

125. Impacts: The siting of labor camp/ storage depts by contractors for carrying out contractor-based works may cause encroachment of forest, agriculture land, alteration of drainage, fuel leakage, disposal of solid waste, and waste water etc. which may cause degradation in the environment. The impact will be direct, medium significance, site specific and for short-term. The locations of workforce camp are listed in Table 6.3.

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

- The location of campsites, storage depots will be kept on unproductive/ barren land away from forest area as far as possible.
- Use of agricultural lands will not be allowed unless in extreme circumstances by paying adequate compensation to the owner.
- All fuel loading, unloading, storage areas will be spill proof, leakage proof and carried out on paved areas.
- The sites will have suitable system to drain out storm water, sanitary facilities and shall not contaminate any near by water courses/drains.
- The site will also have a system for handling any emergency situation like fire, explosion etc.

Table 6.3 List of Suitable Locations for Workforce Camp

Chainage	Location	Description	Suitable For
Ch: 9+150 km	Bhanjyang Deurali, Basantatar-2	Flat plain below the school	Workforce camp
Ch:15+500 km	Lhapse chowk, Mudebas -1		Camp site
Ch: 17+950 km	Saurye	Flat area	Camp site

Source:Field Survey, November, 2009

Construction Equipment Vehicles

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

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

- Contractor shall regularly maintain all equipment/vehicles deployed for construction activities.
- Vehicles/equipment shall be regularly subjected for emission tests and shall have pollution under control certificates.
- All the vehicles deployed for material movement shall be spill proof to the extent possible.
- In any case all material movement routes shall be inspected daily twice to clear off any accidental spills.
- Materials under transportation shall be covered.

Crusher Plants

129. Impacts: The crushed aggregates required for the road construction works will be procured from the market and there will not be impact due to crusher plant.

Measures: The mitigation measure is not warranted since crushed will be bought from nearby crusher markets.

Chemical Issues

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

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

Biological Impacts

Loss or Degradation of Forests and Vegetation

131. Impacts: Some government and community forest will be effected due to road construction work. 8 numbers of trees (Uttis, Lampate, Dudhilo, Painyu species) and 268 bamboo plants will be removed during from private land during road construction. The impacts on vegetation/forest resources have been considered to be direct, low, local and long term.

132. Measures: The loss of trees cannot be minimized; however, it can be compensated by the plantation. 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 ratio 1:1 in private land for each cleared tree. Plantation of local tree species (Siris, Painyu, Salla, Khainyu, Tanki) in about 4500 numbers along RoW on both sides of the road.

Impact on Wildlife Due To Loss of Habitat and Hunting

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

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

- Site clearance for construction shall be limited to the minimum width. No tree or vegetation shall be cut unless absolutely necessary.

- The construction activities near forest area will be appropriately managed so that there will be least disturbance to the wildlife and birds.
- Workers shall be actively discouraged from collecting fuel wood from forest or hunting/harassing of birds or animals.
- Coordination with DFO to control the activities like illegal hunting and poaching by enforcing acts and regulations strictly.

Impacts on Biodiversity (Rare and Endangered species as listed in CITES and IUCN Red data book)

135. Impacts and Measures: There will not be any impacts on the rare and endangered floral and faunal species.

Socio-economic Impacts

Loss or Degradation of Farm Land and Productivity

136. Impacts: There will be permanent loss of 1.3 ha of cultivated land due to road rehabilitation. This will lead to annual loss of food grain production among the families losing lands to the project. Moreover, spoils on farm land will also affect the production of agricultural crops. During the construction phase due to the excavation and other construction works, the loss of the agricultural production is difficult to predict without knowing the construction schedule. This impact is expected to be high in magnitude, local in extent and of long term in duration.

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

Loss or degradation of private properties

138. Impacts: The proposed road alignment passes through nearby the settlement areas. During the construction phase, 5 private houses need to be relocated. The impact will be direct, site specific, short term and medium in magnitude. Details about property loss and damage will be described in Resettlement Plan**.**

139. Measures: Compensation and resettlement measures will be dealt as per decision made by Compensation Determination Committee (CDC). Summary of resettlement and rehabilitation cost is given in Appendix XX.

Impact on Community Infrastructure

140. Impacts: Shree Jal Kanya Primary School at Ch:5+000 km, Saurye Drinking water supply tank at Ch:16+850 km will be affected during road construction. In addition, Shree Jal Kanya Primary School and Singha Devi Higher Secondary School will be affected from dust and noise nuisance during road construction. The impact will be direct, site specific, short term and medium in magnitude.

