Environmental Assessment Document

Initial Environmental Examination

Grant Number: 0093 NEP

November 2010

Nepal: Rural Reconstruction and Rehabilitation Sector Development Program

Sulichour-Badachour Namja-Sirp-Pang Road Subproject, Rolpa District

Prepared by the Government of Nepal

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

Draft Report of Initial Environmental Examination (IEE)

Of

Sulichour-Badachour Namja-Sirp-Pang Road Sub project

Submitted to:
Ministry of Local Development
Government of Nepal

Proponent:
District Development Committee
District Technical Office
Liwang, Rolpa

Nov, 2010

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ABBREVIATIONS

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

NAME AND ADDRESS OF THE PROPONENT

Name of Proposal

Extra widening of Sulichour-Badachour Namja-Sirp-Pang Road Sub project
Rolpa District, Nepal

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EXECUTIVE SUMMARY

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 20.2 km long Sulichour-Badachour-Namja-Sirp-Pang Rural Road in Rolpa District is one of the Subprojects selected under the RRRSDP. It is an alignment proposed for reconstruction.

Project Proponent

The 'Proponent' of the proposed Subproject (Proposal) is District Development Committee (DDC)/District Technical Office, Rolpa. 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 a remote rural area of Rolpa district with the district headquarters. It will provide easier access to people to social services, and market access for local products like vegetables, milk and bamboo products. As a result, the Subproject will assist to promote economic activities, reduce poverty and increase socio-economic conditions of the people of the area.

Study Methodology
The IEE study has been conducted through review of secondary information collected from relevant agencies, and primary information collected from the field survey in April 2010. 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 7/08/2066 BS.

Brief Description of the Subproject
The proposed road lies at the remote south-eastern part of Rolpa district. The proposed 20.2 km road passes through Mijhing, Badachaur, Sirp and Pang Village Development Committees (VDCs). Average width of the road will be 5m. Improvements in geometry and grade of the road will be required and surface will be gravelled. Total project cost is NRs. 165921457.20 and per km cost is NRs. 8213933.51.

Existing Environmental Condition
The road starts from Sulichour of Mijhing VDC at 866m amsl and end in Pang VDC at 1600amsl. The slope along the road alignment is stable. Ambient air and water quality of the proposed project area is observed to be good and there is no noise pollution. The road passes through cultivated land, forest , settlements and barrend land.

The dominant vegetation found in the road alignment are *Alnus nepalensis* (Uttis), *Schima wallichii* (Chilaune), *Ficus semicordata* (Khnew), *Sepium insegne* (Khiro), *Thysolaena maxima* (Amliso), *Pinus roxburghii* (Salla). *Felis chaus* (Jungle Cat), *Macaca mulatta* (Monkey), *Vulpes sp.* (Fox), *Ratufa sp.* (Squirrel) are the common mammals. Dhukur, Jureli, *Corvus splendens* (Crow), *Passer domesticus* (Sparrow), *Columba livia* (Pigeon) 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 5535, total household number is 862, and average family size is 6.42. Brahmin, Chettri, Magar, 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 and high altitude, agriculture farming is not enough for subsistence level. Moreover, significant percentage of the economically active male population also migrates to various places including Kathmandu 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 93787 person days of unskilled and 5210 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 (ZoI)[1] will get easy and fast accessibility to markets, social services and other regions of the country. The fertilizers and pesticides will become cheaper with better transportation facility hence, agricultural production will increase. This will ensure better economic condition and food security of the people living in the ZoI of the project area. Moreover this will promote the small agro based industries that uses local resources. Easy access and opportunity of better transportation system will develop other sectors like education, health, communication, market, banking and other socio-economic sectors. This will increase the overall living condition of the people living in ZoI of project area. The better land network will result in increased land price which will be beneficial for land owners.

Adverse Impacts

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

During road widening and construction required 1.99 Ha of forest area and different type of tree total 850 nos will have to be cleared. Among them from private land 225 trees and from forest area 625 nos. of tree /shrub will be affected by project construction. Also during construction of road there might be possible impacts on wildlife as workers might harass/ hunt the wildlife in the nearby forests, however, such effects are very minimum.

During road construction, there will be loss of 1.36 Ha of agricultural land which results in annual reduction of agricultural production mainly maize and vegetables. Five houses structures will be affected during road construction. Labours and local people are prone to health effects and accidents relating to construction activities.

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

Mitigation Measures

The various benefit augmentation measures and adverse impact mitigation measures have been proposed to make this project environment friendly. Other than land donated by local people for the projects, adequate compensation will be provided to affected poor and marginalize household for all the lands that need to acquire. The construction of road will be based on Labour-based, Environment friendly and Participatory (LEP) and Contractor Road Construction Approach. Affected families will be given high priority for employment and skill development trainings. Necessary measures will be taken to reduce the adverse effects that might arise from site clearance, cutting of slopes, disposal of spoils and quarrying activities. Necessary trainings and awareness programs will be conducted. Necessary measures will be adopted for protection of flora and fauna. At construction site, the workers will be provided insurance, first aid facilities and safety equipments. Loss of trees will be compensated by planting of trees in the ratio of 1:25 and added 10% in forest land and in private land compensatory plantation will be encouraged in the ratio 1:1. Protected species will be given emphasis for plantation. Proper maintenance and proper drain system will be provided to prevent accumulation of water on the nearby agricultural lands during operation. Adequate road safety measures will be provided to minimize road accident. For bridge protection, construction of civil structures as well as bio engineering will be done.

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

Environmental Management Plan

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

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

SN.	Description	Amount (NRs.)	Remarks
1	Environmental awareness raising training and other training	200,000.00	To be included in project cost
2	Insurance of workers	400,000.00	To be included in BoQ
3	Bio-engineering	2,489,389.44	
4	Resettlement and Land Acquisition	5,000,000.00	T o be included in Resettlement plan
5	Restoration or relocation of affected infrastructures, Spoil management, Reinstate of quarry, stockpiling etc.	500,000.00	To be included in BoQ
6	Compensatory Plantation cost	749,615.00	To be included in project cost
7	Social Action Cost (Health / HIV AIDS / STD prevention awareness; other awareness program such as adult literacy'; support to local school etc.)	1,000,000.00	To be included in Social plan, project cost
8	Occupational health and safety, Information signboard	550,000.00	To be included in BoQ
9	Monitoring	200,000.00	To be included in project cost
	Total	**10,889,004/**	

Conclusion and Recommendation

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

1.0 Introduction

1.1 Background

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

2. Rolpa District is one of the project districts under RRRSDP. This Proposal is for construction of Sulichour-Badachour-Namja-Sirp-Pang district road of 20.2 km length in earthen standard.

1.2 The Name and Address of Proponent

Name of Proposal :	Reconstruction of Sulichour-Badachour Namja-Sirp-Pang District Road, Rolpa District, Nepal
Name of Proponent :	District Development Committee, District Technical Office, Rolpa
Address of Proponent :	Liwang, Rolpa District Phone No: 086-440261 Fax No: 086-440062

1.3 Relevancy of the proposal

3 The Project area is located at remote and underdeveloped North-eastern part of Rolpa district. The area has high potential in production of vegetable and milk. The proposed 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.

4. Term of reference of Sulichour -Badachour Namja - Sirp- Pang road Sub- project Rolpa district; approved by the Secretary level decision of the Ministry of Local Development (MLD) on 2066/8/7 B.S, the road alignment covers Mijhing, Badachaur, Sirp and Pang VDCs which starts from Bargibang in Mijhing VDC which is 0.9 Km far from Sulichaur Market area .

