

# Environmental Assessment Document

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## Initial Environmental Examination

Grant Number: 0093 NEP

March 2010

## Nepal: Rural Reconstruction and Rehabilitation Sector Development Program

## Surunga-Saranamati-Taganduba-Digalbank Road Subproject, Jhapa 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**  
[ADBGrant 0093NEP]

## **Initial Environmental Examination (IEE) Report**

Of

### **Surunga-Saranamati-Taganduba-Digalbank Road Subproject Jhapa District**

Submitted to:  
**Ministry of Local Development**  
Government of Nepal

Proponent:  
**District Development Committee/  
District Technical Office**  
Bhadrapur, Jhapa

March, 2010

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## ABBREVIATIONS

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



## सुरुंगा-शरणामती-टाघनडुब्बा-डिगलबैंक सडकको प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदनको कार्यकारी सारांश

### पृष्ठभूमि

नेपाल सरकारले लामो द्वन्द्वले गर्दा क्षति भएका ग्रामीण पूर्वाधारहरूको पुनःनिर्माण र पुनःस्थापना को कार्य एशियाली विकास बैंक (ADB), स्विस् सरकार (SDC), ब्रिटिस सरकार (DFID) तथा ओपेक फण्ड (OFID)को आर्थिक सहयोगमा 'ग्रामीण पूर्वाधार पुनःनिर्माण र पुनःस्थापना आयोजना' नेपालको बिसवटा जिल्लाहरूमा संचालन गरिरहेको छ । भ्यापा जिल्लामा अवस्थित प्रस्तावित सुरुंगा-शरणामती-टाघनडुब्बा-डिगलबैंक ग्रामीण सडकको पुनःस्थापना सोही कार्यक्रम अन्तर्गत संचालन गर्न लागिएको एक उप-आयोजना हो । उप-आयोजना (प्रस्ताव) अन्तर्गत २३.८९ कि.मी. लामो उक्त कच्ची सडकको कालो पत्रे स्तरमा स्तरउन्नती गर्न प्रस्ताव गरिएको छ ।

### प्रस्तावक

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

### प्रारम्भिक वातावरणीय परीक्षण अध्ययनको उद्देश्य

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

### प्रस्तावको सान्दर्भिकता

प्रस्तावित सडकले भ्यापा जिल्लाको दक्षिणी भेग डिगल बैंक ( भारत-नेपाल सिमाना) का वासिन्दाहरूलाई पूर्व-पश्चिम राजमार्ग संग जोडनेछ, भने स्थानिय स्तरमा उत्पादन हुने तरकारी र दुध लाई बजार संग जोडी स्थानिय आय आर्जनमा अभिवृद्धि गर्नेछ ।

### अध्ययन प्रकृया

नोभेम्बर, २००९ मा फिल्ड सर्वेक्षणबाट लिइएको तथ्याङ्क तथा अन्य उपलब्ध तथ्याङ्कहरूको साथै सामाजिक तथा प्राविधिक टोलीबाट पुनर्वास कार्यको सर्वेक्षणको सिलसिलामा संकलन गरेका तथ्याङ्कहरू केलाएर प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन तयार गरी निष्कर्ष तथा सुझावहरू दिइएको छ । यो प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदन नेपाल सरकारको वातावरण संरक्षण ऐन २०५३, वातावरण संरक्षण नियामावली २०५४ अनुसार तथा स्थानीय विकास मन्त्रालयबाट ८ अक्टोवर, २००९ (वि.स. २०६६/०६/२२) मा स्विकृत गरिएको यसै प्रस्तावको कार्यसूची अनुसार तयार गरिएको छ । साथै, एशियाली विकास बैंकको Environmental Assessment Guideline, 2003 तथा Safeguard Policy Statement, 2009 को समेत अनुसरण गरिएको छ ।

### आयोजना को विवरण

प्रस्तावित सडक पूर्व-पश्चिम राजमार्गको सुरुंगा बजारबाट शुरु भई भ्यापा जिल्लाको दक्षिणी भेग डिगल बैंक (भारत-नेपाल सिमाना) मा गएर अन्त हुन्छ । यसको कूल लम्बाइ २३.८९ कि.मि. छ जसमध्ये Ch 0+246 to Ch 3+084 km सडकको सतह कालो पत्रे रहेको छ । उक्त कच्ची ग्रामीण सडकको पुरै सडक खण्डमा वर्षे भरि गाडी चल्छ । यो सडक चारवटा गाउँ विकास समितिहरू क्रमशः सुरुंगा, शरणामती, टाघनडुब्बा र कुमरखोद भएर जान्छ । सडकको औसत चौडाइ ६ मी. रहेको छ । यस उप-आयोजनाको कूल अनुमानित लागत रु.९०,६५८,४८५ र प्रति कि.मी अनुमानित लागत रु.३,७९,४,८३० लाग्ने देखिन्छ ।

### विद्यमान वातावरणीय स्थिति

यो सडक सुरुंगा गा.वि.स.को सुरुंगा बजारबाट समुद्री सतहदेखि १०७ मी. को उचाईबाट शुरु भएर ६७ मी. उचाईको डिगलबैंक बजारमा पुग्छ । प्रस्तावित सडक तराईमा पर्ने भएकोले पहिरोको समस्याहरू देखिदैन । प्रस्तावित सडक क्षेत्रको वायु तथा पानीको स्तर सफा रहेको देखिन्छ साथै ध्वनि प्रदूषणको समस्या देखिदैन । यो सडक वस्ती तथा खेती गरिएको जमीन भएर जान्छ ।

यस सडक खण्डमा पाइने मुख्य रुखको प्रजातिहरूमा सिसौ, आँप, नरिवल, सुपारी, बांस,कदम, पिपल आदी पर्दछन् । आयोजना क्षेत्रमा कुनै पनि वन्य जन्तु पाइदैन तर काग, भँगेरा, परेवा, सुगा आदि पंक्षीहरू सडक छेउको रुखहरूमा पाईन्छ । यो सडक



खण्ड संरक्षित क्षेत्र वा मध्यवर्ती क्षेत्रमा पर्दैन । यो सडक खण्डको प्रभावित क्षेत्र भित्र जम्मा घरधुरी संख्या ३०८७ र जनसंख्या १६५१९ रहेको छ र सरदर परिवार संख्या ५.३५ छ । यहाँ ब्राह्मण, क्षेत्री, राजवंशी, थारु, यादव, लिम्बु, तामाङ तथा दलित ( दमाई, कामी) जातीहरु बसोबास गर्दछन् ।

यहाँका बासिन्दाहरुको मुख्य पेसा कृषि र पशुपालन हो । यातायातको राम्रो सुविधा नभएकोले कृषि उब्जनीले मात्र पर्याप्त नहुने हुँदा यहाका अधिकांश मानिसहरु श्रम रोजगारीका अन्य पेशामा काम गर्ने साथै उल्लेखनीय प्रतिशत मानिसहरु जीविकोपार्जनको सिलसिलामा हिउँदमा काठमाडौं तथा भारत लगायतका ठाउँमा रोजगारीको लागि जाने गर्दछन् ।

### **प्रमुख वातावरणीय प्रभावहरू**

#### **सकारात्मक प्रभाव**

उप-आयोजना बाट तत्कालै हुने लाभमा स्थानीय स्तरमा रोजगारीको सिर्जना हुनेछ । आयोजना संचालनको लागि करिव ८५१४ मानव-दिन बराबरको अदक्ष र १८२४ मानव-दिन बराबरको दक्ष श्रमशक्तीको आवश्यकता पर्नेछ । आयोजना संग सम्बन्धित कार्यमा (रोजगारीमा) गरीब तथा पिछडिएका स्थानीय जनताले प्राथमिकता पाउनेछन् । यस चरणमा हुने अन्य लाभहरुमा बन्द व्यापारको बृद्धि, उप-आयोजनाले प्रदान गरेको शीपमुलक तथा जनचेतनामुलक तालिम तथा उप-आयोजना निर्माण कार्यमा सहभागी भई स्थानीय जनताको शीप बृद्धि हुने अवसर पर्दछन् ।

सडक सञ्चालनका चरणमा सडकले प्रभावित क्षेत्रका बासिन्दालाई बजार, 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 आपूर्तिले कृषिको उत्पादकत्वमा अभिवृद्धि हुनेछ । यसले स्थानीय जनताको आय तथा खाद्य सुरक्षामा अभिवृद्धि हुनेछ साथै स्थानीय श्रोत साधनको उपयोग गर्ने साना कृषि उद्योगहरुको प्रवर्द्धन हुनेछ । पहुँच तथा यातायातको अवसर संगै शिक्षा, स्वास्थ्य, संचार, बजार, बैकिङ्ग तथा अन्य आर्थिक तथा सामाजिक क्षेत्रहरुको विकास हुनेछ । यसले यस क्षेत्रका मानिसहरुको समग्र जीवनस्तर उकास्न मद्दत पुऱ्याउनेछ । सडकको सञ्चालनले स्थानीय जग्गा जमिनको मुल्य बृद्धि गर्न सहयोग पुऱ्याइ स्थानीय जग्गाधनीलाई लाभ पुऱ्याउनेछ ।

#### **उप-आयोजना कार्यन्वयनबाट पर्न सक्ने नकारात्मक प्रभावहरू:**

प्रस्तावित सडकको निर्माण तथा स्तर बृद्धि गर्दा भौतिक तथा जैविक वातावरणमा केहि नकारात्मक प्रभाव पर्ने देखिन्छ । सडक निर्माणको क्रममा सडक छेउको माटो खन्दा बनेको खाल्डो, फोहर तथा खन्दा निस्किएका माटो र ग्रेगरको उचित व्यवस्थापन हुन सकेन भने यसले केहि मात्रामा भू-क्षय बढाउन तथा जल प्रदुषण गराउन सक्ने सम्भावना देखिन्छ ।

सडकको स्तर बृद्धि हालको ६ मी. बाटो चौडाई भित्र गरिने हुँदा थप कुनै पनि जमिनको आवश्यकता एवम जमिनको प्रयोगमा कुनै पनि परिवर्तन हुने छैन भने कुनै पनि रुखहरु काटनु नपर्ने, मन्दिर, चौतारा आदि कुनै पनि वस्तु पुनःस्थापना गर्नु पर्ने देखिदैन ।

सडक निर्माण कार्यले कुलो, पानीको मुहान आदिमा असर नपर्ने देखिन्छ । निर्माण कार्यको क्रममा श्रमिकहरु तथा स्थानीय जनताको स्वास्थ्यमा असर पर्ने अथवा अप्रिय दुर्घटनाहरु घट्न सक्ने सम्भावना रहन्छ ।

सडक सञ्चालनको चरणमा सवारी साधनको आवगमनबाट, वर्षायामको पानी तथा सडक किनाराका नाला बाट बगेको अनियन्त्रित पानीले सडक मुनिका खेतवारीमा भु-क्षय हुन सक्छ । सवारी साधनको बृद्धिले धुलो तथा ध्वनी प्रदुषण बढ्नेछ । त्यसैगरी सडकको सुधार संगै बस्ती र बजारको अव्यवस्थित विस्तार हुने सम्भावना र सडक क्षेत्र मिच्ने प्रवृत्ति देखिन सक्छ ।