141. Measures: In order to avoid such impacts, the following mitigation measures are suggested:

- Restore all disturbed infrastructures to the condition before disturbance or improve where appropriate in coordination with local users'committee and stakeholders
- Avoid contamination of water resources systems during construction
- Schedule the construction activities during crop off-season not to disrupt water bodies being used for other purposes by the road.

Table 6.4: Specific Mitigation Measures of Public Services

Type of Public Service and Infrastructure	Chainage/ Location	Distance from the Road	Mitigation measurs
Shree Jal Kanya Primary School	Ch:5+000 km	Within formation width	Reinstate of affected building and compound wall. For control of dust nuisance, sprinkling of water during road construction, Information signboard will be placed (Such as School area, Speed limit), and Use of horns should be restricted. Plantation of trees on both side of road.
Singha Devi Higher Secondary School	Ch:15+150 km	Within Row	For control of noise nuisance, Information signboard will be placed (Such as School area, Speed limit, Use of horns should be restricted). Sprinkling of water during road construction. Plantation of trees on both side of road.
Saurye Drinking water supply tank	Ch:16+850 km	Within formation width	Relocation of affected water tank.

Source: Field survey, November, 2009

142. Mitigation measures Costs for affected community infrastructures along the road alignments have been included in project cost and relocation cost for community structures will be included in resettlement plan. Summary of resettlement and rehabilitation cost is given in Appendix XX.

Impacts on cultural, religious and archeological sites

143. Impact: There are religious and culturally important sites located nearby the the proposed road alignment, but located out of formation width (eg. Mawarak & Pawarok Devisthal, Pathivara Temple, Lingmadevi Temple etc.). Therefore, they might be affected during the construction of the road. The impact is expected to be of low in magnitude, local in extent and of short term in duration. There will be no likely impact on local culture and tradition during construction stage.

144. Measures: Mitigation measures for this impact are:

- Shifting of centre line of road alignment wherever possible
- Consultation with local people for appropriate solution

Health and Safety Matters

145. Impacts: During construction, workers will be exposed to various risks and hazards. Potential impacts to health are respiration and eye diseases due to exposure to dust, risk of accident during work. The proper sanitation system should be developed to reduce the air and water pollution otherwise the surrounding environment may be polluted. It affects the health of local people.The lack of proper sanitary measures and increase in waste and water pollution can lead to an outbreak of epidemics, diseases as jaundice, typhoid etc. The most vulnerable will be women and children. Furthermore, the road construction will encourage roadside settlement, which will increase the dumping of solid waste around the bridge may cause stomach problems due to poor quality drinking water. This impact is considered to be of the direct, high in magnitude, for the short term and localized.

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

Decline in Aesthetic Value

147. Impact: Landscape degradation relates particularly to poorly designed or monitored activities resulting from quarry operation and from indiscriminate dumping of spoil material. Road induced activities may lead to the generation and mismanagement of wastes in the roadsides and create scars on the landscape. The likely impact will be direct, low in magnitude, local nature and short term in duration

148. 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.

6.3.2 Operation stage

<u>Physical Environment</u>

Impact due to air, water and noise pollution

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

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

151. Measures: Following mitigation measures will be adopted:

- Community and road user awareness program will be organized to enhance public understanding
- Plantation will be done near the settlements
- Use of horns should be restricted near dense forest, health posts, schools and settlements
- Adequate care and regulation mechanisms are needs to control runoff and wastewater generated by poor sanitation practices.

- For control of dust nuisance, sprinkling of water, speed limit of vehicle and vegetative barrier by planting trees along roadsides will be designed.

Road Slope Stability and Management

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

153. Sensitive areas for possible road slope stability problems are:

- Sensitive areas of high gradient places are Thadagaun (Ch:11+550km) , Muktara (Ch: 17+750km), Sano Muktara (Ch: 20+650Km), Sengdag (Ch: 20+850km) and Raja pokhari (Ch: 22+350km).

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

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

<u>Biological Environment</u>

Depletion of Forest Resources

155. Impacts: The forest resources depletion may occur due to ineffective drainage works, inappropriate spoil disposal and construction practices. The development of market centers may exert pressure on forest and eventually deplete the forest resources. There is a possibility of illegal cutting of trees by the workers and collection of forest products by roadside hotels during the operation phase.To meet the increasing needs of the forest products, illegal felling/cutting of poles and trees may occur. Operation of road may increase in timber smuggling due to easy access and easy transportation facilities. The impact will be indirect, medium, local and long term in nature. However, provision of forest products distribution in community forest operational plan will minimize the depletion of forest resources. The pressure on forest resources during road operation is likely to occur.

156. Measures: The mitigation measures recommended are:

- CFUGs will be supported to conserve and manage their CFs according to operational plans by plantation of trees, fencing and control of undesirable activities.
- Encourage and support local community for controlling illegal harvesting of forest resources.
- Awareness programmes shall be organized to educate local people on the conservation of forest.