1.4 Need and Objectives of the IEE Study

5. **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.

6. **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

7. The IEE study has followed the provisions of the EPA, (2053 BS) and EPR, (2054 BS), and the provisions of ADB. It follows methodology suggested in the approved Terms of Reference for IEE Study by MoLD on 7/08/2066 (please 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 ZoI (one and half hour walking distance from the centre line of the road) information of the Subproject area. The IEE study has been conducted through review of secondary information collected from relevant agencies, and primary information collected from the field survey in April 2010. Field survey, sample household survey, organization of Focus Group Discussions in the related VDCs was carried out and necessary information was collected. The DDCs officials, VDCs and Community Groups were also contacted to verify information to solicit their concerns. Based on the analysis of information the impacts have been predicted, mitigation measures prepared and monitoring plan has been developed.

1.6 Description of the proposal

8. The proposed 20.2 km long earthen Sulichour-Badachour Namja-Sirp-Pang road Subproject lies in the North-East part of Rolpa district in Mid Western Development Region of Nepal which links the remote area of the district to its headquarter. The length of road is 20.2 Km which was 15 Km in ToR.Afters detail design the road is now changed and proposed for 20.2 km . This Subproject starts from Barjibang of Mijhing Village Development Committee (VDC) and ends at Rajiban of Pang VDC. The road passes through Mijhing, Badachaur, Sirp, and Pang VDC.

9. The alignment requires widening, geometrical correction in bends, grade improvements. At present detail survey is ongoing and the length of bridge is not fixed because detail design is not completed. The location and alignment of the road is given in **Figure 1.1 and 1.2**. The total project cost is NRs NRs. 165921457.20 and per km cost is NRs. 8213933.51 as shown in **Annex III**.

Salient Feature of the Road Subproject

1. Name of the Project : Sulichaur-Badachaur Namja-Sirp-Pang Road

2. Location
   - 2.1Geographical Locations
     - 2.1.1 Start Point : Bargibang of Mijhing VDC
     - 2.1.2 End Point : Rajiban of Pang VDC
   - 2.2 Geographical Feature
     - 2.2.1 Terrain : Mountainous
     - 2.2.2 Altitude : 866 m amsl at Runiban to 1600m amsl at Pang
     - 2.2.3 Climate : Sub-Tropical/ Temperate
     - 2.2.4 Soil : Residual, Alluvial soil, colluvial soil
3. Classification of Road : District Road (Rural Road Class A)
4. Status of road : New Construction
5. Length of Road : 20.2 km
6. Standard of Pavement : Earthen
7. Construction Period : 270Days
8. Design speed : 20 km/hr
9. Major Settlements:
   - 9.1 Major Settlements : Bargibang, Thulo Namja, Sirp and Pang
   - 9.2 No. of Household : 862 HHs
   - 9.3 VDCs along the Road : Mijhing, Badachaur, Sirp, Pang
   - 10. Cross Section
   - 10.1 Right of way : 5m each side (center line)
   - 10.2 Formation width : 5 m
   - 10.3 Carriageway width : 3.5 m
   - 10.4 Lane : Single
11. Structures
    - 11.1 Retaining Structures
    - 11.1.1 Dry Stone Massonary : 4624.92 Cum.
    - 11.1.2 Gabion Wall : 7358 Cum.
    - 11.1.3 Stone Pitching : 50.2 Cum.
12. Bio-Engineering / Road side Plantation : 3% to total cost (NRs. 2,489,389.44)
13. Earth Work
    - 13.1 Cutting : 447743.49 Cum
    - 13.2 Filling : 164764.19 Cum (No filling work in significant amount)
14. Project cost for Road
    - 14.1 Total Cost (NRs) : NRs 165921457.20
    - 14.2 Costs per km (NRs.) : is NRs. 8213933.51
    - 15. Employment generartion:
    - 15.1 Total employment : 98997 (person days)

15.1.1 Skilled : 5210
15.1.2 Unskilled : 93787

1.7 Construction Approach and Activities

10. This road will be constructed using the labour-based, environment-friendly and participatory (LEP) approach and Contrctor based. 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 labour. Contrctor based will be used in works that cannot be done manually through road building groups. In such works, the construction will be carried by using the equipment and machineries but it will be used in such a way to ensure the minimum environmental damage. Activities included during the road construction are: Site clearance, Pavement work, Earthwork, Retaining structures, Gravelling, Bioengineering, cross drainage works and side drain works.

1.8 Proposed Schedule for Implementation of Sub-project

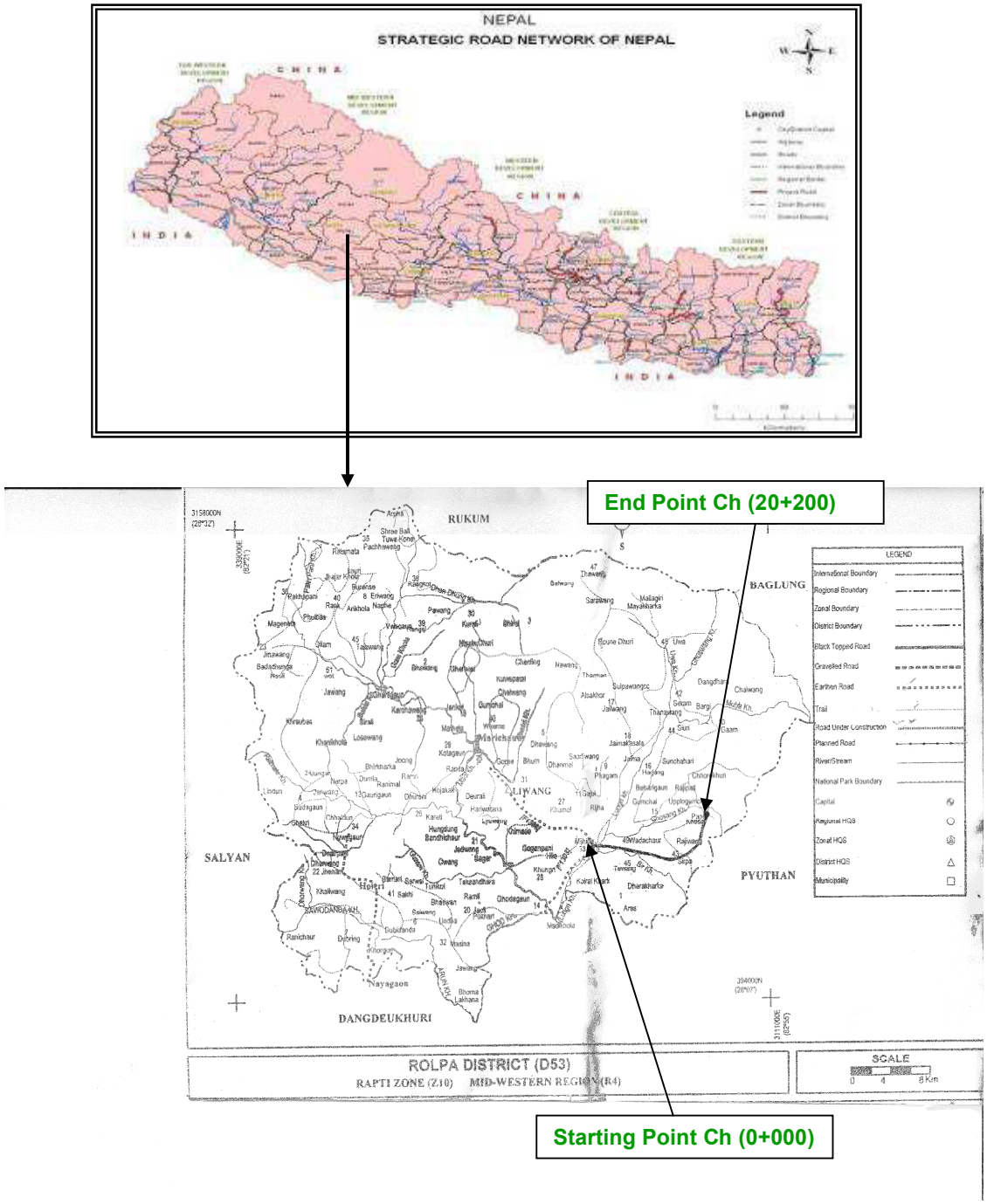
11. Following table shows the proposed implementation schedule for Sulichaur-Badachaur Namja-Sirp-Pang road sub-project:

Table 1.1: Sub-project implementation schedule

SN	Activity	2009	2010				2011				2012			
		IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
1	**Detailed survey, design and estimate**													
2	**Preparation of resettlement plan**													
2.1	Life skill and income generation training													
3	**Environment Assessment and implementation**													
3.1	IEE report preparation and approval from MoLD													
3.2	Implementation of EMP													
3.3	Environmental monitoring													
4	**Work implementation**													
4.1	Civil construction work by contractors													
4.2	Civil construction work by RBGs													

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

Figure 1.1 Map of Nepal showing the location of Sulichaur-Badachaur Namja-Sirp-Pang road Subproject in Rolpa District



2.0 Public Consultation and Information Disclosure

2.1 Public Consultation

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

- Publication of notice- a 15 days public notice was published on 2066/12/3 in the Gorkhapatra, a national daily newspaper (**see Annex V**) seeking written opinion from concerned VDCs, DDC, schools, health posts and related local organizations. A copy of the public notice was also affixed in the above mentioned organizations and Deed of enquiry (*muchulka*) was collected (see **Annex VI** for deed of inquiry and **Annex VII** for the names of organizations).
- IEE team also carried out interaction with local communities and related stakeholders like District Forest Office, District Soil Conservation Office, District Agricultural Development Office and others during field survey to collect the public concerns and suggestions (see **Annex VIII** for the list of persons consulted). Moreover, Focus Group Discussions were conducted to collect and solicit information regarding the bio-physical and socio-economic and cultural aspects of the road. Summary of minutes of meeting with local people is given in **Annex IX** and following **Table 2.1**. The FGDs were held at different 6 VDCs along the ZoI of the road and the results of FGD are mentioned in chapter 4. Existing environmental conditions and socio-economic data are tabulated in **Annex XI a, b, c and d**.
- Draft IEE report will be sent to Mijhing, Badachour, Sirp and Pang VDC for Public disclosure. Recommendation letters were also obtained from above mentioned VDCs as given in **Annex X**. A copy of draft IEE will also be kept in information center of DDC, Rolpa for Public disclosure. After reviewing draft IEE report and incorporating the suggestions from the concerned stakeholders, final IEE report will be prepared and sent to PCU for approval from MLD and ADB.

Table 2.1: Summary of FGD Meeting

Location	Date	No. of Participants		Issues and Suggestion
		Male	Female	
Mijhing	2066/12/22	25	-	1. FGD program disseminated information on the project. 2. Participants committed on providing land voluntarily for the road. 3. Cash compensation should be provided for land and crop, free distribution of seedlings for private planting, good drainage system, and protection of water sources. 4. Project work should be careful to protect environment.
Badachaur	2066/12/24	15	6	
Sirp	2066/12/26	26	4	
Pang	2066/12/28	24	5	

2.2 Information Disclosure

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

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

3. Review of Relevant Acts, Regulations and Guidelines

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

Table 3.1: Review of Environmental Acts, Regulations and Guidelines

SN	Environmental Acts, Regulations and Guidelines	Description of Requirements
1	Environmental Protection Act, 1997	Any development project, before implementation, shall pass through environmental assessment, which may be either IEE or an EIA depending upon the location, type and size of the projects.
2	Environmental Protection Rule 1997 (amendment, 2007)	The EPR and its schedules clearly provide various step-wise requirements to be followed while conducting the IEE study. It also obliges the Proponent to timely consult and inform the public on the contents of the proposal.
3	Forest Act, 1993 (amendment, 2007)	Requires decision makers to take account of all forest values, including environmental services and biodiversity, not just the production of timber and other commodities. It includes several provisions to ensure development, conservation, management, and sustainable use of forest resources based on approved work plan.
4	Forest Rules, 1995	Elaborates legal measures for the conservation of forests and wildlife. Expenses incurred for cutting trees and transportation shall be borne by proponent.
5	*Batabaraniya Nirdesika* (Nepal; MLD), 2057	The directive is focused in the practical implementation of small rural infrastructures through the minimization of environmental impacts. This directive includes the simple methods of environmental management in the different phases of the project cycle.
6	National Park and Wildlife Conservation Act, 1973	Addresses for conservation of ecologically valuable areas and indigenous wildlife. The Act prohibits trespassing in park areas, prohibits wildlife hunting, construction works in park area, damage to plant and animal, construction of huts and house in park area without permission of authorized person. It lists 26 species of mammals, 9 species of birds, and 3 species of reptile as protected wildlife.
7	Local Self Governance Act (1999) and Regulation (1999)	Empowers the local bodies for the conservation of soil, forest and other natural resources and implements environmental conservation activities
8	Land Acquisition Act, 1977 and Land Acquisition Rules, 1969	Specifies procedural matters on land acquisition and compensation
9	National Environmental Impact Assessment Guidelines, 1993	Provides guidance to project proponent on integrating environmental mitigation measures, particularly on the management of quarries, borrow pits, stockpiling of materials and spoil disposal, operation of the work camps, earthworks and slope stabilization, location of stone crushing plants etc.
10	APPROACH for the Development of Agricultural and Rural Roads, 1999	Emphasizes labor based technology and environmental friendly, local resource oriented construction methods to be incorporated actively in rural infrastructure process.
11	RRRSDP Environmental Assessment & Review Procedures (EARP), 2007	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.
12	Reference Manual for Environmental and Social Aspects of Integrated Road Development, 2003	Suggests stepwise process of addressing environmental and social issues alongside the technical, financial and others
13	Green Roads in Nepal, Best Practices Report: An Innovative Approach for Rural Infrastructure Development in the Himalayas and Other Mountainous Regions, 1999	Focuses on participatory, labor based and environment friendly technology with proper alignment selection, mass balancing, proper water management, bioengineering and phased construction
14	ADB Environmental Assessment Guidelines, 2003	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
15	Three Years Interim Plan, 2007/08-2009/10	Requires all projects will be formulated and constructed based on methods that optimally utilize the local skill and resources and generate employment opportunities.
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.
19	Child labours Act,2056	No child having not attained the age of 14 year shall be engaged in works as laborer.

4.0 Existing Environmental Condition

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

4.1 Physical Environment

4.1.1 Topography

16. The elevation of the starting point of the road at Bargibang is 866m amsl and at the end of road at Rajiban is 1600m amsl. The road alignment passes through the Lower valley slopes and ridges of middle hills and ascends up to Rajiban.

4.1.2 Geology and Soil Type

17. The road section comprises of different types of quartzite and schists. In general, soil type along the alignment can be classified as alluvial, colluvial, residual, boulder mixed soil, hard and soft rock.