#### **प्रभाव न्युनिकरणका उपायहरू:**

यस उप-आयोजनालाई वातावरण मैत्री बनाउनका लागि सकारात्मक प्रभावलाई बढावा गर्ने तथा नकारात्मक प्रभावहरुलाई नियन्त्रण या न्युनिकरण गर्ने थुप्रै उपायहरु यस प्रतिवेदनमा प्रस्तावित गरिएको छ । सडक सम्भव भयसम्म LEP (श्रम मुलक, वातावरण मैत्री, सहभागीता मुलक) ढंगले निर्माण गरिने छ । उप-आयोजनाले प्रभावित जनतालाई निर्माण कार्यमा रोजगारीमा तथा शिपमुलक तालिममा प्रथमिकता दिनेछ । उप-आयोजना निर्माणको क्रममा जमिन काट्दा, खन्दा निस्किएका माटो, ग्रेगर थुपार्दा तथा अन्य कार्य गर्दा त्यस क्षेत्रको संवेदनशील वातावरणलाई सुरक्षित राख्न विशेष ध्यान दिनेछ । निर्माण कार्यमा कार्यरत श्रमिकहरुको बिमा गरिने छ तथा सुरक्षाका सम्पूर्ण सामग्री श्रमिकहरुलाई प्रयोगमा ल्याउन दिइने छ । सामाजिक अक्षुण्णतालाई कायम राख्न जनचेतनामुलक कार्यक्रमहरु तथा तालिमहरु सञ्चालन गरिनेछ । सडकछेउ हरीयालीको लागि वायोईन्जिनियरीङ्ग गरिनेछ । निर्माण स्थलहरुमा प्राथमिक उपचारको सामग्रीहरुको व्यवस्था गरिने छ । 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 दुर्घटना बाट बचाव गर्न उपायहरु अवलम्बन गरिनेछ ।



### वातावरण व्यवस्थापन योजना

यस प्रतिवेदनमा वातावरण व्यवस्थापन योजना अन्तर्गत उप-आयोजनाबाट पर्ने संभावित असरहरु, असरहरुको प्रभाव, न्युनिकरण विधि, अनुगमन विधि तथा कार्यतालिका प्रस्तावित गरिएको छ । यसका साथै न्युनिकरणका उपायहरुको तथा अनुगमन कार्यको कार्यान्वयन 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 कार्यान्वयन गर्न निम्नानुसार खर्च हुने अनुमान गरिएको छः

क्र. सं.	विवरण	रकम (ने.रु.)	कैफियत
१.	वातावरण सम्बन्धी जनचेतनामूलक तालिम तथा अन्य तालिम	४,५०,०००/-	आयोजनाको बजेटमा समावेश गरिने ।
२.	श्रमिकहरुको विमा	४००,०००/-	BoQ मा समावेश गरिने ।
३.	बायो-इन्जिनियरिङ्ग	१५,३०,०००/-	BoQ मा समावेश गरिने ।
४.	पुननिर्माण तथा अन्य	५,००,०००/-	BoQ मा समावेश गरिने ।
५.	सामाजिक कार्य लागत (एच. आई. भी. रोकथाम तथा अन्य चेतनामूलक कार्यक्रमहरु जस्तै: युवा साक्षरता, स्थानीय विद्यालय सहयोग आदि)	२,००,०००/-	सामाजिक योजना तथा आयोजनाको बजेटमा समावेश गरिने ।
६.	पेशागत स्वास्थ्य सुरक्षा तथा जानकारीमूलक सूचनापाटी	५५०,०००/-	BoQ मा समावेश गरिने ।
७.	अनुगमन तथा मुल्यांकन	२००,०००/-	आयोजनाको बजेटमा समावेश गरिने ।
	<b>जम्मा :</b>	<b>३८,३०,०००/००</b>	

### निष्कर्ष

परिचान गरिएका प्रायः वातावरणीय प्रभावहरु कम महत्वका तथा मुख्य गरी निर्माणकार्यका वखतमा सिमित रहेको पाइएको छ । वातावरण व्यवस्थापन योजना अन्तर्गत उल्लेख गरिएको उपायहरुको कार्यान्वयन गरिएमा यस आयोजनाको कार्यान्वयनले आयोजना क्षेत्रको भौतिक, जैविक, सामाजिक - आर्थिक तथा साँस्कृतिक वातावरणमा उल्लेखनीय नकारात्मक प्रभाव नपर्ने देखिन्छ । यस प्रारम्भिक वातावरणीय अध्ययनको आधारमा यस प्रतिवेदनमा उल्लेख गरिएको वातावरणीय व्यवस्थापन योजनालाई पूर्ण रुपमा लागु गरी प्रस्तावित उप-आयोजना कार्यान्वयन गर्न सिफारिश गरिन्छ । उप-आयोजनाको 'वातावरणीय प्रभाव मुल्याङ्कन' स्तरमा अध्ययन गर्न आवश्यक नरहेको सिफारिश समेत गरिन्छ ।



## EXECUTIVE SUMMARY

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### Background

Government of Nepal has received financial assistance from ADB, SDC, DFID and OFID for implementation of the Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP). The RRRSDP aims for reconstruction and rehabilitation of rural infrastructures damaged in the twenty conflict affected districts of the country. The Proposed 23.89 km long Surunga-Sharnamati-Taganduwa-Kumarkhod in Jhapa District is one of the Subprojects selected under the RRRSDP. It is an existing earthen road proposed for upgrading in Blacktop standard.

### Project Proponent

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

### Objectives of the IEE Study

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

### Relevancy of the Proposal

The proposed Subproject will connect the southern part Digalbank (Indo-Nepal border) of Jhapa district to East West highway. It will provide easier access to people to social services, and market access for local products like vegetables and milk. As a result, the subproject will assist to promote economic activities, reduce poverty and increase socio-economic conditions of the people of the area.

### Study Methodology

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

The IEE report has been prepared following the Environmental Protection Act, 1997 and Environmental Protection Rules, 1997 (second amendment 2007) of the Government of Nepal (GoN); and Environmental Assessment Guidelines, 2003, and Safeguard Policy Statement, 2009 of ADB. The report follows the Terms of Reference for IEE Study approved by MoLD on 8 October, 2009 (22/06/2066 BS).

### Brief Description of the Subproject

The proposed road starts from Surunga market of East West highway and ends at Digalbank (Indo-Nepal border). The 23.89 km road is already motorable and from Ch 0+246 to Ch 3+084 km road surface is blacktopped. The road passes through Surunga, Sharnamati, Taganduwa and Kumarkhod Village Development Committees (VDCs). The average width of road is 6 m. Total project cost is NRs. NRs 90,658,485.00 and per km cost is NRs. NRs. 3,794,830.00.

### Existing Environmental Condition

The road starts from Surunga market of Surunga VDC at 107m amsl and passes through Digalbank Bazaar at 67m amsl. The propose road lies in terail, therefore no any landslide problems have been seen. Ambient air and water quality of the proposed project area is observed to be good and there is no noise pollution. The road passes through cultivated land and settlements.

The dominant vegetations found in the road alignment on private lands are Sisso (*Dalbergia Sisso*), Mango (*Magnifera Indica*), Coconut (*Cocos nucifera*), Betelnut (*Areca catechu*), Bamboo (*Bambusa vulgaris*), Kadam (*Anthrocephalus chinensis*) and Peepal (*Ficus religiosa*). There is no any wild animals are found but *Corvus splendens* (Crow), *Passer domesticus* (Sparrow), *Columba livia* (Pigeon), Parrot are the birds found in the Subproject area. The road does not fall under any protected area or their buffer zones. Total population of the Subproject area is 16519 and total household number is 3087, and average family size is 5.35. Brahmin, Chettri, Rajbanshi, Tharu, Yadav, Limbu, Tamang, and occupational caste (Damai, Kami) are the main castes living in the area.



Subsistence agriculture and livestock farming are the main occupation. Due to limited transportation facilities agriculture farming is not enough for subsistence level. Moreover, significant percentage of the economically active male population also migrates to various places including Kathmandu and India seasonally during slack farming season for employment.

## **Major Environmental Impacts**

### ***Beneficial Impacts***

The immediate benefit from this road Subproject is employment opportunities. The implementation of Subproject require about 8514 person days of unskilled and 1824 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 Zone of Influence (Zol)<sup>1</sup> 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 Zol 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 Zol of project area. The better land network will result in increased land price which will be beneficial for land owners.

### ***Adverse Impacts***

Some adverse environmental impacts are likely to result from the proposed upgrading of road works. Disposal of soil and earth material, operation of quarryies might result in on erosion during construction and operation. Futhermore, spoils generated during construction can create the water pollution to the nearby water sources.

There will be no change in land use, since the road will be upgraded and widened under the existing width of 6m and no additional acquisition of land is necessary, no trees are required to cut down during road construction. Also there are not any houses, temples, chautaras will be displaced.

No any water supply lines, irrigation canal and water sources are affected during construction of road. Labours and local people are prone to health effects and accidents relating to construction activities.

During operation stage, vehicular movement, monsoon rain, grazing of animals might result in erosion in embankment of road. 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. New settlement, bazaar area will be expanse and this may increase encroachment of the RoW.

## **Mitigation Measures**

The various benefit augmentation measures and adverse impact mitigation measures have been proposed in the report to make this project environment friendly. The construction of road will be based on Labour-based, Environment friendly and Participatory (LEP) Approach as far as possible. 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 earthworks, pavement works, operation of construction vehicles and equipments, disposal of spoils and quarrying activities. Necessary trainings and awareness programs will be conducted. Bioengineering will be done for roadside greenery. At construction site, the workers will be provided insurance, first aid facilities and safety equipments. 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.

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<sup>1</sup> Zol is one and half hour walking distance from the road alignment.



### 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	4,50,000	To be included in project cost
2	Insurance of workers	4,00,000	To be included in project cost
3	Bio-engineering	15,30,000	
4	Restoration or relocation of affected infrastructures, Spoil management, Reinstatement of quarry, stockpiling etc.	5,00,000	To be included in BoQ
5	Social Cost (Health / HIV AIDS / STD prevention awareness; other awareness program such as adult literacy; support to local school etc.)	2,00,000	To be included in Social plan, project cost
6	Occupational health and safety, Information signboard	5,50,000	To be included in Project cost
7	Monitoring	2,00,000	To be included in project cost
	Total	38,30,000	

### Conclusion and Recommendation

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



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## 1. INTRODUCTION

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### 1.1 Background

1. The Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP) focuses on immediate post conflict development priorities for accelerated poverty reduction and inclusive development, thereby enhancing the effectiveness and efficiency of the delivery of public services, and improving access of rural people to economic opportunities and social services. The Program is financed by the Government of Nepal (GoN), Asian Development Bank (ADB), Department for International Development (DFID), Swiss Development Cooperation (SDC), Nepal and OPEC Fund for International Development (OFID). The Program covers twenty districts spread over the country. Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) under the Ministry of Local Development (MoLD) is the executing agency (EA). The District Development Committees (DDCs) / District Technical Office (DTO) are the Project Implementing Agencies. The DDC/DTO are supported by District Implementation Support Team (DIST) with engineering, safeguards and social mobilization responsibilities.

2. Jhapa District is one of the project districts under RRRSDP. This Proposal is for upgrading in bituminous standard of the 23.89 km long Surunga-Sharanamati-Taganduba-Digalbank district road in Jhapa District.

### 1.2 The Name and Address of Proponent

Name of Proposal : Rehabilitation of Surunga-Sharanamati-Taganduba-Digalbank  
District Road, Jhapa District, Nepal  
Name of Proponent : District Development Committee, District Technical Office, Jhapa  
Address of Proponent : Bhadrapur, Jhapa District  
Phone No: 023-456273  
Fax No: 023-456273  
Name of Preparer : Mr. Prakash Chaudhary (Environmental Specialist- DIST Jhapa)

### 1.3 Relevancy of the Proposal

3. The Project area is located at remote and underdeveloped central part of Jhapa district in Eastern part of Nepal. The road is currently graveled and motorable in fair-weather. The area has high potential in production of vegetable, fruit and milk. In this regard, the proposed rehabilitation of the road will enhance access of people to social services and market centers with significantly reduced travel time and cost, and will contribute in their socio-economic development. Access shall also attract other development infrastructures and open door to further development opportunities in the area. The total length of the road alignment was 24.2 Km as in approved ToR but after detail survey the alignment length was changed to 23.89 Km.