Possible impact on biodiversity rare and endangered species

157. Impacts: Easy accessibility due to access road will increase the number of population in the project area. There may be possibility of increasing illegal poaching and hunting during the operation phase. Such activities may stop occasional wildlife movement in these areas.

158. Measures: The mitigation measures recommended are:

- Encourage and support local community for controlling of poaching and hunting of rare and endangered species.
- Awareness programmes shall be organized to educate local people on the conservation of biodiversity
- CFUGs will be strengthen to conserve rare and endangered species in their CFs too.

Disturbance to the wildlife movement and Illegal Hunting

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

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

Impact on aquatic life

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

162. Measures: The mitigation measure recommended are:

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

Socio-economic and Cultural Impacts

Change in Social behavior

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

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

Road safety Measures

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

166. 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.

Chapter- 7

7. ENVIRONMENTAL MANAGEMENT PLAN

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

7.1 Institutions and Their Roles

Table 7.1: Institution and their roles

Institution	Role	Responsibility in the Project	Remark
Ministry of Environment	Mandated to formulate and implement environmental policies, plans and programs at national level	Facilitate when needed on environmental safeguards	No direct responsibility in the project
Ministry of Local Development (MoLD)	It is concerned line ministry, executive agency and concerned agency as per EPA/EPR. Environment Management Section is responsible to look into safeguard matters for the ministry.	▪ 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 MoLD responsible to execute infrastructure projects under MoLD. Provides back-up support to DDCs in technical matters through DTO.	RRRSDP is being executed under overall coordination and supervision of the Department for the Ministry. It is also supporting DDCs through DTOs to implement the project.	Executing Agency
RRRSDP- Project Coordination Unit	Project specific unit.	Technical Unit to support and coordinate all activities for implementation of RRRSDP. Review, comment, and forward IEE ToR and Report for review to ADB and for approval to MoLD	First Class Officer / DDG of DoLIDAR has been heading the PCU.
District Development Committee / District Technical Office	DDC/DTO is Project Implementing Agency.	▪ Prepare IEE ToR and submit for approval to PCU/MoLD ▪ Conduct IEE Study, Public Consultation, and prepare IEE Report ▪ Receive comments from PCU/ADB/MoLD and modify accordingly. Get final approval from MoLD. ▪ 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

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

7.2. Reporting and Documentation

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

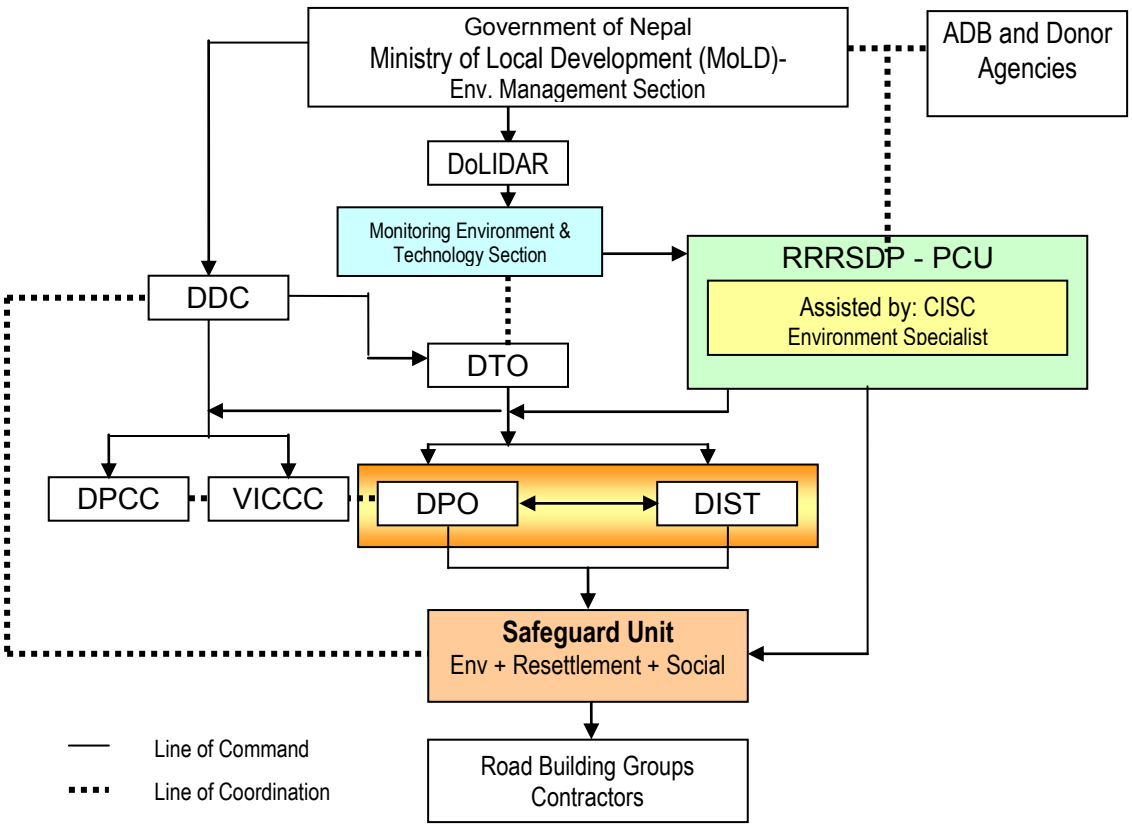
170. The Contract with contractor will clearly state that the DDC/DTO must approve the road building groups/contractor's arrangements for environmental protection, health and safety, waste management and other environment related actions identified during the detailed design phase.