4.1.3 Climate

18. The road lies in the Subtropical Temperate climatic region. Generally, rainy season starts from June and ends in September. The meteorological record shows unevenly distributed monsoon rain in the project area with the total average annual rainfall of 1612 mm. Average minimum temperature of 3.60° C and average maximum temperature of 31.32°C is in the area. (*Source: District Profile of Rolpa*, 2065-66)

4.1.4 Hydrology and Drainage System

19. There is no any major perennial river along the road alignment. The summary of the cross drainage works along the road alignment is given in **Annex XIV.**

4.1.5 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 major landslides or erosion prone area. There is existing landslide near the chainage 0+950 and erosion prone areas at Ch 1+200 and 2+550 . Following **Table 4.1** presents the geological features observed along the road alignment.

Table 4.1 Geological features along the road alignment

Chainage	Location	Terrain slope	State of Land	Land Use Pattern	Geological Problem	Soil type
0+000 - 0+500 Km	Mijhing	Moderate	Dry	Cultivated + Barren land	Gully erosion	OS 60%,HS 35%,OR 5%
1+500 - 11+000 km	Badachaur	Moderate	Dry	Cultivated + forest	Gully erosion	OS 55%,HS 53% OR 6%, MR 4%
11+000 -1 6+920 km	Gumchal	Moderate	Dry	Barren land+Cultivated	Small scale landslide	OS 44%,HS 50%,OR 4%,HR 2%
16+920 - 19+000 km	Harjang	Moderate	Dry	Forest + Barren +Cultivated	Gully erosion	OS 45%,HS 52%,OR 1%,MR 2%
19+000 -20+500 km	Syuri	Moderate	Moist	Barren +Forest	Gully erosion	OS 35%,HS 50%,OR 9%,HR 6%

Source: Field survey, April, 2010

4.1.6 Existing Traffic Situation

21. No any vehicle movement in this proposed road alignment. Approximately 250-350 pedistrian move on the foot trail.

4.1.7 Land Use

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

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

Type of Land	Chainage		Length(m)	Width(m)	Area(Sq.m)	Area (ha)
	From	To				
Built up area	4+300	7+300	3000	5	15000	1.5
	8+200	9+300	1100	5	5500	0.55
	12+500	13+500	1000	5	5000	0.5
Sub total						**2.55**
Agricultural land	0+000	1+020	1020	5	5100	0.51
	11+900	12+500	600	5	3000	0.30
	17+500	18+600	1100	5	5500	0.55
Sub total						**1.36**
Forest	1+020	3+400	2380	5	11900	1.19
	18+600	20+200	1600	5	8000	0.80
Sub total						**1.99**
Barren Land	3+400	4+300	900	5	4500	0.45
	7+300	8+200	900	5	4500	0.45
	9+300	11+900	2600	5	13000	1.30
	13+500	17+500	4000	5	20000	2.0
Sub total						**4.2**
Total						**10.1**

Source: Field Survey, April, 2010

4.1.8 Air, Noise and Water Quality

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

4.2 Biological Environment

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

4.2.1 Vegetation

25. The dominant forest and fodder species reported in the road alignment are *Pinus roxburghii* (Salla), *Alnus nepalensis* (Uttis), *Schima wallichii* (Chilaune), *Thysolaena maxima* (Amliso), *Ficus semicordata* (Khnew) and *Sepium insegne* (Khiro). Major NTFPs are not found along the road alignment.

26. The road alignment passes through two community forest, Badachour Community forest at chainages 1+020 to 3+400, Pang Community forest at chainages 18+600 to 20+200.

4.2.2 Wildlife

27. *Vulpes sp.* (Fox), *Macaca mulatta* (Monkey), *Felis chaus* (Jungle Cat), *Ratufa sp.* (Squirrel) are the common wildlife found in the surrounding forest along the road alignment. Dhukur, Jureli, *Corvus splendens* (Crow), *Passer domesticus* (Sparrow), *Columba livia* (Pigeon) are the birds found in the Subproject area. *Ratufa sp.* (Squirrel) is listed in Appendix II of CITES.

4.2.3 Aquatic Life

28. Fish species found in water bodies along the road alignment are Asala (*Schizothorax plagiostomus*), Katle (*Accrocheilus spp*.), Hile, and Buduna. These fish species are mainly found in Lungri Khola, and Dal khola.

4.3 Socio-economic and Cultural Environment

4.3.1 Population, Household and Ethnicity

29. The alignment covers four VDCs namely: Mijhing, Badachaur, Sirp, and Pang . The ZOI population and Household in Mijhing VDC (65) and (11), Badachaur VDC (1862) and (307), Sirp VDC (2357) and (261), and Pang VDC (1251) and (283). Major settlements within ZoI of the project are Bargibang, Thullo Namja, Sano Namja , Salldada, Khetalchaur ,Ouwaldada,Pakhepato and Pangdada. Major castes in the area are Magar, Chhetri, Brahman, and Dalit.

4.3.2 Main Occupation

30. The main occupation of all people residing within the ZoI of the proposed road alignment is agriculture and livestock. However, agriculture farming is not enough for subsistence level due to small landholding size and lack of irrigation facilities. Therefore people are carrying out other economic activities like labour for different works.

4.3.3 Market Centres and Business Facilities

31. There are grocery shops and tea stalls available in the almost all settlements. Bargibang and Namja have also some hotels. Necessity of sewerage/drainage system has been felt in these places. Other smaller market centres with shops of daily commodities are also found along the road alignment**.**

4.3.4 Local Economy

32. The economy of the area is predominantly agriculture based some are harvesting forest products such as Uttis for timber. Local people are gradually attracted towards cultivation of cash crops such as orange, amliso, ginger. Dairy production and selling it to the local market has been also another source of income for local farmers. Over 65 percent populations base upon agricultural activities for their livelihood. With growing closeness of the project area with Runiban bazar due to porter, cultivation of fruits, vegetables in a commercial scale seems to gain momentum. Diversity in employment pattern has been also observed in recent years. Local people have increasingly engaged in business activities in Sulichaur bazar area. Many people seasonally migrate to Kathmandu and even different parts of India to earn some money for their livelihood.

4.3.5 Agriculture Pattern

33. Major crops that are cultivated in the project area are rice, wheat, maize, millet, potato and beans. Local peoples are also found to be encouraged in cash crops in recent days. Major cash crops that are grown in the project area are orange, ginger, amliso and vegetables.

4.3.6 Livestock

34. Due to availability of good number of fodder trees, the project area has also immense potentiality of cow and buffalo farming for dairy and goat farming for meat. This alignment people used to carry milk on their back or hire porters to sell it to Sulichaur and they were not encouraged to produce milk in commercial scale due to time consumption and difficult access.

4.3.7 Industry

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

4.3.8 Trade and Commerce

36. Goods of daily commodities are major imports in the project area, which includes salt, sugar, packed food items, spices, clothes and other items of daily uses. Similarly, major items exported from the project area are milk, vegetables, fruits, timber, bamboo products.

4.3.9 Tourism Related Services

37. Some hotels are in operation in Runiban Bazaar area. Since the ZoI of the project and its surrounding area has potentiality of various types of tourism promotion. People may engage themselves in various kinds of tourism related activities such as porter, promotion of local handicrafts and other local products if they are provided appropriate training and support.

4.3.10 Health and Sanitation

38. Major health problems observed in the area are gastric, water borne diseases, gout, respiratory diseases, skin, malnutrition, typhoid etc. Sanitation awareness among local people is increasing and many of them have toilets in their home, but there is no public sewerage system. People discharge their wastewater in the nearby natural streams.