### 1.4 Need and Objectives of the IEE Study

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

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

### 1.5 Methodology Adopted

6. The IEE study has followed the provisions of the EPA, 1997 and EPR, 1997, and the provisions of ADB. It follows methodology suggested in the approved Terms of Reference for IEE Study (Refer Annex 1). 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 Zol (one and half hour walking distance from the centre line of the road) information of the Subproject area. The IEE study has been conducted through review of



secondary information collected from relevant agencies, and primary information collected from the field survey in November 2009. The IEE report is based on the Terms of Reference for IEE Study approved on 8 October, 2009 (22/06/2066 BS) by MoLD which is given in Annex (1). Field survey, sample household survey, organization of Focus Group Discussions in the related VDCs was carried out and necessary information was collected. The DDCs officials, VCDs and Community Groups were also contacted to verify information to solicit their concerns. Based on the analysis of information the impacts have been predicted, mitigation measures prepared and monitoring plan has been developed.

## 1.6 Description of the Proposal

7. The proposed 23.89 km long gravelled road lies in Jhapa District constructed 20 yrs ago that links the remote southern area Digalbank (Indo-Nepal border) of the District to East West National highway at Surunga market. The proposed road starts from Surunga market of East West highway and ends at Digalbank (Indo-Nepal border). The 23.89 km road is already graveled and motorable and from Ch 0+246 to Ch 3+084 km road surface is blacktopped. The road passes through Surunga, Sharanamati, Taganduwa and Kumarkhod Village Development Committees (VDCs) (see in Figure 1.1 and 1.2). The total width of road is 6 m. Widening, gravelling, geometric correction and grade improvement, side drains and construction of cross drainage structures, bioengineering is planned to be implemented under the proposed rehabilitation works of the road. The total project cost is estimated at average of NRs 90,658,485.00 and per km cost is NRs. 3,794,830.00.

### Salient Features of the Subproject:

1. Name of the sub-Project	: Surunga- Sharanamati-Taganduba-Digalbank Road
2. Location	
<u>Geographical Location</u>	
i. Region:	Eastern Development
ii. Zone:	Mechi
iii. District:	Jhapa
iv. VDCs:	Surunga, Sharnnamati, Taganduba and Kumarkhod
v. Latitude:	N 26°38.788'
vi. Longitude:	E 87° 53.577'
vii. HH/Population served:	3087 / 16519
<u>Geographical Feature</u>	
i. Terrain:	Plain
ii. Climate:	Sub-tropical
3. Road type:	District Road
4. Standard of Pavement	Premix Carpeting
5. Length of Road	23.89 km
i. Starting point:	Surunga
ii. End point:	Digalbank (Lasuna)
6. Settlement on Alignment Surveyed:	Surunga Bazaar, Tulsibari, Chapramari, Kirat Chowk, Sharnamati Bazaar, Virkuti Chowk, Phulgachhi Chowk, Swasthani Chowk, Kamatoli, Chatragachhi, Jhapa Bazaar and Lasuna Digalbank
7. Standard of pavement	Premix Carpeting
8. Design Criteria	
i. Design speed	40 km /hour
ii. Maximum gradient	5%
9. Cross section	
i. Right of way	5m each side (from center line)
ii. Formation width	6m
iii. Carriage way width	3m
iv. Shoulder width	1.5 m on either side
v. Side drain	0.75m (in the specified section only)
10. Structure	
<u>Cross Drainage Structure</u>	
i. Hume pipe culvert	32 existing and 9 Proposed
ii. Concrete causeway	0
iii. Slab Culvert	1 no
iv. Bridge	0
<u>Retaining Structure</u>	
i. Gabion wall	200 cum



ii.	Dry stone wall	0
iii.	Cement masonry wall	0
<b>Earthwork</b>		
ii.	Cutting cum	0
iii.	Filling	14832 cum
<b>11.</b>	<b>Project Cost</b>	
i.	Cost of civil Works	NRs 90,658,485.00
ii.	Cost per km	NRs 3,794,830.00
<b>12.</b>	<b>Employment generation:</b>	
i	Total employment :	10338 (person days)
ii	Skilled :	1824
iii	Unskilled	8514
<b>13.</b>	<b>Project Duration</b>	31 months
<b>14.</b>	<b>DTMP Code</b>	04A015R

## 1.7 Construction Approach and Activities

8. 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.

9. Activities included during the road construction are: Earthwork, Retaining structures, Bioengineering, Gravelling, cross drainage works are side drain works

## 1.8 Proposed Schedule for Implementation of Subproject

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

**Table 1.1: Subproject Implementation Schedule**

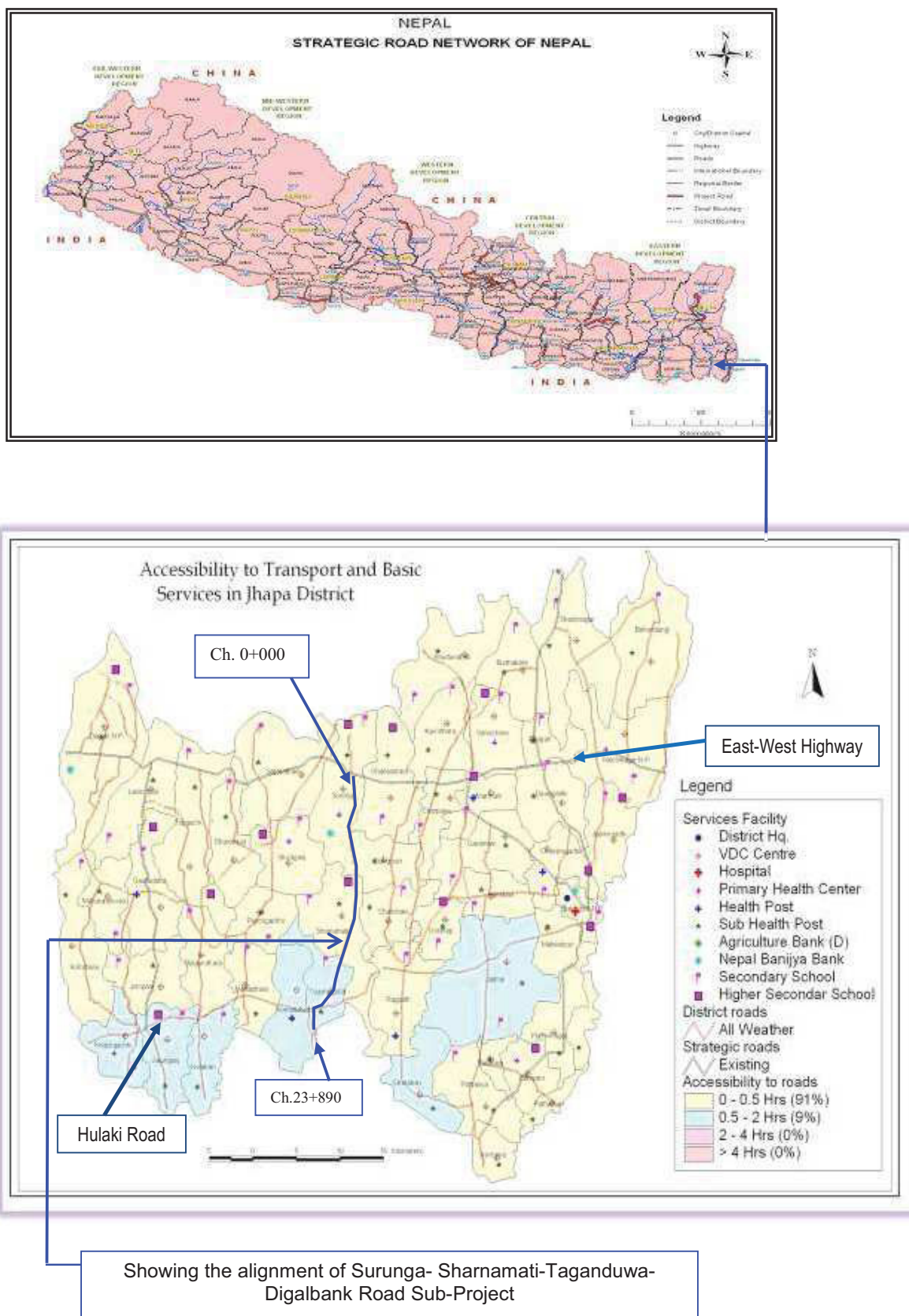
SN	Activity	2008 IV	2009				2010				2011	
			I	II	III	IV	I	II	III	IV	I	II
1	Detailed survey and design											
2	Preparation of resettlement plan											
2.1	Life skill and income generation training											
3	Environment Assessment and Monitoring											
3.1	IEE report preparation and approval											
3.2	Implementation of EMP											
3.3	Environmental monitoring											
4	Construction Work											
4.1	Civil construction work by contractors											
4.2	Civil construction work by RBGs											

### Note:

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

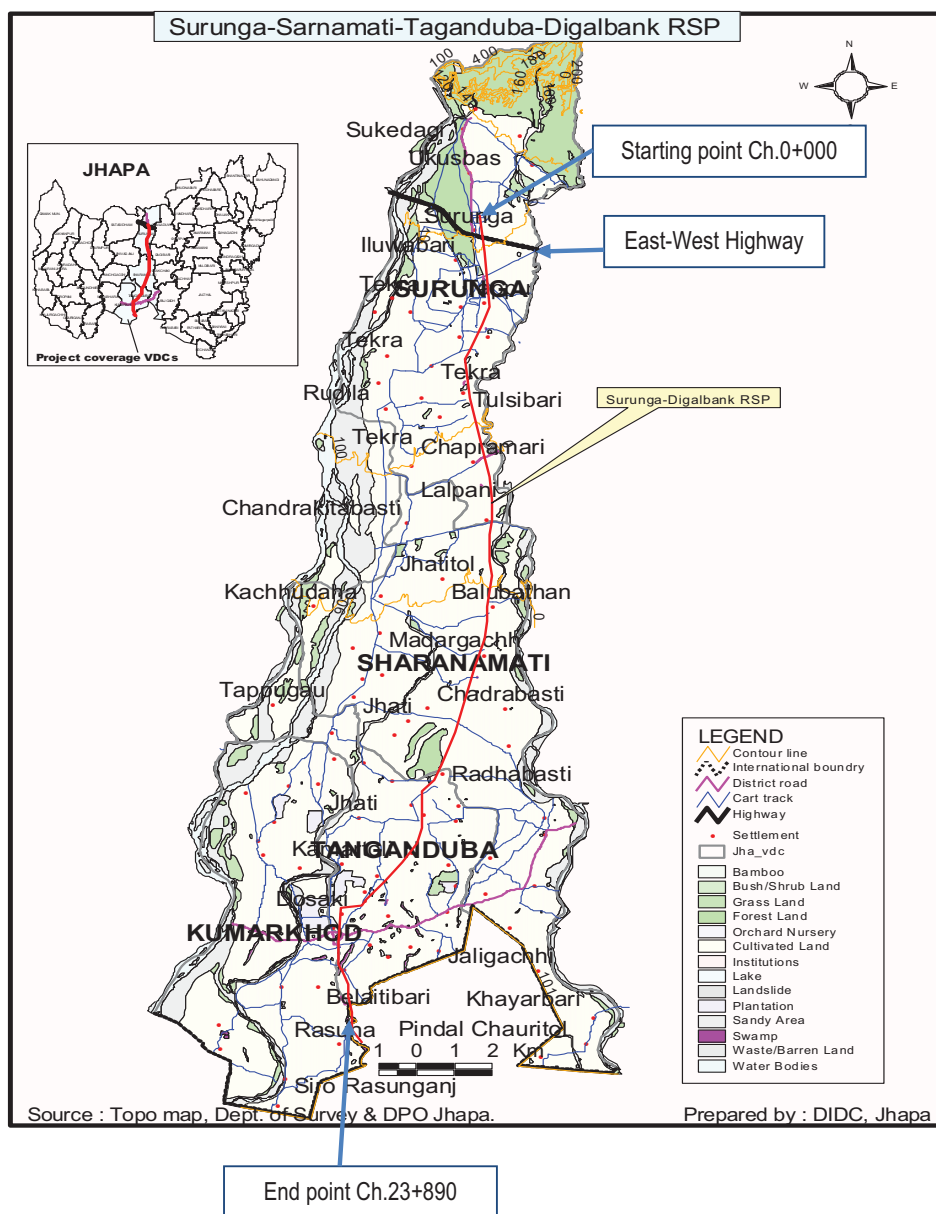


**Figure 1.1: Map of Nepal showing the location of Surunga-Sharnamati-Taganduwa-Digalbank Road Subproject in Jhapa District**



**Figure 1.2: Alignment of Surunga-Sharnamant-Taganduwa-Digalbank Road Subproject**







## 2. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

### 2.1 Public Consultation

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

- Publication of Public Notice- a 15 days public notice was published on 29/06/2066 in the Rajdhani national daily newspaper (see Annex V) seeking written opinion from the concerned VDCs, DDC, schools, health posts and related local stakeholders. A copy of the public notice was also affixed in the offices of the above mentioned organizations and *Deed of Enquiry (muchulka)* was collected (see Annex VI and Annex VII).
- Interaction with local communities and related stakeholders like District Forest Office, District Soil Conservation Office, District Agricultural Development Office and others were carried out during field survey to collect the public concerns and suggestions (see Annex VIII). Focus Group Discussions were conducted in all the four VDCs to collect and solicit their suggestions on protection of bio-physical and socio-economic environment in the Zone of Influence (ZOI) of the road. Summary of minutes of meeting is given in Annex IX and following Table 2.1.
- Draft IEE report was kept at information center of DDC, Jhapa and Surunga, Sharnamati, Taganduwa and Kumarkhod VDCs for public disclosure. Information was also disseminated through person to person contacts and interviews and group discussions. Recommendation Letters for implementation of the Proposal were also obtained from all the concerned VDCs (see Annex X).