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

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

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

Fig. 7.1: Environmental Management Organization Structure



7.3. Environmental Management Plan

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

Table 7.2: Beneficial Impacts and Proposed Enhancement Measures

Activity	Effect	Related Beneficial Impacts	Type of Impact *)				Benefit Augmentation Measures	Responsible Agencies	
			Nat	Mag	Ext	Dur		Executing Agency	Supporting Agency
Construction Stage									
Construction of road	Employment Generation and Increase in Income	Increase in income level	D	H	L	ST	Involve local people to extent possible to implement manual works through labour-based approach (Skilled-35,024 person days and Unskilled-140,094 person days)	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	L	L	ST	Provide support to local entrepreneurs, promotion of cooperatives and linkage with financial institutions. Provide traiings under LEST program of SAP.	DDC/DTO	DIST/ CISC/PCU
Construction coordination committee and RBG program	Community Empowerment and Ownership	Increase in income and ownership.	IN	L	L	ST	Provide skill trainings	DPO/DIST	DDC/DTO / CISC/PCU
Construction of road	Women and Indigenous People Empowerment	Empower the women and indigenous people	IN	H	L	LT	Priority to women, dalit and vulnerable workers. Women and Indigenous people will be empowered through IPDP program of project.	DDC/DTO	DIST/VICCC
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
	Increase in Trade, Commerce and Development of Market centers	Shifts towards improved and commercial agriculture	IN	L	L	LT	Encourage local farmers towards improved agricultural practices by providing trainings under social action plan to grow quality and demanding products with implication of improved seeds and modern techniques.	DPO	DDC/VDC
	Appreciation of Land Value	Improvement in local economic condition	IN	M	L	LT	Promotion of land development activities and control of encroachment within RoW. Awareness program shall be organized on use of high value land to get bank loans for setting up enterprise ventures.	DDC/DPO	DDC/VDC
	Availability of agricultural. inputs and extension facilities	Increase in productivity and sale of farm product in the settlements like Raja Rani Bazaar, Deurali/Aitabare, Samewa, Thadagaun, Lapha chowk, Lhapse, Saurye and Budhabare bazaar	IN	H	L	LT	Promotion of market linkages and networking for better market price by providing Small business and Micro Enterprise Development Training under Livelihood Enhancement Skills Training (LEST) programs of Social Action Plan.	Local farmers	DDC, VDC
	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