4.3.11 Public Services and Infrastructures

39*.* ***Education***: The proposed project area consists of a total of 8 educational institutions ranging from primary level to college level educational institutions. There is a higher secondary school in Namja settlement. Most of the families send their children to school. Female enrollment in schools is lower than that of male students. Literacy rate in the project area has been estimated around 65 percent.

40. ***Health Facility*****:** There are altogether one sub health posts and one district hospital within ZoI.

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

42. ***Transportation*****:** No any vehical movement in this alignment.

43.. ***Electricity*****:** Almost all settlements in ZoI use liplight.

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

45. ***Irrigation*:** No irrigation facility has been observed in ZoI of the project area.

46. ***Other Infrastructures/services*:** There is a Suspension Bridge, water mills; and Veterinary Service Sub Centre are also available in the project area.

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

48. ***Financial Institutions*:** There are Nepal Bank Ltd and Krishi Bikash Bank in Liwang.

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

50. Following House/Sheds, Public Services and Infrastructures are affected during road construction.

Table 4.3: House/Sheds, Public Services and Infrastructures along the Road Alignment

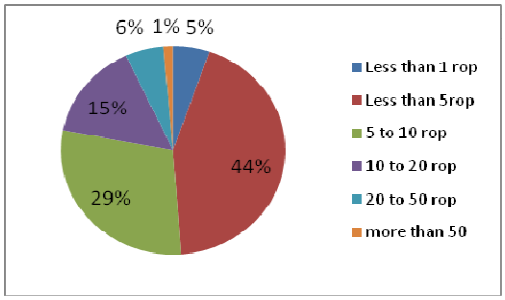
Type of Public Service and Infrastructure	Chainage	Location	Distance from CL of the road
Trail bridge	0+455	Bargibang	About 10m
House	0+450	Bargibang	Within formation width
House	0+750	Bargibang	Within formation width
House	5+020	Namja	Within formation width
Sub Healthpost	12+500	Salldada	About 100
House	14+650	Khetalchaur	Within formation width
House	16+450	Ouwaldada	Within formation width

Source: Field Survey, April, 2010

4.3.12 Land Holding Pattern

51.

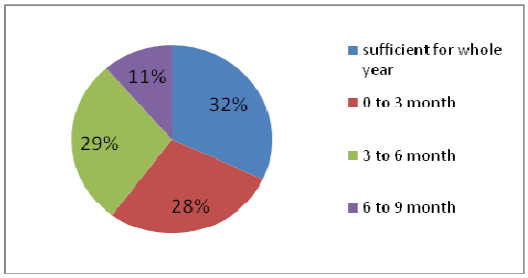
Land holding pattern within the ZoI of the road project demonstrates that about 5% households have less than 1 ropani, about 44% households have land between 1 to 5 ropani, 29 % households have 5 to 10 ropani land and about 15% households have 10 to 20 ropani land and 6% households have 20 to 50 ropani land and1% households have more than 50 ropani land . Details about land holding pattern are given in the **Annex XI c.**



4.3.13 Food Security

52.

About 28% of the households can meet food supply for only up to three months. While 29% of the households of the project area have food sufficiency for 6 months and 32% households have food sufficiency for 9 months , 11 % households produce food sufficient for whole years. Food sufficiency condition is given in **Annex XI b.**



4.3.14 Migration Pattern

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

4.3.15 Settlement Pattern

54. Most of the settlements within ZoI of the project are scattered type. Housing pattern of these settlements are mostly Slat plate roofed House. Some of them are also thatch roofed buildings. RCC buildings have been started to appear in market centres such as Runiban Bazaar.

4.3.16 Potential for Development

55. Many of the places, areas and settlements within ZoI of the project have the potentialities in various sectors. These sectors and their potentialities have been mentioned in **Table 4.4** below.

Table 4.4: Development Potentialities in Various Sectors

SN	Sector	Devlopment potentiality
1	Agriculture	Maize,Wheat,Potato,Orange,Amsilo,production, within the whole ZoI
2	Tourism Promotion	There are no any places along the alignment.
3	Trade and business	Development several rural market centres at various places along the road alignment and main market centres at Runiban.

Source: Field Survey, April, 2010

4.3. 17 Religious, Cultural and Historical Sites

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

5.0 Project Alternatives

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

5.1 No Action Option

58. This alternative does not allow the implementation of the Proposal. As the proposed road connects few major settlements with high potential in vegetable and milk products, the no action option will increase the transportation time and cost for the local people to the district headquarter and markets and vice versa resulting into low level of productivity and prevalence of poverty. The no action option will conserve some of the environmental adverse impacts at the cost of poverty and hardship of the people.

5.2 Proposal Alternatives

62. Considering other project alternatives, the proposed road project can be the best option to serve the purpose of efficient transportation requirement.This alignment covers four VDC and linkage to Ares-Tewang road and Sirp -Pang road.

5.3 Alternative Alignment

63. The alignment of the Sulichour -Badachaur Namja-Sirp-Pang road is an existing foot trail. This alignment is proposed for New construction.

5.4 Alternative Schedule and Process

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

5.5 Alternative Resources

69. The physical resources consumed for the construction of the proposed road will mainly include boulders for gabions and stone for dry masonry wall. Stones are easily available in ch.5+550 and 16+900. The proposed construction will optimally use the local labour force and local materials.

6.0 Identification and Evaluation of Impacts Benefit Augumentation and Mitigation Measures

70. The identification and assessment of impacts has been carried out by considering the proposed proposal activities examined in terms of its current condition and likely impacts during construction and subsequent operation phases. 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 suggested hereunder and the detail impact of bridge construction is given in separate table (see Table 7.2 and 7.3 in Chapter 7).

6.1 Mitigation Measures During Pre-construction phase

6.1.1 Route Selection

71. Since, this alingment is New construction alignment shall be followed with required geometrical design and reconstruction of the road to the specified width of 5m. Local conditions and requirement for private land acquisition and protection of forest will be taken into due consideration while designing the road reconstruction work.

6.2 Beneficial Impacts and Benefit Augmentation Measures

6.2.1 Construction Stage

6.2.1.1 Employment Generation and Increase in Income

74. Impacts: Employment opportunity for local people during construction of the road with 5210 person day as skilled and 93787 person day as unskilled labor. Efforts will be made to employ more than 50% 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.

75. 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.

6.2.1.2 Skill Enhancement

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

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

6.2.1.3 Enterprise Development and Business Promotion

78. Impacts: During construction period, different types of commercial activities will come into operation in order to meet the demand of workers. Since they will have good purchasing power, they will regularly demand for different types of food, beverage and other daily necessary items. Development of several rural market centres at centres at Runiban, Namja , Sirp and Pang. This impact is direct, low significance, local and short term in nature.

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

6.2.1.4 Community Empowerment and Ownership

80. 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.

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

6.2.2 Operation Stage

6.2.2.1 Women and Indigenous People Empowerment

82. 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.

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

6.2.2.2 Improvement in Accessibility and Saving of Time and Transportation Cost

84. *.Impacts:* Construction of road will enhance the access of people to social services, and quick transportation of goods. It only takes 1.5 hr after construction of road instead of 1 day to reach Pang from Sulichour . This impact is direct, high, regional and long term.