**Table 2.1: Summary of FGD Meeting Conducted Under IEE Study**

Location	VDC	Date	No. of Participants	Decision
Chapramari	Surunga	16/7/2066	15	1. Priority should be given to local people in employment opportunities. 2. There will be no conflict during road construction. If conflict arises it will be solved by VICCC. 3. There will be no discrimination on dissemination of payments during road construction. 4. People are agreed to work in rate as given in DPR and benefitted people agreed for volunteer contribution as required during road construction. 5. No major environment issue arised during FGD meeting.
Kirat chowk and Baluwathan	Sharnamati	17/7/2066	17	
Kamatoli	Taganduwa	18/7/2066	16	
Jhapa market chowk	Kumarkhod	19/7/2066	15	

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

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



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

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

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

SN	Environmental Acts, Regulations and Guidelines	Description of Requirements
1	Three Years Interim Plan, 2007/08-2009/10, GoN	Requires all projects will be formulated and constructed based on methods that optimally utilize the local skill and resources and generate employment opportunities.
2	Environmental Protection Act, 1997, GoN	Any development project, before implementation, shall pass through environmental assessment, which may be either IEE or an EIA depending upon the location, type and size of the projects.
3	Environmental Protection Rule 1997 (amendment, 2007), GoN	The EPR and its schedules clearly provide various step-wise requirements to be followed while conducting the IEE study. It also obliges the Proponent to timely consult and inform the public on the contents of the proposal and IEE study.
4	Forest Act, 1993 (amendment, 2007), GoN	Requires decision makers to take account of all forest values, including environmental services and biodiversity, not just the production of timber and other commodities. It includes several provisions to ensure development, conservation, management, and sustainable use of forest resources based on approved work plan.
5	Forest Rules, 1995, GoN	Elaborates legal measures for the conservation of forests and wildlife. Expenses incurred for cutting trees and transportation shall be borne by proponent.
6	<i>Batabaraniya Nirdeśika</i> (Nepal; MLD), 2057, GoN	The directive is focused in the practical implementation of small rural infrastructures through the minimization of environmental impacts. This directive includes the simple methods of environmental management in the different phases of the project cycle.
7	National Park and Wildlife Conservation Act, 1973, GoN	Addresses for conservation of ecologically valuable areas and indigenous wildlife. The Act prohibits trespassing in park areas, prohibits wildlife hunting, construction works in park area, damage to plant and animal, construction of huts and house in park area without permission of authorized person. It lists 26 species of mammals, 9 species of birds, and 3 species of reptile as protected wildlife.
8	Local Self Governance Act (1999) and Regulation (1999), GoN	Empowers the local bodies for the conservation of soil, forest and other natural resources and implements environmental conservation activities
9	Land Acquisition Act, 1977 and Land Acquisition Rules, 1969, GoN	Specifies procedural matters on land acquisition and compensation
10	National Environmental Impact Assessment Guidelines, 1993, GoN	Provides guidance to project proponent on integrating environmental mitigation measures, particularly on the management of quarries, borrow pits, stockpiling of materials and spoil disposal, operation of the work camps, earthworks and slope stabilization, location of stone crushing plants etc.
11	APPROACH for the Development of Agricultural and Rural Roads, 1999, GoN	Emphasizes labor based technology and environmental friendly, local resource oriented construction methods to be incorporated actively in rural infrastructure process.
12	RRRSDP Environmental Assessment & Review Procedures (EARP), 2007, GoN	For preparation of environmental assessments of future subprojects under Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP), this EARP includes: i) The process to be adopted while preparing environmental reports, ii) the potential environmental impacts that could result from undertaking the Project based on the Initial Environmental Examinations (IEEs) of sample core subprojects; iii) the proposed mitigation measures to avoid the identified impacts; iv) institutional capacity assessment and strengthening arrangements; v) legal framework for environmental assessment, domestic and the Asian Development Bank (ADB) environmental assessment and review procedures; and finally vi) the approaches to be adopted during implementation of the Project in order to ensure that environmental aspects are dealt with in a comprehensive manner.
13	Reference Manual for Environmental and Social	Suggests stepwise process of addressing environmental and social issues alongside the technical, financial and others



	Aspects of Integrated Road Development, 2003, GoN	
14	Green Roads in Nepal, Best Practices Report: An Innovative Approach for Rural Infrastructure Development in the Himalayas and Other Mountainous Regions, 1999, GoN	Focuses on participatory, labor based and environment friendly technology with proper alignment selection, mass balancing, proper water management, bioengineering and phased construction
15	Environmental Assessment Guidelines, 2003, ADB	Requires that environmental considerations be incorporated into ADB operations where environmental assessment is the primary administrative tool to integrate environmental considerations into decision-making of all types of development initiatives
16	Safeguard Policy Statement, 2009, ADB.	ADB's Safeguard Policy Framework consists of three operational policies on the Environment, Indigenous people and Involuntary resettlement. It requires that (i) impacts are identified and assessed early in the project cycle, (ii) plans to avoid, minimize, mitigate or compensate for the potential adverse impacts are developed and implemented and (iii) affected people are informed and consulted during project preparation and implementation.
17	The Interim Constitution of Nepal, 2063 (2007).	Has provision of right regarding environment - Every person shall have the right to live in clean environment.
18	The Labor Act, 1992	Regulates the working environment and deals with occupational health and safety.



## 4. BASELINE ENVIRONMENTAL CONDITION IN THE SUBPROJECT AREA

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

### 4.1 Physical Environment

#### 4.1.1 Topography

15. The proposed road lies in Terai. The highest elevation of the proposed road at starting point at Surunga is 107 m amsl and lowest elevation at Digalbank is 67 m amsl. The location of the road is at 26°38.788' north (latitude) and 87°53.577" east (longitude). The topographical setting of the road section is characterized by flat plain sloping gently to the south.

#### 4.1.2 Geology and Soil Type

16. Most of the soils in the proposed road alignment area are alluvium soil, sandy with ordinary soil but somewhere clay mixed, sandy mixed soil, boulder mixed soil and soft rock are found along the road alignment. There is marked variation within profiles and between adjacent profiles.

#### 4.1.3 Land Use

17. Land use pattern of the area through which the road passes have been classified into two types: cultivated land and built up area as shown in Table 4.1.

**Table 4.1: Summary of Land Use Pattern along the Road Alignment**

Type of Land	Chainage		Length(m)	Existing Width(m)	Additional Width (m)	Existing area (ha)	Additional Area ( ha)
	From	To					
Built up area	0+000	0+300	300	6m	0m	0.18	No
	11+600	11+700	100	6m	0m	0.06	No
	16+300	16+400	100	6m	0m	0.06	No
	20+200	20+500	300	6m	0m	0.18	No
<b>Sub total</b>			<b>800</b>			<b>0.48</b>	
Agricultural land	0+300	10+400	10100	6m	0m	6.06	No
	10+400	11+600	1200	6m	0m	0.72	No
	11+700	16+300	4600	6m	0m	2.76	No
	16+400	20+200	3800	6m	0m	2.28	No
	20+500	23+890	3390	6m	0m	2.034	No
<b>Sub total</b>			<b>23090</b>			<b>13.854</b>	
<b>Total (Built up area + Agriculture land)</b>			<b>23890</b>			<b>14.334</b>	

Source: Field Survey, November, 2009

#### 4.1.4 Climate

18. The road lies in the Sub-tropical climatic region. Rainy season starts from June and ends in September. The meteorological record shows on an average Jhapa gets 2451.3 mm of annual rainfall. Average minimum temperatures of 8°C and average maximum temperature of 34 °C is observed in the area.

**Table 4.2: Meteorological Records from Jan –Dec 2004**

Year/Month		Temperature		Rainfall
		Maximum	Minimum	
2004	January	23.0	8.8	20.4
2004	February	27.5	11.3	0.00
2004	March	31.7	17.6	10.2
2004	April	31.4	20.5	93.2
2004	May	32.8	22.7	245.3
2004	June	33.3	23.7	308.7
2004	July	31.6	24.1	903.0
2004	August	34.2	24.9	327.1
2004	September	33.2	23.3	412.7



2004	October	31.9	18.7	130.7
2004	November	30.6	13.0	0.00
2004	December	27.4	11.3	0.00
				2451.3

Source: District Profile of Jhapa, 2063

#### 4.1.5 Hydrology and Drainage System

19. There are not any rivers along the road alignment but Biring River is the major natural drainage within Zol, lying in 1 km far from the road. The irrigation canal at Ch 5+744 crosses the road. No wetlands are found within the vicinity of the road. There are existing 32 pipe culverts and 1 slab culvert along the road alignment.

#### 4.1.6 Soil Erosion and Sedimentation

20. The stability of slopes along the road corridor depends upon slope angle, the material constituting the slope, rock discontinuities, and hydrological conditions. Proposed alignment does not pass through landslides or erosion-prone areas. There is no such soil erosion and sedimentation status of the road alignment.

**Table 4.3 : Geological Features along the Road Alignment**

Chainage	Location VDC	Terrain slope	State of Land	Land Use Pattern	Geological Problem
0+000-0+300	Surunga	Plain	Dry	Built up area	No
0+300-10+400	Surunga	Plain	Dry	Cultivated land	No
10+400-11+600	Sharnamati	Plain	Dry	Cultivated land	No
11+600-11+700	Sharnamati	Plain	Dry	Built up area	No
11+700-16+300	Taganduwa	Plain	Dry	Cultivated land	No
16+300-16+400	Taganduwa	Plain	Dry	Built up area	No
16+400-20+200	Taganduwa	Plain	Dry	Cultivated land	No
20+200-20+500	Kumarkhod	Plain	Dry	Built up area	No
20+500-23+890	Kumarkhod	Plain	Dry	Cultivated land	No

Source: Field survey, November 2009

#### 4.1.7 Existing Road Condition

21. The road is black topped from chainage 0+246 up to 3+084 and remaining sections is graveled. The road is motorable in fair weather. Average width of the road is 6m.

#### 4.1.8 Air, Noise and Water Quality

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

### 4.2 Biological Environment

23. This alignment does not pass through any national park, protected area or their buffer zones.

#### 4.2.1 Vegetation

24. The dominant vegetations found along the road alignment on private lands are Sisso (*Dalbergia Sisso*), Mango (*Magnifera Indica*), Coconut (*Cocos nucifera*), Betelnut (*Areca catechu*), Bamboo (*Bambusa vulgaris*), Kadam (*Anthrocephalus chinensis*), and Peepal (*Ficus religiosa*).