Table 7.3: Adverse Impacts and Proposed Mitigation Measures

Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact (*)					Mitigation Measures	Responsibility for Mitigation Measure	
			Nat	Mag	Ext	Dur	Rev		Responsible Executing Agency	Relevant Supporting Agency
Pre-construction and Construction Stage										
Physical Environment										
Construction of Road, site clearance	Change in land use; 1.3 ha of cultivated land, 0.15 ha of barren land and 0.75 ha of government/ 1.71 ha of community forest will be lost	Loss of agricultural land, production, loss of property	D	H	L	LT	IR	Avoid fertile land, forest, settlement areas etc. Plantation of local tree species (Siris, Painyu, Salla, Khainyu, Tanki) in about 4500 numbers along RoW on both sides of the road,	DDC/DTO	DIST
Construction works, operation of construction vehicles, material hauling and unloading etc. Slope cutting, spoil and waste disposal during road construction	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. Plantation of local tree species (Siris, Painyu, Salla, Khainyu, Tanki) in about 4500 numbers along RoW on both sides of the road which act as noise and dust barrier.	DDC/DTO / RBGs	DIST
	Noise pollution	Disturbance and annoyance around school, health posts, forest areas.	D	L	L	ST	Re	Restrict horn near school, health posts etc. ch: 5+000 and 15+150km. 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	DIST/VICCC /VDC
Operation of quarry sites and stockpiles of material, cutting of slope, earth excavation and spoil disposal	Quarry/borrow operation and its potential effect on instability, landslide	Damage to farmland, water pollution, change in river regime, instability, land slide.	D	L	L	ST	Re	Proper selection and management of quarry sites, rehabilitation of quarry sites after completion of work. Bolders/ Aggregates: Lhapse (15+150 - 16+150), Deurali(7+900 - 8+650), Darlamitar, Chapleti, Budhabare-9 Sand: Muktara (17+750 – 17+8+450), Charuwa Athase Bhangtar-6, Dhapper Khola, Chisyang Khola	DDC/DTO/ Contractor/ RBGs	DIST/ VICCC
	Slope Instability 11+550,17+750, 20+650,20+850, 22+350	Slope instability and erosion	D	H	L	LT	Re	Bio- engineering application (Such as Grass plantation, Tree/Shrub plantation, Brush layering, Palisades, Bamboo plantation, Live checkdam construction etc)to stabilize the rough slopes at chainages: 5+650, 8+900, 11+500, 16+600 - 16+850 19+420; 21+600 to 21+950	DDC/DTO	DIST
	Sedimentation of water bodies, damage to crop lands	Effect to aquatic life, loss of property	D	M	L	ST	Re	Proper management of spoils and waste, provision of proper drainages at chainages 0+200, Ch : 10+250 to 11+700km	DDC/DTO	DIST/VICCC /VDC

Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact (*)					Mitigation Measures	Responsibility for Mitigation Measure	
			Nat	Mag	Ext	Dur	Rev		Responsible Executing Agency	Relevant Supporting Agency
Construction of Road	Stock piling of construction materials	Loss of agricultural production	D	M	L	ST	Re	Compensate for the loss of agriculture production	DPO assisted by DIST/ Contractor	DIST/ VICCC
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 Ch: 0+000 -0+200km at RajaRani and Ch: 10+250 - 11+700km at Samewa, Thada gaun.	DDC/DTO	DIST
Construction of Road	Water Management, generation of large volume of surface runoff	Erosion, landslide, damage to farmland	IN	M	SS	MT	IR	Proper drainage structures and proper spoil disposal, Avoid blockage or diversion of natural channels due to construction of road and disposal of spoils.	DDC/DTO	DIST
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 Ch: 9+150, 15+500 and 17+950); use local labor and local houses as camp; pay compensation to land owner of camp area; proper storage of chemical and materials; drinking water facilities and latrine.	DPO assisted by DIST/ Contractor	DIST/VICCC
Operation of construction equipments	Construction machineries and tools (Rollers, tippers, spreader, water tanker etc.)	Air pollution due to emission of smoke, increase in vibration and noise pollution	D	H	SS	ST	Re	Equipment/vehicles deployed for construction activities shall be regularly maintained. All the vehicles deployed for material movement shall be spill proof to the extent possible	DPO assisted by DIST/ Contractor	DIST/CISC/PCU
Chemical Environment										
Storage of Chemicals and operation of machineries	Spillage of fuels and chemicals.	Pollution to the nearby water sources and soil. Health hazards to the workers	D	M	L	ST	Re	Store fuels and chemicals on paved surface with surrounding catch drain to protect soil from leakage. Provide information signboards. Use of safety gears. Close monitoring during operation of machineries.	DTO/DIST/ Contractor	PCU/CISC/DIST
Biological Environment										
Clearance of vegetation necessary for road formation	Loss of trees (8 nos.) and bamboo trees 268, vegetation cover(0.25 ha.)	Loss of environmental benefits from vegetation, disturbance in ecological function (dust and noise absorbance, aesthetic value etc.)	D	L	L	LT	Re	Minimize cutting of tree and vegetation, compensatory plantation of local species in 1:1 ratio in private land. Plantation of local tree species (Siris, Painyu, Salla, Khainyu, Tanki) in about 4500 numbers along RoW on both sides of the road	DDC/DTO/ DFO	DFO/CFUGs/ DIST
Construction activity	Disturbing, killing, poaching of wildlife	Loss of biodiversity and valuable species of wildlife	IN	L	L	ST	IR	Work only in day time, do not disturb wildlife, aware workers	DDC/DTO /DFO	DFO/CFUGs/ DIST

Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact (*)					Mitigation Measures	Responsibility for Mitigation Measure	
			Nat	Mag	Ext	Dur	Rev		Responsible Executing Agency	Relevant Supporting Agency
Socio-economic Environment										
Acquisition of land for maintaining road width*	Loss or Degradation of Farm Land and Productivity (loss of 1.3 ha of cultivated land)	Reduced production, hardship, food shortage	D	H	L	LT	IR	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 of affected houses at (Ch: 0+220 – 0+227, Ch: 0+230–0+240, Ch:5+040-5+051, Ch: 26+000-26+010)	DDC/DTO	CFC[2]/DIST
Demolition of structures along road alignment	Loss/damage of community infrastructures falling under road width.	Loss of services provided by them	D	M	SS	ST	Re	Restoration or relocation of affected infrastructures (Ch: 5+000km- Compound wall and school building; Ch:16+850 km - Saurye Drinking water supply tank)	DDC/DTO	PCU DIST/CISC/ VICCC/VDC
Construction of Road	Occupational health and safety matters	Injury, fatal accidents, outbreak of epidemics and diseases, decline in capacity to work	D	H	L	ST	IR	Occupational health and safety regulations, 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
	Decrease in aesthetic value	Disturbances in working areas and scar on topography	D	L	L	ST	Re	Cover the road alignment by planting tree on both sides; manage working areas.	DPO in assistance by DIST / Contractors	PCU / CISC / Users Committee / VDC
Operation Stage										
Physical Environment										
Operation of vehicles	Air and noise pollution effects, particularly near sensitive spots(School, healthpost)	Disturbance to students, patients, wildlife effect to nearby agriculture land and crops	D	L	L	LT	Re	Speed limit for vehicles, no horn signs, use vegetation barrier, Regular maintenance of drainage.	DDC/DTO	DoLIDAR/ Local administration
Quarrying, operation of construction equipments	Road Slope Stability and Management	Slides and slope failure, Disturbance to traffic flow, pollution of water bodies, impacts on agriculture land, loss of vegetation.	D	M	L	LT	Re	Regular maintenance of drainage, Regular maintenance of slope protection structures.	DDC/DTO/ VDC	DoLIDAR , DFO, District Watershed and Soil Conservation Office (DWSSC)

* 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		Responsible Executing Agency	Relevant Supporting Agency
Biological Environment										
Road operation	Depletion of Forest Resources	Loss of timber, forest resources and benefits	IN	M	L	LT	IR	Enforcement of law, vigilance and monitoring, participation of community	DFO/ CFUGs/ VDCs	DDC/CDO
Road operation	Illegal trade of species of plant and wild animals	Loss of biodiversity	IN	L	L	LT	IR	Enforcement of law, vigilance and monitoring, participation of community	DFO/ CFUGs/ VDCs	CDO / CBOs, NGOs
Road operation	Disturbance to the Wildlife and Illegal Hunting	Collision of wildlife with vehicles, disturbance in their normal activities, Loss of biodiversity	IN	L	L	LT	IR	Warning traffic signal, Awareness training to driver to limit speed and horn use	DTO/ CFUGs	DDC/CDO / DFO
Inappropriate driver practices	Water pollution	Impacts on aquatic species and drinking water sources	IN	L	L	LT	Re	Discourage vehicle washing activities along drinking water sources and natural streams	DDC/DTO	DoLIDAR/ Local administration
Socio-economic Environment										
Operation of Road	Change in Social behavior	Social and cultural conflicts	IN	M	L	LT	Re	Awareness, Enforcement of law and order, Provision of training for skill	DTO	DDC/ DoLIDAR
Operation of Road	Road Safety Measures	Increase in accidents	D	M	L	LT	IR	Appropriate road safety measures, Safety signs along the road.	DTO	DDC/ DoLIDAR

* Legend Value in parenthesis is level of significance:
Nature- IN= Indirect; D= Direct
Magnitude- L= Low; M= Medium); H= High;
Extent- SS= Site Specific; L= Local; R= Regional; N= National; CB=Cross-boundary
Duration- ST= Short Term; MT= Medium Term; LT= Long term
Re=Reversible; IR= Irreversible

7.4. Mitigation cost

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

Table 7.4: Cost Estimate for Environmental Enhancement and Mitigation Measures

S.N.	Environmental Protection Measures	Estimated Budget (NRs.)	Remarks
1. Benefits Augmentation Measures			
1.1	Training to DDC/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	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 (including plantation of 4500 trees)	34,00,340.00	To be included in BoQ
2.2	RBG Insurance	100,000.00	To be included in BoQ
2.3	Information Signboard	50,000.00	To be included in BoQ
2.4	Compensation for properties	34,72,778.00	T o be included in Resettlement plan
2.5	Restoration or relocation of affected infrastructures, spoils disposal site management and rehabilitation, reinstate of quarry etc.	500,000.00	To be included in BoQ
2.6	Compensatory plantation Re-plantation / Re-forestation	16,000.00	To be included in project cost
2.7	Social Action Plan (Health / HIV AIDS / STD prevention awareness; other awareness program such as adult literacy'; support to local schoo etc.)	935,000.00	To be included in Social plan, project cost
2.8	Occupational health and safety; First aid boxes, campsite sanitation (Pit latrine); solid waste management, Safety measures for workers (Helmets, gloves, masks, boots, etc,)	500,000.00	To be included in BoQ
	Sub-Total (2)	**8,974,118.00**	
	Total (1 + 2)	**9,174,118.00**	