85. Measures: Proponent will undertake regular maintenance of the road.

6.2.2.3 Increase in Trade, Commerce and Development of Market

86. Impact: There is a possibility of increased economic opportunities and significant growth and extension of market centers at Runiban, Sirp markets will grow. Productivity such as Maize,Wheat,Potato, Soyabean, oil seed, timber (uttis) will increase due to cheaper transportation. Sale of farm and livestock products will increase in the bigger markets of Rolpa district. This will support the economy of rural area. The impact will be indirect, significant, local and long term in nature.

87. 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.

6.2.2.4 Appreciation of Land Value

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

89. 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.

6.2.2.5 Enhancement of Community Development Services

90. 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.

91. 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

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

6.3.1.1 Physical Impacts

1. Change in Land Use

93. Impacts: Construction of road will convert 1.36 ha. of cultivated land, 4.2 ha.of barren land, 1.99 ha.of forest and 2.55ha.of settlement areas into road structure. The impact will be high, direct, local and for long term.

94. Measures: Compensation will be given for all private properties. Plantation of trees will be done to increase greenery in the area.

2. Slope Instability

95. Impacts: Removal of vegetation and open cuts with exposed soil to rain may cause soil erosion as well as landslide. As the road is an existing corridor, hill slopes will not be disturbed by widening cuttings of slope. Major instability areas along the road alignment are at Ch 0+950, 1+200, 2+550 and 10+500. The likely impact is direct, high, site specific and medium term.

96.Measures: The mitigation measures will be balance cut and fill; ensuring minimum cut slope depending upon the soil type; Re-vegetation of exposed areas; adoption of bio-engineering techniques on Ch 0+950,1+200, 2+550 and 10+500, like Grass plantation, Shrub/Tree plantation, Brush layering; no construction work during rainy season; and use of soft engineering structures (dry wall, check dams) before disposing spoil. For protection of bridge embankment, Gabion structures and Bioengineering measures (Grass plantation, Brush layering and tree plantation is proposed. At down stream of the bridge site, Lunching apron is proposed for the protection of scouring. Recommended civil engineering structures and bioengineering measures necessary at various chainages for slope stabilization have been given in Annex XV.

3. Spoil Disposal

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

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

Table 6.1 Potential Spoil Disposal Sites

S. No	Chainage	Location
1	1+100	Badachaur
2	5+900	Namja
3	9+800	Sirp
4	19+500	Pang

Source: Field survey, April, 2010

4. Quarry/ Borrow Operation

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

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

Table 6.2: Recommended Quarry Sites

SN	Chainages	Places of recommended quarry sites
1.	5+550	Stone quarry in a limited scale.
2.	16+900	Stone quarry is available approximately 20m far from the road alignment.

Source: Field Survey, April, 2010

5. Air, Noise and Water Pollution

101. 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.

102. 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, Local, reversible and short term.

103. 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.

104. 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, Use of ear muffles, helmet to lessen noise pollution during rock breaking and quarrying and bridge works. Both the sides of the road alignment will be planted with trees, as far as possible which will act as sound and noise barrier.

6. Water Management

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

106. 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. River flow do not affect by construction of Bridge. Details about necessary structures required to mitigate the water induced adverse impacts are as given in Annex XIV.

7. Location of Camp Sites and Storage Depots

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

108. Measures: The mitigation measures will be use of local labors to avoid camp; rent local house instead of camp to keep labors; camp away from productive lands and forest areas; compensation will be paid for using private farm or lands for storage or camp; provide drinking water facilities, first aid and pit latrine at campsite; soak pit for waste water; 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 5+560 near Namja and at 18+200 near Pang.

8. Construction equipments

111. 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.

112. 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.

9. Chemical Issues:

113. Impacts: Petrol, diesel and grease required for vehicle to operate and kerosene to workers to cook meals. Spillage of these chemicals also damage soil productivity. Storage of fuels and chemicals and operation of vehicles and machineries result in the spillage of hazardous chemicals that can pollute nearby water sources and soil; and affects health of the workers.

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

6.3.1.2 Biological Impacts

1. Loss or Degradation of Forests and Vegetation

113. Impacts: Total 1.99 ha of forest will be permanently lost and 850 trees will be removed, of which 625 from forest and remaining 225 from private land (see Annex XII). The impacts on vegetation/forest resources have been considered to be direct, high in magnitude, site specific in extent and long term in duration. During bridge construction there is no need of removing tree.

114. Measures: The loss of trees can not be minimized; however, it can be compensated by replantation. Following the 'Work Procedure for Providing the Forest Land for Other Use, 2063' of Government of Nepal (cabinet decision of 10.11.2063 B.S.), Proponent will manage a nursery to grow tree sapling and plant them in 1:25 ratio and added 10% in forest land and 1:1 in private land for each cleared tree. Trees will be planted on both sides of the road as far as possible. Bioengineering measures will be done for bridge embankment protection.

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

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

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

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

117. Impacts: Among the flora and fauna found in the ZoI of the Subproject area, *Ratufa sp.* (Squirrel) is listed in Appendix II of CITES.

118. Measures: Wildlife irrespective of common species will be protected.

6.3.1.3 Socio-economic Impacts

1. Loss or Degradation of Farm Land and Productivity

119. Impacts: There will be permanent loss of 1.36 ha of agricultural land due to road construction. This may reduce annual production of 0.562 Mt maize, 0.632Mt wheat, millet and vegetable. Dust settling on crop and vegetation will also affect production. This impact is expected to be direct, high in magnitude, local in extent and long term in duration

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

2. Loss of Private Properties

121. Impacts: The proposed road alignment will damage five houses. The location and detail of affected houses are presented in Table 6.3. The impact will be direct, high significance, site specific, and long term.

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

3. Impact on Community Infrastructure

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

Table 6.3: Impact on Private Properties/Community Infrastructure and Mitigation Measures

Infrastructure	Location	Distance from the Road CL	Mitigation Measure
Trail bridge	0+455	About 10 m	Need not to relocate

Infrastructure	Location	Distance from the Road CL	Mitigation Measure
Foot Trail	0+900	Within formation width	Damaged during road construction, required to relocate.
House	0+450	Within formation width	Damaged during road construction, required to relocate.
House	0+750	Within formation width	Damaged during road construction, required to relocate.
House	5+020	Within formation width	Damaged during road construction, required to relocate.
Sub Health post	12+500	Within formation width	Need not to relocate
House	14+650	Within formation width	Damaged during road construction, required to relocate.
House	16+450	Within formation width	Damaged during road construction, required to relocate.

4. Health and Safety Matters

123. 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.

124. 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. Awaren ess generation to local people and workers on HIV AIDS and other communicable diseases. Safety measures for bridge construction (Helmets, boots, Gloves).

5. Decline in Aesthetic Value

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

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

6. Impacts on Cultural, Religious and Archeological Sites

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

6.3.2 Operation Stage

6.3.2.1 Physical Environment

1. Road Slope Stability and Management

128. Impacts: Destabilization of slope (quarrying stones or soil, animal grazing, irrigated cultivation, opening of branch roads), poor maintenance of road, blockage of drains can lead to slides and slope failure. Sensitive areas for possible slope stability problems are the areas of steep cut; and surroundings of streams at 0+250(river). The impact will be direct, medium local and long term nature.

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

2. Impact Due to Air, Noise and Water Pollution

130. 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.

131. 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.

132. 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.

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

6.3.2.2 Biological Environment

1. Depletion of Forest Resources

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

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

2. Disturbance to Wildlife and Illegal Hunting

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

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

6.3.2.3 Socio-economic and Cultural Impacts

1. New Settlement and Market Center Development

138. Impacts: Expansion of settlement area and market can be observed at Runiban Bazaar. Namja, Sirp, Pang. Encroachment of RoW may take place. This will reduce road capacity, increase road accidents, and adversely impact road. The impact will be direct, medium, local and long term in nature.