#### Forest

25. The road does not pass through any type of forest.

#### 4.2.2 Wildlife

26. Wildlife like Common Mongoose (*Herpetes edwardsii*) and Jackal (*Canis aureus*) are found in Zol. Crow (*Corvus splendens*), Sparrow (*Passer domesticus*), Pigeon (*Columba livia*), Bakula, Parrot are the birds found in the Subproject area. The road does not fall under any protected area or their buffer zones.

#### 4.2.3 Aquatic Life

27. There are no river and water bodies along the road alignment.



#### 4.2.4 Endangered and protected species

28. Faunal species: Common Mongoose (*Herpetes edwardsii*) and Jackle (*Canis aureus*) is listed in CITES Appendix-III.

### 4.3 Socio-economic and Cultural Environment

#### 4.3.1 Population, Household and Ethnicity

29. The demographic profile of the concerned VDCs is presented in following Table 4.4. Major castes in the area are Rajbanshi, Madheshi, Chhetri, Brahman and Dalit.

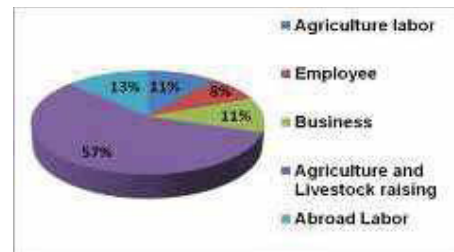
**Table 4.4: Demographic Profile of VDCs**

VDC	Population			HH	Average HH Size
	Male	Female	Total		
Surunga	2865	2771	5636	1078	5.22
Sharnamati	2104	2158	4262	778	5.47
Taganduwa	2514	2329	4843	903	5.36
Kumarkhod	956	822	1778	328	5.42
TOTAL	8439	8080	16519	3087	5.35

Source: Field Survey, November 2009

#### 4.3.2 Main Occupation

30. The main occupation of the area is agriculture & livestock (57%), business & commerce (11%), agriculture labour (11%), employee (8%).and household percentage working abroad as labor is 13%. Agriculture farming is not enough for subsistence due to small landholding size and low productivity. Therefore people also depend on seasonal labour in Nepal and India.



#### 4.3.3 Market Centres and Business Facilities

31. There are 486 shops (hotel and restaurant, tea shops, grocery shops, stationery, medicine, tailoring etc.) and 35 rice mills present within the Zol of the subproject area.

#### 4.3.4 Local Economy

32. The economy of the area is predominantly (57% of the population) agriculture-based. Rice is the main agricultural crop grown in this area. Local people are gradually attracted towards cultivation of cash crops such as Tea and off season vegetable. Dairy production and selling it to the local market has been also another source of income for local farmers. Cultivation of fruits and vegetables for commercial purpose aiming major market of Jhapa such as Surunga, Birtamode, Damak and Kakadvitta seems to be increasing. Local people also do business activities in Surunga, Sharnamati, Taganduba and Jhapa market area. Many people seasonally migrate to Kathmandu and India during off-agriculture season to earn money for their livelihood.

#### 4.3.5 Agriculture Pattern

33. Major crops grown in the Subproject area are rice, wheat, maize, potato and beans. Major cash crops grown in the area are mustard, vegetable, tea and fruits like coconut, mango and Betelnut.

#### 4.3.6 Livestock

34. Due to availability of good number of fodder trees and grazing land, the Subproject area has good potentiality of cow and buffalo farming for dairy, and goat farming for meat. People have kept buffalo and sell milk since 2030 B.S. Despite being potential, they were not encouraged to produce milk in commercial scale due to time consumption in transportation and difficult access. Currently, the existing road has facilitated selling of milk from all the Subproject VDCs. Milk collection centre are at Surunga, Sharnamati and Kumarkhod Bazar along the road.

#### 4.3.7 Industry



35. Some local people are engaged in weaving of bamboo products, making furniture, dairy production, Tea production, and tailoring. The area has high potentiality for agro-based industries. There are 35 nos. of rice/flour mill and 2 milk collection centers are available within Zol.

#### 4.3.8 Tourism Potential

36. The Subproject area has potentiality of eco-tourism development. Some lodges are in operation in in Surunga and Kumarkhod Bazaar area.

#### 4.3.9 Health and Sanitation

37. People use water from Tube well and Tap. Open defecation is also prevalent. Major health problems observed in the area are gastric, water borne diseases, gout, respiratory diseases, skin disease, malnutrition, and typhoid. Sanitation awareness among local people is increasing and many of them have toilets in their home, but there is no public sewerage system.

#### 4.3.10 Public Services and Infrastructures

**Table 4.5: Infrastructure Facilities in the Project Area**

Infrastructure Facilities	Details
Education	There are 18 primary schools, 2 lower secondary schools, 5 secondary schools and 1 higher secondary school are found in Zol. There is a higher secondary school in Surunga. Most of the families send their children to school. Female enrollment in schools is lower than that of male students. Literacy rate in the project area has been estimated around 65 percent.
Health	1 Public Health Post, 2 sub health posts and 1 health post exists in 4 VDCs
Communication	All of the settlements have telephone facilities mostly with CDMA connection. 4 post offices have been serving the local people
Electricity	All settlements in Zol are connected with national grid transmission line
Water Supply	Tube well and Piped drinking water supply is available to all settlements
Other Infrastructures	There is a Agricultural Service Sub-Centre, Veterinary Service sub-Center, Diary, Forest office, Security offices are also available in the project area
Financial Institutions	There are 10 nos. of saving and credit cooperatives in Zol of Surunga, Sharnamati, Taganduwa and Kumarkhod VDCs.

Source: Field Survey, November 2009

**Table 4.6: Public Services and Infrastructures along the Road Alignment**

Type of Public Service and Infrastructure	Chainage/ Location	Distance from the Road CL
Public Health Post	1+050	RoW
Kankai Higher Secondary School	1+065	RoW
Surunga VDC office	1+080	RoW
Nepal Banjiya Bank	2+890	RoW
Irrigation Crossing	5+744	Across the road
Primary School	11+500	RoW
Sharnamati VDC Office	11+535	RoW
Health post Sharnamati	11+535	RoW
Janta Higher secondary School Sharnamati	11+534	RoW
Police Office Sharnamati	11+540	RoW
Lower Secondary School Taganduwa	14+850	RoW
Dilliraj Secondary School Taganduwa	19+340	RoW
Taganduwa VDC Office	19+500	RoW
Sub Health post	19+500	RoW
Hulaki road	20+220	Crosses the road alignment
VDC Office Kumarkhod	20+300	RoW
Public Health Post	21+435	RoW

Source: Field Survey, November 2009

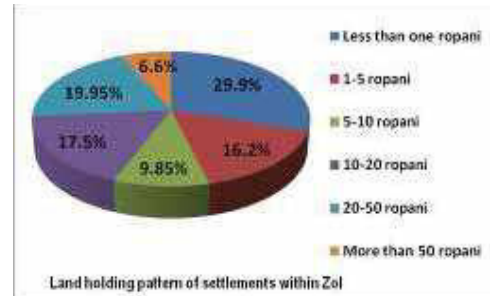
#### 4.3.11 Existing Traffic Situation

38. Five regular passenger buses daily ply on the road, whereas about 10 numbers of mini truck/pick-up and 850 motorcycles are found to operate in the road. Vehicles are mainly used for commuting and transportation of milk and vegetables.



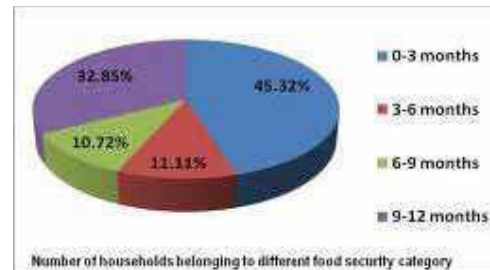
#### 4.3.12 Land Holding Pattern

39. Land holding pattern within the Zol of the road demonstrates that about 16% of households have 1-5 ropani (approximately 1 ha= 19.8 ropani) land while 10% households have 5-10 ropani, 18% households have 10-20 ropani, 20% households have 20-50 ropani, 7% households have more than 50 ropani and about 30 % households have less than one ropani land. Details of land holding pattern are given in Annex XI b.



#### 4.3.13 Food Security

40. About 45% households have food security only for upto 3 months while about 33% have food sufficient for 9-12 months, 11% have enough food for 3-6 months and other 11 % households have enough food 6-9 months. Food sufficiency condition is given in Annex XIc.



#### 4.3.14 Migration Pattern

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

#### 4.3.15 Settlement and Market

42. Major settlements within Zol are Surunga Bazaar, Tulsibari, Chapramari, Kirat Chowk, Sharnamati Bazaar, Virkuti Chowk, Phulgachhi Chowk, Swasthani Chowk, Kamatoli, Chatragachhi, Jhapa Bazaar and Lasuna Digalbank. Housing pattern of these settlements is mostly clustered type. Some of the houses in main markets have rented shops in the ground floor and are used as residential purposes for upper floors. This type of commercial cum residential buildings is seen in dense form at the Surunga and Jhapa market area. The agricultural land adjacent to the main roads of these areas has been turning into residential and commercial plots.

#### 4.3.16 Potential for Development

43. The potential of the Subproject area are as mentioned in Table 4.7 below.

**Table 4.7: Development Potentialities in Various Sectors**

SN	Sector	Development potentiality
1	Agriculture	Tea, potato, vegetable and fruit farming, Rice production, dairy production, within the whole Zol
2	Tourism Promotion	There are many places along the alignment in which the tourism activities can be enhanced such as in Surunga and Jhapa Bazar Settlements.
3	Small and Cottage Industry	Bamboo products, furniture, tea industry, dairy industry within the whole Zol
4	Trade and business	Development several rural market centres at various places along the road alignment and main market centres at Surunga, Sharnamati, Kamatoli, Jhapa bazaar and Digalbank.

Source: Field Survey, November 2009

#### 4.3.17 Religious, Cultural and Historical Sites

44. There are no significant sites of religious, cultural and historical importance in the Zol.



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## 5. PROJECT ALTERNATIVES

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

### 5.1 No Action Option

46. This alternative assesses the consequences if the Proposal is not implemented. The gravel road currently exists, which is operable in all weather. The road connects a remote and poverty ridden area with high potential in dairy, vegetable, fruit, tea productions. People have been selling the products to the markets of Surunga and Jhapa markets. However, travel time and cost is high due to not good condition of the existing road. Upgrading of the road will decrease the cost as well as provide better access facility with enhanced opportunity for development of the area without any additional significant adverse impacts. The no action option may avoid environmental impacts, but only at the cost of poverty and underdevelopment of the area. Development is must for attaining poverty reduction goal of the government, and access facility is the basic infrastructure that facilitates overall development. Thus, this option is not relevant for the Proposal.

### 5.2 Proposal Alternatives

47. Construction of other supporting roads could be the options for achieving the transportation and access.

48. Considering other project alternatives, the proposed road project can be the best option to serve the purpose of efficient transportation requirement as well as this road links with east west National Highway and it will be alternative route of Britamod Rajghad road to reach rajghad

### 5.3 Alternative Alignment

49. The alignment of the road is an existing motorable and fair weather with 6m width. Since this is an existing road, the proposed rehabilitation measures do not need to acquire additional land and clearing of trees. Hence, new alternative alignment is not feasible and the proposed existing alignment can be the best option.

### 5.4 Alternative Design and Construction Approach

50. 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

51. During the rainy season, the construction work will be stopped. Rehabilitation and construction work will be carried out during the remaining months. The construction period is more appropriate from October to June due to dry weather, and then the people are generally free from farming activities.

### 5.6 Alternative Resources

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



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## 6. IDENTIFICATION OF IMPACTS AND MITIGATION MEASURES

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53. The identification and assessment of impacts has been carried out by considering the proposed proposal activities examined in terms of its current condition and likely impacts during construction and subsequent operation phases. The impacts have been predicted in terms of their nature, magnitude, extent and duration. The possible impacts (positive and negative) in construction and operation phases are presented in the following sub-sections. Beneficial impacts maximization and adverse impacts mitigation measures are also suggested hereunder (see Table 7.2 in Chapter 7).