7.5. Implementation of Mitigation Measures

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

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

7.6. Environmental Monitoring

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

7.6.1 Monitoring Responsibility

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

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

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

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

Table 7.5: Environmental Monitoring Cost

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

Thus, total environmental monitoring and management cost is NRs. 9,374,118.00.

7.6.2 Types of Monitoring for this subproject and Monitoring Parameters

183. Monitoring is an on going component of the environmental assessment process and subsequent environmental management and mitigation activities. The subproject will conduct two types of environmental monitoring:

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

Table7.6 : Monitoring Indicators Selected for IEE

Monitored Sector	Parameters Selected for Monitoring
Soil, Landslide, Erosion Waste management sites	▪ Number, location and extent of slope failures ▪ Cause analysis for slope failure, natural/man-made ▪ Area (ha.) of land, forest and properties affected ▪ Nos. and extent of gully erosions and pavement failures ▪ Nos. and extent of road subsiding effects ▪ Suitability of corrective/bio-engineering measures ▪ Nos. of days and nature of traffic delays due to slides ▪ Sites and suitability for safe disposal of wastes and garbage
Bio-engineering	▪ Nos. and plant species selected for bio-engineering, disaggregated by protective function
Seismicity	▪ Nos. and magnitude of local seismic activities and respective damage to structures, including road
Water Pollution, Water Resources and their uses: Surface/ ground water Irrigation water Drinking water Public taps	▪ Nos. and extent of water-logging at operative and/or decommissioned construction sites ▪ Blockage of waterways - extent and secondary impacts ▪ Water pollution incidents due to unsafe disposal of waste and spoil, analyzing effects on local fisheries ▪ Damage to farm lands due to water shortage or pollution ▪ Use of field kit for drinking water quality, determining pH, particulates, turbidity etc.
Air and Noise Level in relation to traffic volume	▪ Assessment of noise level in site by direct observation and interview with stakeholders ▪ Visual assessment of dust development at selected sites/sensitive spots and interview with local stakeholders ▪ Traffic volume measurements
Road Safety	▪ Speed measurements at selected spots ▪ Nos. and type of road accidents recorded in the Traffic Police and in local health service centers ▪ Suitability of local road signs ▪ Records on public and driver road safety awareness campaigns
Wildlife/ Habitat Disturbance Impacts on Forest resources	▪ Nos. and extent of road accidents inflicting wildlife ▪ DFO records of illegal timber extraction and wildlife trade ▪ Observations and handling of invasive species
Socio-economic Development near Road alignment	▪ Demographic, economic and education data ▪ Nos. and extent of new settlements /types and ethnic groups ▪ Nos. and extent of new businesses ▪ Nos. and extent of new services and utilities
Resettled Households and livelihood restoration	▪ Nos. of HHs resettled ▪ HH questionnaire to identify livelihood conditions of resettlers ▪ Income situation and opportunities for the resettlers ▪ Verification of compensation and assistance to resettlers
Community awareness programs relating to environment protection and avoidance of social conflicts	▪ Nos./schedule of campaigns and nos. of beneficiaries ▪ Revision of training agenda & propagated information material ▪ Questionnaire evaluation, interviewing selected participants on the impacts of the training provided by associated NGOs and Contractors ▪ Nos. of beneficiaries having received awareness training against the spread of HIV/AIDS and girl/boy trafficking ▪ Records from locals and local police concerning social conflicts

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

Pre-construction Stage

185. Monitoring at this stage of project is to:

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

Construction Stage

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

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

Operation Stage

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

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

Table 7.7 Compliance Monitoring for Raja Rani – 6 no. Budhabare Road Construction Works

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

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

Table 7.8: Impact / Effect Monitoring for Raja Rani- 6 no. Budhabare Road Construction Works