### 6.1 Beneficial Impacts and Benefit Augmentation Measures

#### 6.1.1 Construction Stage

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

54 *Impacts:* Employment opportunity for local people during construction of the road, without gender biasness, is 10338 person days, with 1824 for skilled and 8514 for unskilled labor. Efforts will be made to employ more than 40% women workers. The amount of money earned as wages will directly support various economic activities of the people, and assist to empower women and indigenous people. It will assist towards enterprise development with multiplier effect if wage is used for economic investments. This is one of the direct and significant impacts of the project but it is of short-term and local in nature.

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

##### *Skill Enhancement*

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

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

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

58 *Impacts:* During construction period, different types of commercial activities like daily commodities will come into operation in order to meet the demand of workers. Since they will have good purchasing power, they will regularly demand for different types of food, beverage and other daily necessary items. Local shops and restaurants will be opened to meet these demands around the vicinity of the construction sites. Development of several rural market centres at Surunga, Jhapa Bazar, Sharnamati, Kamatoli and Digalbank. This impact is direct, low significance, local and short term.

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

##### *Community Empowerment and Ownership*

60 *Impacts:* During construction various road construction coordination committees and road building groups will be constituted in order to facilitate in implementation of the road. In this process, they will be oriented and trained to build and safeguard community infrastructures which will result in community empowerment and feeling of ownership. This impact is indirect, low, local and short term.

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

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

62 *Impacts:* Women and indigenous people in particular may be benefited more from improved access to the market centers and various service providing agencies like health centers, banks, training



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

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

#### **6.1.2 Operation Stage**

##### ***Improvement in Accessibility and Saving of Time and Transportation Cost***

64 *Impacts:* Upgrading of road will enhance the access of people to social services, and quick transportation of goods. Once the road project is completed, the people living within the road corridor will have easy access to cities and markets. It will save more than 50% of travel time and transportation cost too. This impact is direct, high, regional and long term.

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

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

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

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

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

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

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

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

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

71 *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**

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

##### **6.3.1.1 Physical Impacts**

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

73 *Impacts:* The widening/upgrading works of road formation and side drain construction will be in existing RoW, therefore will not require additional land. The major component of the project is the earth filling necessary for road width widening and borrow pits for earth and gravel. The extraction of earth from nearby areas will cause depression in the ground surface will result in water logging problems and soil erosion. Therefore, the impact on loss of agricultural land will be direct, low, short term and site specific.



74 *Measures:* Site selected for borrow pits must be lands where the effect will be temporary and generally involve lower value land and the sites shall be rehabilitated soon after use or compensation will be given in private land.

#### **Slope Instability**

75 *Impacts:* Removal of vegetation and open cuts with exposed soil to rain may cause soil erosion. The road lies in terai so no any landslide will be occur. Major instability embankment areas along the road alignment are at Ch 5+977, 6+220, 6+855, 7+100, 8+403, 8+780, 13+720, Ch 13+860. The likely impact is indirect, low, site specific and short term depending on cases.

76 *Measures:* The mitigation measures will be re-vegetation of exposed areas; adoption of bio-engineering techniques (Grass plantation, Brush layering, and Bamboo/tree plantation); no construction work during rainy season; and use of soft engineering structures (dry wall, check dams) before disposing spoil. Recommended civil engineering structures and bioengineering measures necessary at various chainages for slope stabilization have been given in Annex XII (Detail Structure).

#### **Spoil Disposal**

77 *Impacts:* Unmanaged disposal of spoil may cause gulying and erosion, block drainages, damage farm lands, crops, waterloggings. The impact from spoil disposal will be direct, medium, site specific and short term in nature.

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

**Table 6.1: Potential Spoil Disposal Sites**

S. No	Chainage	Location	Remarks
1	8+900	Baluwathan	Biring river area

*Source: Field survey, November 2009*

#### **Quarry/ Borrow Operation**

79 *Impacts:* Disturbance in river regime, disturbance in natural drainage patterns, water logging and water pollution. The likely impact will be direct, medium in magnitude, site specific in extent and short term in duration.

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

**Table 6.2: Recommended Quarry Sites**

SN	Chainages	Places of recommended quarry sites
1.	5+800	Stone and sand quarry from Biring river which is 1km far from the road alignment.
2.	19+600	Sand from after shiv temple chowk area.

*Source: Field Survey, November 2009*

#### **Air, Noise and Water Pollution**

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

82 The project area at present does not experience higher levels of noise pollution. However, during construction, the increased construction activities may increase the noise level to some extent. The impact of road construction on the noise level will be direct, low, site specific, reversible and short term.



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

84 *Measures:* The mitigation measures will include use of face mask by the workers working in the areas of high dust generation; contractor will frequently sprinkle water during surfacing of the road; avoid disposal of excavated materials in the waterbodies; cover dry material or make it wet during transportation. Plantation of 4800 no. of trees (Mango and Kadam), which will act as sound and noise barrier.

#### ***Water Management***

85 *Impacts:* Water from the roadside drain outlets may cause erosion and landslide affecting the stability of the road. Irrigation crossing at 5+744 may get blocked due to road construction. Natural drainage may get blocked due to construction of road. The impact will be indirect, medium, site specific and medium term.

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

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

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

88 *Measures:* The mitigation measures will be use of local labors to avoid camp; rent local house instead of camp to keep labors; siting camp away from productive lands areas; pay compensation for using private farm or lands for storage or camp; fuel and chemical storage areas will be on paved surface with surrounding catch drain to protect soil from leakage. Appropriate camp sites have been observed at 3+400 near Tappu chowk and 20+300 near Jhapa Bazar.

#### ***Crusher Plants***

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

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

#### ***Use of Bitumen***

91 *Impacts:* Bitumen is required for black topping which needs heating before using. Contractors tend to use local fuel wood collected from nearby forest to heat bitumen. Spillage of bitumen also damage soil productivity.

92 *Measures:* The following mitigation measures will be adopted

- Use kerosene for heating and strict prohibition to heat bitumen by using fuelwood.
- Appropriate storage of material.
- Use of appropriate safety gears to ensure safe health of workers such as masks, boot, gloves, hat.

#### ***Construction equipment vehicles***

93 *Impacts:* The Machine Intensive Road Construction Approach will use machineries and tools (Rollers, tippers, spreader, water tanker etc.). The related negative impacts are increase in air pollution due to emission of smoke, increase in vibration due to vehicular movement. Impact will be direct, high significance, site specific and short-term.



94 *Measures:* The 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. Fencing for the equipments camp.

### 6.3.1.2 Biological Impacts

#### *Impact on Wildlife Due To Loss of Habitat and Hunting*

95 *Impacts and Measures:* The proposed area is not a significant habitat of wildlife and bird species. Hence there will be no impact on the wildlife.

### 6.3.1.3 Socio-economic Impacts

#### *Loss or Degradation of Farm Land and Productivity*

96 *Impacts:* The widening/upgrading works of road formation and side drain construction will be in existing ROW, therefore will not require additional land and there is also not dismantle private and community properties. But Dust settling on crop and vegetation will affect production. This impact is expected to be of low in magnitude, local in extent and short term in duration

97 *Measures:* Plant trees along both sides of the road to act as dust and noise barrier. Tree planted along RoW will protect settlement and crops from dust.

#### *Impact on Community Infrastructure*

98 *Impacts and Measures:* During construction, the increased construction activities may increase the noise level to some extent and affect the community structure. The impact of road construction on the noise level will be direct, low, site specific, reversible and short term.

**Table 6.3: Impact on Community Infrastructure and Mitigation Measures**

Infrastructure	Location	Distance from the Road CL	Mitigation Measure
Public Health Post	1+050	RoW	Information signboard will be placed (Such as Health post, Speed limit), Restriction on use of horns. Two rows roadside tree plantation.
Kankai Higher Secondary School	1+065	RoW	Information signboard will be placed (Such as School area, Speed limit), Restriction on use of horns. Two rows roadside tree plantation.
Surunga VDC office	1+080	RoW	Information signboards, Restriction on use of horns. Two rows roadside tree plantation.
Slab culvert (Irrigation Canal)	5+744	Crossing the road	May damaged during road construction, required to reinstate. Removal of spoil material from irrigation canal.
Primary School	11+500	RoW	Information signboard will be placed (Such as School area, Speed limit), Restriction on use of horns. Two rows roadside tree plantation.
Sharnamati VDC Office	11+535	RoW	Information signboards, Restriction on use of horns. Two rows roadside tree plantation.
Health post Sharnamati	11+535	RoW	Information signboard will be placed (Such as Health post, Speed limit), Restriction on use of horns. Two rows roadside tree plantation.
Janta Higher secondary School Sharnamati	11+534	RoW	Information signboard will be placed (Such as School area, Speed limit), Restriction on use of horns. Two rows roadside tree plantation.
Police Office Sharnamati	11+540	RoW	Information signboards, Restriction on use of horns. Two rows roadside tree plantation.
lower Secondary School Taganduwa	14+850	RoW	Information signboard will be placed (Such as School area, Speed limit), Restriction on use of horns. Two rows roadside tree plantation.
Dilliraj Secondary School Taganduwa	19+340	RoW	Information signboard will be placed (Such as School area, Speed limit), Restriction on use of horns. Two rows roadside tree plantation.
Taganduwa VDC Office	19+500	RoW	Information signboards, Restriction on use of horns. Two rows roadside tree plantation.
Sub Health post	19+500	RoW	Information signboard will be placed (Such as Health post, Speed limit), Restriction on use of horns. Two rows roadside tree plantation.
Hulaki road	20+220	RoW	Information signboards.
VDC Office Kumarkhod	20+300	RoW	Information signboards, Restriction on use of horns. Two rows roadside tree plantation.
Public Health Cente	21+435	RoW	Information signboard will be placed (Such as Health post, Speed limit), Restriction on use of horns. Two rows roadside tree plantation.

Source: Field Survey, November 2009



### ***Health and Safety Matters***

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

100 *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***

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

102 *Measures:* Discourage indiscriminate dumping of spoil material; quarry sites will be properly closed to suit the local landscape and cover by plantation of trees (Mango and Kadam).

### ***Impacts on Cultural, Religious and Archeological Sites***

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

## **6.3.2 Operation Stage**

### **6.3.2.1 Physical Environment**

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

104 *Impacts:* Quarrying stones or soil, irrigated cultivation, opening of branch roads, poor maintenance of road, and blockage of drains can lead to embankment erosion. Sensitive areas for possible soil erosion and instability problems Ch 5+977, 6+220, 6+855, 7+100, 8+403, 8+780, 13+720, Ch 13+860. The impact will be direct, medium local and long term nature.

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

#### ***Impact Due to Air, Noise and Water Pollution***

106 *Impacts:* Dust will be generated from the gravel road and vehicles emit gaseous pollutants. Continued dust pollution may cause adverse health impact to the people living in the vicinity. As the road is of district road category and the vehicular movement is not expected to be very high. Thus, the impact will be direct, low, local and long term.

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

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

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

### **6.3.2.2 Biological Environment**

#### ***Disturbance to the Wildlife and Bird***

110 *Impacts:* There are no significant habitats of wildlife in the ZoI. Although illegal hunting of birds might occur.

111 *Measures:* Community and authorities will remain vigilant and alert on illegal felling of timber and killing of birds.



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

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

112 *Impacts:* Expansion of settlement area and market can be observed at Surunga, Sharnamati, Taganduwa, Jhapa Bazar. Encroachment of RoW may take place. This will reduce road capacity, increase road accidents, and adversely impact road. The impact will be direct, medium, local and long term.

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

#### ***Change in Social Behavior***

114 *Impacts:* 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.

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

#### ***Road Safety Measures***

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

117 *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.



## 7. ENVIRONMENTAL MANAGEMENT PLAN

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

### 7.1 Institutions and Their Roles

**Table 7.1: Concerned Institutions and Their Roles**

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

119 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 Zol. They carryout the manual construction works. Contractor will be appointed for works requiring higher skill and mechanized support.