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

Parameters /Issues	Verifiable Indicators	Verification Methods	Location	Schedule	Responsible Implementation and Monitoring Agency
Forest and vegetation	Numbers of trees, presence of ground vegetation, signs of illicit logging and extraction of NTFPs	Observations, DFO records, photos; interview with CFUGs members	In and around the construction sites, markets,	During construction and operation	DIST/ CFUGs/DFO during construction; CFUGs / DFO during operation
Wildlife	Wildlife hunting trapping and poaching by work force, trade of wildlife, biological survey on selected biota, road accidents inflicting wildlife	Interview with local people / DFO/ CFUGs members, photos, observations	Forest areas at roadside	Twice a year during construction and routine during operation	DIST during construction; CFUGs/DFO during operation
Change in economy	Numbers of people employed by the Project during construction Numbers of women in work forces	Records kept by the Project management, DISTussion with stakeholders	Project Area	Trimester during construction phase	DIST /Proponent
Trade and commerce	Numbers of shops increased or decreased, rental of houses and land spaces	Records, interviews, observations, photos	Project Area	Throughout Project, once in a year	Proponent / VDC
Cottage industries	Establishment of industries in the vicinity of Project Area	Records and interviews, photos	Project Area/ zone of influence	Throughout Project	Proponent / VDC
Occupational safety and hazard	Type and number of accident occurred during construction; Adequacy of occupational safety measured provided; Compensation provided in case of fatal accidents or invalidity	Observations, photos, spot checks, contractors' and health centre records interview with labourers	Project Area	During construction	DIST/Proponent
Change in socio-economic structure	No and extent of new settlements / types and ethnic groups; Nos and extent of new businesses; Nos and extent of new services and utilities, social conflicts	Observations, interview with local people, DDC Police and VDC records	Project Area	During operation	Proponent / VDC
Ribbon settlement	Congestions to road users Nos. of accidents, RoW encroachment	Records, observations	Project Area	During operation	DDC/CDO
Chemical pollution	Spillage of chemicals during storage; and operation of machineries. Events of health hazards due to chemicals.	Inspections, Records	Project Area	During Construction	DPO/DIST/Contractor
Heavy machineries, equipments and Crusher Plants	Dust and noise level increase, effect of vibration	Observation, Discussion with people at sensitive locations	Construction sites	During construction	DPO / DIST/Contractor at district and PCU/CISC at center

CHAPTER – 8

8. CONCLUSION AND RECOMMENDATION

8.1 Conclusion

188. The IEE study of the proposed Raja Rani – 6 no. Budhabare Rural Road does not pass through any environmentally sensitive area and have minimal detrimental effects associated with loss of forest and agricultural land. Most of the adverse impacts predicted are of low significance and short term as well as of reversible nature.

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

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

8.2 Recommendation

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

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

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Letter of Approval from MoLD and Terms of Reference (ToR)

नेपाल सरकार

स्थानीय विकास मन्त्रालय

(वातावरण व्यवस्थापन शाखा)

फोन नं. ५५४८५१४
फ्याक्स नं. ५५४८५१४
Web: www.mld.gov.np

पत्र संख्या ०६५/०६६
चलानी नं. २८३.

मिति:- २०६६/३/१०

विषय :- प्रारम्भिक वातावरणीय परीक्षण (IEE) को कार्यसूची स्वीकृत भएको ।

श्री स्थानीय पूर्वाधार विकास तथा कृषि सडक विभाग,
जावलाखेल, ललितपुर ।

उपर्युक्त विषयमा ग्रामीण पुनर्निर्माण तथा पुनर्स्थापना आयोजना अन्तर्गत धनकुटा जिल्ला विकास समितिको कार्यालयबाट निम्नानुसारका सडकहरुको प्रारम्भिक वातवरणीय परीक्षण (IEE) को कार्यसूची (TOR) तयार गरी त्यहाँ विभाग मार्फत वातारण संरक्षण नियमावली, २०५४ अनुसार स्वीकृतिको लागि यस मन्त्रालयमा पेश भएकोमा नेपाल सरकारको मिति २०६६।३।९ को निर्णय(सचिवस्तर) अनुसार स्वीकृत भएको कार्यसूची २/२ थान यसै पत्रसाथ पठाईएको व्यहोरा अनुरोध छ ।

निम्न

१. हिले-उत्तरपानी-छिन्ताङ सडक ।
२. राजारानी-६नं.बुधवारे सडक ।
३. त्रिशुले-हात्तीखर्क-अ.जितपुर सडक ।

(डण्डुराज घिमिरे)
उप-सचिव

Terms of Reference (ToR)

स्वीकृत मिति :- ९०६।३।९

Government of Nepal
Ministry of Local Development
Department of Local Infrastructure Development Agricultural Roads
Rural Rehabilitation Reconstruction Sector
Development Project Co-ordination Unit

Terms of Reference
for
Initial Environmental Examination
of
Raja-Rani-6 No.Budhabare Road (27.1 Km)

Proponent:
District Development Committee
District Technical Office Dhankuta

Telephone No. – 977- 026-520920
Fax No. – 977-026-521481

Submitted by:
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District Project Office, Dhankuta
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