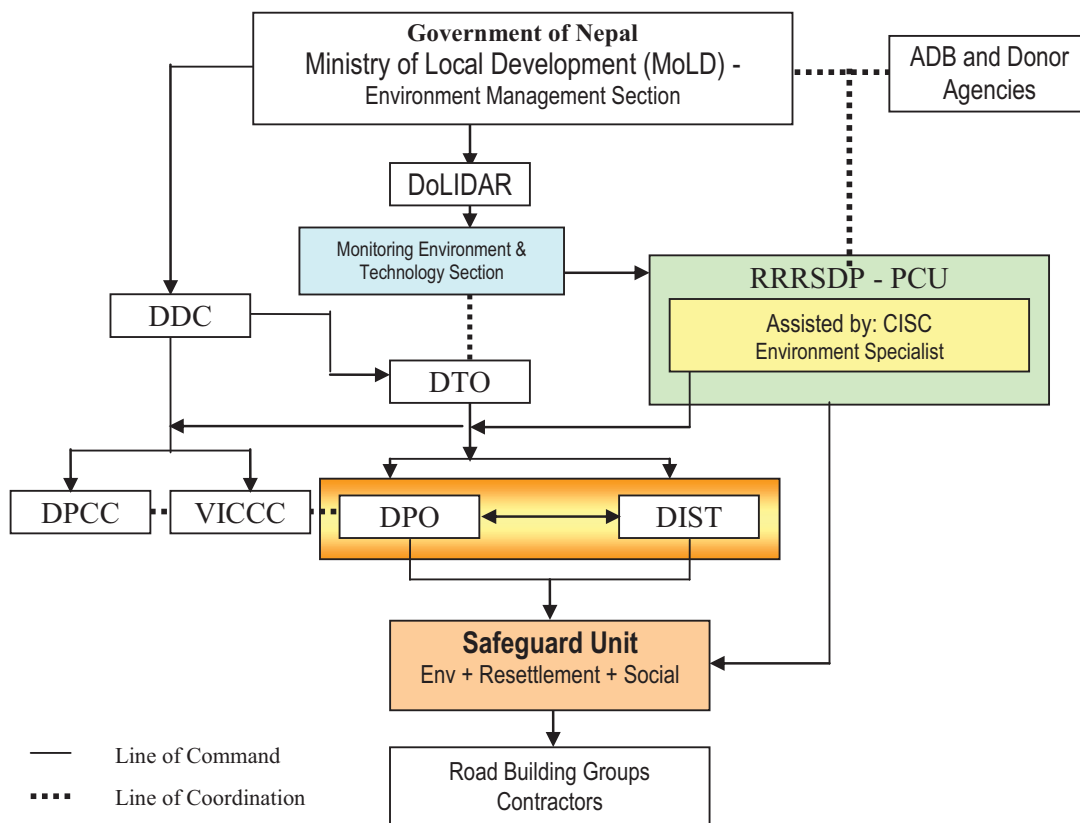
## 7.2 Reporting

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

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

122 The trimester environment monitoring report will be submitted for the first year of operation of the road by the Proponent (DDC/DTO) to Executing Agency (PCU/DoLIDAR), who will forward the report to ADB and MoLD. 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

123 The DDC/DTO with support of DPO/DIST at local level and PCU/CISC at central level will be responsible for conducting careful and routine monitoring of EMP compliance. Overall implementation of the EMP will be the responsibility of the Proponent. Framework for implementing environmental management plan is shown in Table 7.2.



**Table 7.2: 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. Employment generation of Skilled-1824 nos, unskilled 8514	D	H	L	ST	Maximize manual work through local, poor, vulnerable and women. Training in income generation and skill enhancement.	DDC/DTO/ DIST	DPCC / VICCC / CISC/PCU
On the job training to local labour	Skill Enhancement	Increase in income generating activities, employment opportunities	IN	M	L	LT	Priority to Affected Peoples (APs) and vulnerable groups, job training on various constructions works.	DPO/DIST	DDC/DTO / CISC/PCU
Construction of road	Enterprise Development and Business Promotion	Enhancement in local economy	D	M	L	ST	Training in cooperatives, and promote use of local products by the construction crews.	Contractor/ RGB	DIST/ CISC/PCU
Construction coordination committee and RBG program	Community Empowerment and Ownership	Increase in income and ownership.	IN	L	L	ST	Coordination committees will be constituted and training will be given to them.	DPO/DIST	DDC/DTO / CISC/PCU
Operation of Road	Women and Indigenous People Enhancement	Poor, indigenous and women will have easy and frequent access to social services (education, health, community development, bank,training, CBOs and networking)	IN	H	L	LT	Assist to organize women's groups, provide training in enterprise development, organize cooperatives, provide micro-financing to undertake production of commercial products, provide market services.	VDC / DDC	VDC / DDC
Operation Stage									
Operation of Road	Improvement in Accessibility and Saving of Time and Transportation Cost	Saving in travel time and travel cost	D	H	R	LT	Proper maintenance (regular, emergency) , continuation of bioengineering	DTO/DDC	DoLIDAR
Operation of Road	Increase in Trade, Commerce and Development of Market centers	Shifts towards improved commercial agriculture and increase in non-agricultural occupation	IN	H	L	LT	Manage planned growth with required infrastructure facilities in the market areas. Agriculture extension services, market linkages and networking for better market price.	DPO	DDC/VDC
Operation of Road	Appreciation of Land Value	Improvement in local economic condition	IN	M	L	LT	Promotion of land development activities and control of encroachment within RoW. Awareness program shall be organized on use of high value land to get bank loans for setting up enterprise ventures.	DDC/DPO	DDC/VDC
Operation of Road	Enhancement of Community Development Services	Ease of access to social service and raise in quality service	IN	H	R	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		Executing Agency	Supporting Agency
Construction Stage										
Physical Environment										
Construction of Road, site clearance	Change in land use	The extraction of earth from nearby areas will cause depression in the ground surface will result in water logging problems and soil erosion	D	L	SS	ST	IR	Site selected for borrow pits must be lands where the effect will be temporary and generally involve lower value land and the sites shall be rehabilitated soon after use.	DDC/DTO	DIST
Construction of Road, earth excavation	Spoil Disposal	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 is 8+900	DDC/DTO	DIST/VICCC/ VDC
Site clearance, excavation	Slope Instability	Erosion and instability areas of concern are at Ch Ch 5+977, 6+220, 6+855, 7+100, 8+403, 8+780, 13+720, Ch 13+860	IN	L	SS	ST	Re	Civil structures with bio-engineering application (Such as Grass plantation, Tree/Shrub plantation, Brush layering, Palisades, Bamboo plantation, Live checkdam construction etc.) shall be used to stabilize the slopes. Drainage management (Catch drain, rip-rap drain, checkdam etc.)	DDC/DTO	DIST
Construction of Road	Water Management, generation of large volume of surface runoff	Erosion, landslide, damage to farmland	IN	M	SS	MT	Re	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 works, operation of construction vehicles, material hauling and unloading etc. Earthwork, spoil and waste disposal.	Air pollution due to dust from exposed surface, from construction equipments and vehicles	Affect on local people and workers health and affect on agriculture.	D	L	L	ST	Re	Use of face mask while working on dust prone areas, covering of dust sources	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, settlement, forest areas. Locate crusher plant away from these areas; cover material during transportation.	DDC/DTO / Contractor	DIST
	Water pollution due to sediment level, spills and leakage of oils and chemicals to water bodies	Risk of water borne diseases	D	L	L	ST	Re	Proper spoil management, and prevention of leakage and spills of construction chemicals, restriction in urination and defecation in open areas	DDC/DTO/ Contractor/R BGs	DIST/VICCC
Cutting of slopes	Quarry/borrow operation and its potential effect on instability, landslide	Change in river regime, instability, land slide; damage to farmland and property; water pollution	D	M	SS	ST	Re	Proper selection and management of quarry sites, rehabilitation of quarry/borrow sites after completion of work. Recommended quarry sites are 5+800, 19+600	DDC/DTO/ Contractor/R BGs	PCU/CISC/DIST/ VICCC
Construction of road	Location of Camp Sites, Storage Depots	Encroachment of agriculture land, solid waste,and waste water may cause pollution	D	M	SS	ST	Re	Locate camp site away from productive land (potential sites at 3+400, 20+300, use local labor and local houses as camp; pay compensation to land owner of camp area; proper storage of chemical and materials.	DPO assisted by DIST/ Contractor	DIST/VICCC



Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact *)					Mitigation Measures	Responsibility for Mitigation Measure	
			Nat	Mag	Ext	Dur	Rev		Executing Agency	Supporting Agency
Operation of heavy equipments	Crusher Plants	Dust and Noise pollution and health risks to workers	D	H	SS	ST	Re	Locate site away from farm and forest area; away from settlement and sensitive habitat; do not operate at night; water sprinkling facility to reduce dust.	DPO assisted by DIST/ Contractor	DIST/CISC/PCU
Construction of road	Use of Bitumen	Damage in soil productivity, air pollution due to heating of bitumen	D	M	L	ST	IR	Use kerosene for heating and strict prohibition on firewood uses, safety gears to workers (Such as gloves, boots, masks etc), appropriate storage of materials	DPO assisted by DIST/ Contractor	DIST/CISC/PCU
Operation of construction equipments	Construction machineries and tools (Rollers, tippers, spreader, water tanker etc.)	Air pollution due to emission of smoke, increase in vibration and noise pollution	D	H	SS	ST	Re	Equipment/vehicles deployed for construction activities shall be regularly maintained. All the vehicles deployed for material movement shall be spill proof to the extent possible.	DPO assisted by DIST/ Contractor	DIST/CISC/PCU
<b>Biological Environment</b>										
Construction activity	Impact on Wildlife Due To Loss of Habitat and Hunting	Killing and harrasing of wildlife; Loss of biodiversity and valuable species of wildlife	IN	L	L	ST	Re	Work only in day time, do not disturb wildlife, aware workers	DDC/DTO/D FO	DFO/CFUGs/DIST
<b>Social-economic Environment</b>										
Acquisition of land for maintaining road width*	Loss or Degradation of Farm Land and Productivity	Dust settling on crop and vegetation will affect production	D	L	L	ST	IR	Plantation of 4800 no. of trees( Mango and Kadam ) along both sides of the road to act as dust and noise barrier. Tree planted along RoW will protect settlement and crops from dust.	DDC/DTO	CFC <sup>2</sup> DIST/VICCC
Construction of road	Impact on Community Infrastructure (see table 6.3)	Air pollution and Noise pollution during the construction of road. Irrigation canal at Ch. 5+744 may get blockaged due to disposal of spoil materials and construction activities.	D	L	SS	ST	Re	Information signboard will be placed (Such as Health post, School Area, Speed limit), Use of horns should be restricted. Removal of spoil and construction materials from irrigation canal.	DDC/DTO	PCU DIST/CISC/VICCC/DC
Occupational health and safety aspects	Health and safety matters	Injury, fatal accidents, outbreak of epidemics and diseases, decline in capacity to work	D	H	L	ST	IR	Occupational health and safety regulations, first aid facility at sites with health treatment arrangements, contingency planning; Proper drinking water and toilet facility for construction crew	DDC/DTO / Contractors	DIST/CISC

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

<sup>2</sup> The Land Acquisition Guidelines, 1991 specify the establishment of an Acquisition and Rehabilitation Committee (also known as Compensation Fixation Committee, “CFC”) for fixing the rate of compensation of private properties to be acquired, consisting of the concerned Chief District Officer (Chair), Land Revenue Officer, representative of the DDC and the Project Manager and others as deemed necessary.



Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact *)					Mitigation Measures	Responsibility for Mitigation Measure	
			Nat	Mag	Ext	Dur	Rev		Executing Agency	Supporting Agency
Construction of Road	Decrease in aesthetic value	Disturbances in working areas and scar on topography	D	L	L	ST	RE	Cover the road alignment by planting tree on both sides; manage working areas.	DPO in assistance by DIST / Contractors	PCU / CISC / Users Committee / VDC
<b>Operation Stage</b>										
<b>Physical Environment</b>										
Quarrying, operation of construction equipments	Road Slope Instability	Embankment erosion, Disturbance to traffic flow, pollution of water bodies, impacts on agriculture land, loss of vegetation.	D	M	L	LT	Re	Regular maintenance of slope protection structures, Selection of healthy upland farming techniques	DDC/DTO/VDC	DoLIDAR , DFO, District Watershed and Soil Conservation Office (DWSSC)
Operation of vehicles, Inadequate drainage	Air, Noise and Water Pollution	Disturbance to students, patients, wildlife, effect to nearby agriculture land and crops	D	L	L	LT	Re	Speed limit for vehicles, no horn signs, use vegetation barrier; Regular maintenance of drainage.	DDC/DTO	DoLIDAR/Local administration
<b>Biological Environment</b>										
Road operation	Disturbance to the Wildlife and Illegal Hunting	There are no significant habitats of wildlife in the ZoI. Although illegal hunting of birds might occur.	IN	L	L	LT	IR	Community and authorities will remain vigilant and alert on illegal felling of timber and killing of birds.	DTO/CFUGs	DDC/CDO / DFO
<b>Social-economic Environment</b>										
Easy Access by road operation	New Settlement and Market Center Development	Encroachment of Row, increased accidents, delay in traffic movement, depletion of local resources, water pollution	D	M	L	LT	IR	Awareness program, enforcement of law, planning of land development, plantation of trees.	DDC/DTO	CDO / VICCC
Operation of Road	Change in Social behavior	Social and cultural conflicts	IN	M	L	LT	IR	Awareness, Enforcement of law and order, Provision of training for skill	DTO	DDC/DoLIDAR
Operation of Road	Road Accidents	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

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

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

SN.	Environmental Protection Measures	Estimated Budget (NRs.)	Remarks
<b>1. Benefits Augmentation Measures</b>			
1.1	Training to DC/DTO/DPO/DIST to conduct environmental monitoring and reporting	50,000.00	To be included in project cost
1.2	Training to Leader of RBGs	200,000.00	To be included in project cost
1.3	Enhancement in Technical Skills (Bio-engineering)	200,000.00	To be included in project cost
	<b>Sub-Total (1)</b>	<b>450,000.00</b>	
<b>2. Adverse Impacts Mitigation Measures</b>			
2.1	Bio-engineering work (tree plantation)	15,30,000.00	To be included in BoQ
2.2	RBG Insurance	4,00,000.00	To be included in project cost
2.3	Information Signboard (6 nos)	50,000.00	To be included in BoQ
2.4	Compensation for properties	-	Resettlement cost is not required.
2.5	Restoration or relocation of affected infrastructures, spoils disposal site management and rehabilitation, reinstate of quarry etc.	5,00,000.00	To be included in BoQ
2.7	Social cost (Health / HIV AIDS / STD prevention awareness; other awareness program such as adult literacy; support to local school etc.)	2,00,000.00	To be included in Social plan, project cost
2.8	Social Cost (Occupational health and safety; First aid boxes, campsite sanitation (Pit latrine); solid waste management, Safety measures for workers (Helmets, gloves, masks, boots, etc.)	5,00,000.00	To be included in Project cost
	<b>Sub-Total (2)</b>	<b>31,80,000.00</b>	
	<b>Total</b>	<b>36,30,000.00</b>	

## 7.5 Implementation of Mitigation Measures

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

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



## 7.6 Environmental Monitoring

### 7.6.1 Monitoring Responsibility

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

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

129 The Safeguard Unit at Subproject level shall submit monthly monitoring report to the PCU, who will forward a copy to ADB, NRM. Total cost of environmental monitoring (field visits, observation, review of reports and report preparation), excluding the cost of personnel, is estimated at NRs.200,000.00 as given in Table 7.5.

**Table 7.5: Environmental Monitoring Cost**

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

130 Thus, total environmental monitoring and management cost is NRs.38,30,000.00.

### 7.6.2 Types of Monitoring and Monitoring Parameters

131 There will be basically two types of monitoring:

- Compliance Monitoring – that verifies whether the EMP provisions are properly implemented in the field. The framework for compliance monitoring is given in the Table 7.6.
- Impact Monitoring - that confirms the result of implementing mitigation measures. The framework for impact monitoring is given in the Table 7.7.



**Table 7.6: Compliance Monitoring for Surunga-Sharnamati-Taganduwa-Digalbank Road Construction Works**

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



Parameters/Issues	Responsible Implementing Agency	Verifiable Indicators	Verification Methods	Schedule	Responsible Monitoring Agency
labourers		works; employment generation skill	participants	during construction	center (DTO)
Compliance to occupational health and safety matters	DPO / DIST; Contractor (if involved)	Health and safety regulations, first aid and medical arrangements, contingency plan, number and type of safety equipments such as mask, helmet, glove, safety belt.	Spot checks at work sites, accident records, safety equipment at site; discussion with workers	throughout construction stage	DPO / DIST at district and PCU/CISC at center
Restoration, rehabilitation, reconstruction of all infrastructure services disrupted or damaged during the construction work	Contractor / RBG / DIST	Continued services by the facilities and functional public life	Site observation; Public Consultation Meetings	Once in 15 days during construction	DPO / DIST at district and PCU/CISC at center
Clean up and reinstatement of the construction sites (camps, quarries, borrow pits)	Contractor	Decommissioned sites indicate no adverse/residual environmental impacts, and are rehabilitated to the satisfaction of the supervisor and land owners	Site observation; Comparing photos; Consultation with land owners	At end of construction period	DPO / DIST at district and PCU/CISC at center



**Table 7.7: Impact / Effect Monitoring for Surunga-Sharnamati-Taganduwa-Digalbank Road Construction Works**

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



## **8. CONCLUSION AND RECOMMENDATION**

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### **8.1 Conclusion**

132 The IEE study of the proposed Surunga-Sharnamati-Taganduwa-Digalbank road Subproject does not pass through any environmentally sensitive area, and have minimal adverse impact associated with loss of agricultural land. Most of the adverse impacts predicted are of low significance and short term as well as reversible. The rehabilitated road will provide better access to market and social services, and is expected to enhance productivity and improving quality of life of the people. Local people will get direct employment opportunity as workers during construction works, which will contribute in improving their income. The beneficial impacts from the implementation of the proposed road are more significant and long term in nature against the adverse impacts most of which could be avoided or minimized or compensated.

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

### **8.2 Recommendation**

134 The Subproject does not require acquisition of any private properties, public infrastructures or agricultural land. There are no forest areas along the road alignment and not any government/private trees need to be cut down during road construction.

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



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## ANNEXES



## Annex I :Terms of Reference



नेपाल सरकार  
स्थानीय विकास मन्त्रालय  
जिल्ला विकास समितिको कार्यालय  
जिल्ला प्राविधिक कार्यालय  
ग्रामीण पुनर्निर्माण तथा पुनर्स्थापना आयोजना  
जिल्ला आयोजना कार्यालय  
भद्रपुर, झापा

०२३-४५६२७३

पत्र संख्या :- ०६६/६७

चलानी नं. :- १६

मिति :- २०६६/०५/३०

विषय :- TOR पठाइएको सम्बन्धमा ।

श्री ग्रामीण पुनर्निर्माण तथा पुनर्स्थापना आयोजना  
आयोजना समन्वय ईकाइ  
जावलाखेल, ललितपुर

उपरोक्त सम्बन्धमा ग्रामीण पुनर्निर्माण तथा पुनर्स्थापना आयोजना (Rural Reconstruction and Rehabilitation Sector Development Program) अन्तर्गत यस जिल्लामा छनोट भएका तपसिलमा उल्लेख गरीएवमोजिका ग्रामीण सडकहरुको प्रारम्भिक वातावरणीय परिक्षण (IEE) गर्नको लागि तयार गरिएको Term of Reference (TOR) यसै पत्र साथ स्वीकृतिको लागि पठाईएको व्यहोरा अनुरोध छ ।

तपसिल

१. सुरङ्गा-शर्णामती-टाघनडुब्बा-डिगल वैक सडक ।
२. साधुटार-मदनपुर-लक्ष्मीपुर-घेरावारी सडक ।
३. दुधे-शिवगञ्ज-महाभारा-कुञ्जिवारी-कोरोवारी-वीरपुर-वगाह चौधरी सडक ।

शम्भु कोर्की  
आयोजना प्रमुख



# Letter of Approval from MLD and Detail TOR for IEE



नेपाल सरकार  
स्थानीय विकास मन्त्रालय  
स्थानीय पूर्वाधार विकास तथा कृषि सडक विभाग (डोलीडार)  
**ग्रामीण पुनर्निर्माण तथा पुनस्थापना आयोजना**  
**आयोजना सम्बन्ध इकाई**

एकान्तकुना, जाउलाखेल  
ललितपुर

च.नं. ४०८

मिति: २०६६।६।२८

विषय: प्रारम्भिक वातावरणीय परीक्षण (IEE) को स्वीकृत कार्यसूची (ToR) पठाईएको बारे ।

श्री जिल्ला प्राविधिक कार्यालय  
ग्रामीण पुनर्निर्माण तथा पुनस्थापना आयोजना  
जिल्ला आयोजना कार्यालय  
भापा ।

उपयुक्त सम्बन्धमा त्यस जिल्लामा निर्माण हुने दुधे-शिवराज-महाभारा-कुन्जिवारी-कोरोवारी-थोरपुर-दगाहा चौधरी सडक, सुरुङ्गा-शर्पामति-टाघतडुक्का-डीगल वैक सडक तथा साधुटार-मदनपुर-लक्ष्मीपुर-घेरावारी सडकहरूको प्रारम्भिक वातावरणीय परीक्षण (IEE) को कार्यसूची (ToR) नेपाल सरकार (सचिवस्तर) को मिति २०६६।६।२२ को निर्णय अनुसार स्वीकृत भएकोले स्वीकृत ToR हरूको कपी (१, १ खान) यसैसाथ संलग्न गरी सो अनुसार आवश्यक कारवाहीको लागि अनुरोध छ ।

*Singh*

ई. जगन्नाथ तिवारी।

वातावरण इन्जिनियर तथा तालिम संयोजक

बोधार्थ:

श्री जिल्ला विकास समितिको कार्यालय, भापा ।

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फोन : ५५३६६९०, ५५३७०७४, ५५३६६९१, ५५३५१७३ (आयोजना संयोजक)

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**Terms of Reference (ToR)**  
for  
Initial Environmental Examination (IEE)  
of  
**Surunga-Saranamati-Taganduba-  
Digalbank**  
**Road Sub-Project**

Submitted to:  
**Ministry of Local Development,  
Government of Nepal**

Proponent:  
**District Development Committee (DDC)/  
District Technical Office (DTO)**

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September 2009



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## ABBREVIATIONS

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ADB	Asian Development Bank
Ch	Chainage
CF	Community Forest
CISC	Central Implementation Support Consultants
CITES	Convention on International Trade in Endangered Species of Flora and Fauna
DDC	District Development Committee
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
DTO	District Technical Office
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management Section
EPA	Environmental Protection Act
EPR	Environmental Protection Rules
FGD	Focus Group Discussion
GoN	Government of Nepal
IEE	Initial Environmental Examination
IUCN	The World Conservation Union
Km	Kilometer
LEP	Labour based, environment friendly and participatory
MLD	Ministry of Local Development
NGO	Non-Governmental Organization
PAM	Project Administrative Memorandum
PCU	Project Coordination Unit
REA	Rapid Environmental Checklist
RRRSDP	Rural Reconstruction and Rehabilitation Sector Development Project
SF	Social Funding
SDC	Swiss Agency for Development and Cooperation
SDS	Social Development Specialist
SM	Social Mobilizer
TA	Technical Assistance
ToR	Terms of Reference
VDC	Village Development Committee'
ZoI	Zone of Influence