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

2. Change in Social Behavior

140. 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.

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

3. Issues on Road Safety

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

143. 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. Delinator will be placed at both side of bridge.

7.0 Environmental Management Plan

144. 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.	▪ To review IEE ToR and Report, and give approval. ▪ Coordinate with project on safeguard issues ▪ Conduct environmental monitoring from central level.	Executing Agency
Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR)	Department under MLD responsible to execute infrastructure projects under MLD. Provides back-up support to DDCs in technical matters through DTO.	RRRSDP is being executed under overall coordination and supervision of the Department for the Ministry. It is also supporting DDCs through DTOs to implement the project.	Executing Agency
RRRSDP- Project Coordination Unit	Project specific unit.	Technical Unit to support and coordinate all activities for implementation of RRRSDP. Review, comment, and forward IEE ToR and Report for review to ADB and for approval to MLD	First Class Officer / DDG of DoLIDAR has been heading the PCU.
District Development Committee / District Technical Office	DDC/DTO is Project Implementing Agency.	▪ Prepare IEE ToR and submit for approval to PCU/MLD ▪ Conduct IEE Study, Public Consultation, and prepare IEE Report ▪ Receive comments from PCU/ADB/MLD and modify accordingly. Get final approval from MLD. ▪ Conduct environmental safeguard monitoring ▪ Reporting	District Technical Officer is the Project Manager
District Project Office	Project implementation office working directly under DDC/DTO.	Responsible for overall activities related to implementation of the works at field level.	Implementing Agency
Central Implementation Support Consultant (CISC)	Support consultants at central level	Technical and management support to PCU	Consultant
District Implementation Support Team (DIST)	Support consultants at district level	Technical and management support to DPO	Consultant

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

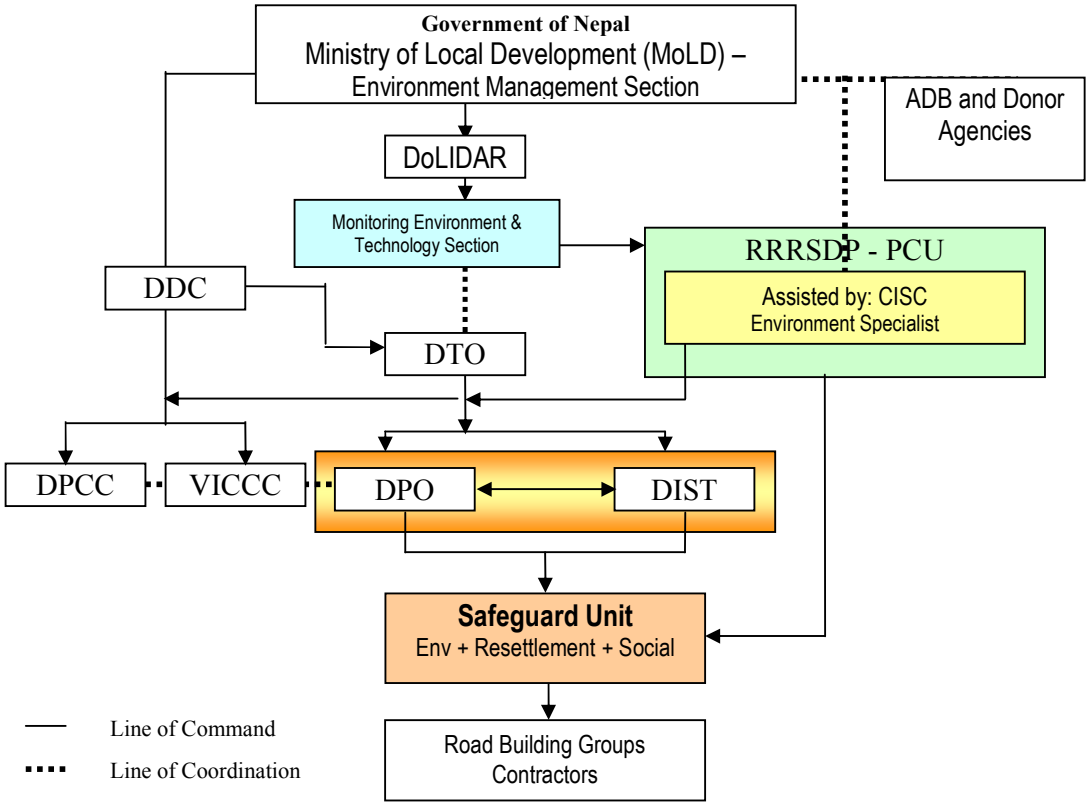
7.2 Reporting

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

147. 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.

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

Fig. 7.1: Environmental Management Organization Structure



7.3 Environmental Management Plan

149. 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 & 7.3

Table 7.2: Road Subproject

A.Beneficial Impacts and Proposed Enhancement Measures

Activity	Effect	Related Beneficial Impacts	Type of Impact *)				Benefit Augmentation Measures	Responsible Agencies	
			Nat	Mag	Ext	Dur		Executing Agency	Supporting Agency
Construction Stage									
Construction of road	Employment Generation and Increase in Income	Increase in income level Skilled 5210 person days, unskilled 93787 person days	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	L	L	ST	Training in cooperatives, and promote use of local products by the construction crews in Sirp, Namja and Pang.	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.Namja,Sirp and Pang village develop in market centers	DPO	DDC/VDC
Operation of Road	Appreciation of Land Value	Improvement in local economic condition	IN	M	L	LT	Promotion of land development activities in Namja,Sirp,Pang 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	Ease of access to social 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

Activity	Effect	Related Beneficial Impacts	Type of Impact *)				Benefit Augmentation Measures	Responsible Agencies	
			Nat	Mag	Ext	Dur		Executing Agency	Supporting Agency
	Services	and raise in quality service						DDC, VDC	

B: Adverse Impacts and Proposed Mitigation Measures

Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact *)					Mitigation Measures	Responsibility for Mitigation Measure	
			Nat	Mag	Ext	Dur	Rev		Executing Agency	Supporting Agency
Construction Stage										
Physical Environment										
Construction of Road, site clearance	Change in land use (Loss of agricultural land (1.36 ha.); forest area (1.99 ha.), barren land (4.2 ha.), settlement area (2.55 ha.).	Cause production loss, loss of property, loss of forest area.	D	H	L	LT	IR	Minimize use of fertile land, forest, settlement areas.	DDC/DTO	DIST
Construction of Road, earth excavation	Spoil Disposal and imposed weight of spoil on fragile slopes	Gully erosion, landslide, disruption of road, damage to farmland, water pollution etc.	D	H	L	LT	IR	Proper site selection and management of spoil at designated areas approved by Engineer; provision of proper drainages, toe walls; Proposed spoil disposal sites are 1+100, 5+900	DDC/DTO	DIST/VICCC/ VDC
Site clearance, excavation	Slope Instability, site clearance for bridge	Erosion, landslide, loss of property. Areas of concern are at Ch 0+950,1+200, 2+550, 10+500.	D	H	SS	MT	Re	Civil structures with bio-engineering application (Such as Grass plantation, Tree/Shrub plantation, Brush layering, Palisades, Bamboo plantation, Live checkdam construction etc.) shall be used to stabilize the slopes. Drainage management (Catch drain, rip-rap drain, checkdam etc.)	DDC/DTO	DIST
Construction of Road	Water Management, generation of large volume of surface runoff	Erosion, landslide, damage to farmland	IN	M	SS	MT	Re	Proper drainage structures and proper spoil disposal, Avoid blockage or diversion of natural channels due to construction of road and disposal of spoils. Not affected to river flow during bridge construction.	DDC/DTO	DIST
Construction works, operation of construction vehicles, material hauling and unloading etc. Slope cutting,	Air pollution due to dust from exposed surface, from construction equipments and vehicles	Affect on local people and workers health and affect onagriculture.	D	L	L	ST	Re	Use of face mask while working on dust prone areas, covering of dust sources. Sprinkling of water during surfacing of the road.	DDC/DTO / RBGs	DIST
	Noise pollution	Disturbance and annoyance around school, health posts,	D	L	L	ST	Re	Restrict horn near school, health posts, settlement, forest areas. Locate crusher plant away from these areas; cover material during	DDC/DTO /	DIST

Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact *)					Mitigation Measures	Responsibility for Mitigation Measure	
			Nat	Mag	Ext	Dur	Rev		Executing Agency	Supporting Agency
spoil and waste disposal.		forest areas.						transportation. Use of ear muffles, helmet to lessen noise pollution during rock breaking and quarrying and bridge works.	Contractor	
	Water pollution due to sediment level, spills and leakage of oils and chemicals to water bodies	Risk of water borne diseases	D	L	L	ST	Re	Proper spoil management, and prevention of leakage and spills of construction chemicals, restriction in urination and defecation in open areas	DDC/DTO / Contractor /RBGs	DIST/VICCC
Cutting of slopes	Quarry/borrow operation and its potential effect on instability, landslide	Change in river regime, instability, land slide; damage to forest, farmland and property; water pollution	D	M	SS	ST	Re	Proper selection and management of quarry sites, rehabilitation of quarry/borrow sites after completion of work. Recommended quarry sites are Ch 1+550,16+900 for Dry wall,Gabion wall and Stone Pitching.	DDC/DTO / Contractor /RBGs	PCU/CISC/DIST/ VICCC
Construction of road	Location of Camp Sites, Storage Depots	Encroachment of forest, agriculture land, solid waste,and waste water may cause pollution	D	M	SS	ST	Re	Locate camp site away from productive land and forest area (potential sites at 5+560, 18+200,); use local labor and local houses as camp; pay compensation to land owner of camp area; proper storage of chemical and materials.	DPO assisted by DIST/ Contractor	DIST/VICCC
Operation of heavy equipments	Crusher Plants	Dust and Noise pollution and health risks to workers	D	H	SS	ST	Re	Locate site away from farm and forest area; away from settlement and sensitive habitat; do not operate at night; water sprinkling facility to reduce dust.	DPO assisted by DIST/ Contractor	DIST/CISC/PCU
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
Storage of Chemicals and operation of machineries	Spillage of fuels and chemicals.	Pollution to the nearby water sources and soil. Health hazards to the workers	D	M	L	ST	Re	Store fuels and chemicals on paved surface with surrounding catch drain to protect soil from leakage. Provide information signboards. Use of safety gears. Close monitoring during operation of machineries.	DTO/DIST / Contractor	PCU/CISC/DIST
Biological Environment										
Clearance of vegetation necessary for road formation	Loss or Degradation of Forests and Vegetation (1.99 Ha, and 850 no.of trees) During bridge construction there is no need of removing tree.	Loss of green cover; loss of environmental benefits from vegetation, disturbance in ecological function (dust and noise absorbance, aesthetic	D	H	SS	LT	Re	Cutting of tree only in formation width, compensatory plantation of local species of tree at 1:25 +10% in forest area and 1:1 in private land. Compensatory plantation of 42261 no. of trees.	DDC/DTO /DFO	DFO/CFUGs/DIST/VDC

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
		value etc								
Construction activity	Impact on Wildlife Due To Loss of Habitat and Hunting	Killing and harrasing of wildlife; Loss of biodiversity and valuable species of wildlife	IN	L	L	ST	Re	Work only in day time, do not disturb wildlife, aware workers	DDC/DTO /DFO	DFO/CFUGs/DIST
Construction activity	Impacts on Flora and Fauna	Loss of biodiversity	IN	M	L	ST	Re	Minimum site clearance, discouraging workers for collecting fuel wood from forest or hunting/harassing faunas	DDC/DTO /DFO	DF/CFUGs/DIST
Social-economic Environment										
Acquisition of land for maintaining road width*	Loss or Degradation of Farm Land and Productivity (1.36 Ha)	Reduced production, hardship, food shortage	D	H	L	LT	IR	Minimize productive land acquisition through alignment selection, Compensation for affected people	DDC/DTO	CFC[2] DIST/VICCC
Acquisition of land and property for maintaining road width	Loss of Private Properties	Displacement of people, hardship	D	H	SS	LT	IR	Compensation and resettlement to the owner as described in resettlement plan	DDC/DTO	CFC[3]/DIST
Demolition of structures along road alignment	Impact on Community Infrastructure	Loss of services (see table 6.3)	D	M	SS	ST	Re	Restoration or relocation of affected infrastructures: Foot Trail (0+900), Houses (0+450, 0+750, 5+020, 14+650,16+450) at different locations, Trail bridge (0+455,) Sub health post (12+500,)	DDC/DTO	PCU DIST/CISC/VICCC/VDC
Occupational health and safety aspects	Health and safety matters	Injury, fatal accidents, outbreak of epidemics and diseases, decline in capacity to work	D	H	L	ST	IR	Occupational health and safety regulations, first aid facility at sites with health treatment arrangements, contingency planning; Proper drinking water and toilet facility for construction crew. During bridge construction safety measures will be adopted.	DDC/DTO / Contractors	DIST/CISC
Construction of Road	Decrease in aesthetic value	Disturbances in working areas and scar on topography	D	L	L	ST	RE	Cover the road alignment by planting tree on both sides; manage working areas.	DPO in assistance by DIST / Contractor	PCU / CISC / Users Committee / VDC

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

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

Activity	Potential Negative Effects	Related Adverse Impacts	Type of Impact *)					Mitigation Measures	Responsibility for Mitigation Measure	
			Nat	Mag	Ext	Dur	Rev		Executing Agency	Supporting Agency
									s	
Operation Stage										
Physical Environment										
Quarrying, operation of construction equipments	Road Slope Instability and Management	Slides and slope failure , Disturbance to traffic flow, pollution of water bodies, impacts on agriculture land, loss of vegetation.	D	M	L	LT	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
Biological Environment										
Road operation	Depletion of Forest Resources	Loss of timber, forest resources and benefits	IN	M	L	LT	IR	Enforcement of law, vigilance and monitoring, participation of community	DFO/ CFUGs/VDCs	DDC/CDO
Road operation	Disturbance to the Wildlife and Illegal Hunting	Collision of wildlife with vehicles, disturbance in their normal activities, Loss of biodiversity	IN	L	L	LT	IR	Warning traffic signal, Awareness training to driver to limit speed and horn use	DTO/ CFUGs	DDC/CDO / DFO
Social-economic Environment										
Easy Access by road operation	New Settlement and Market Center Development	Encroachment of Row, increased accidents, delay in traffic movement, depletion of local resources, water pollution	D	M	L	LT	IR	Awareness program, enforcement of law, planning of land development, plantation of trees.	DDC/DTO	CDO / VICCC
Operation of Road	Change in Social behavior	Social and cultural conflicts	IN	M	L	LT	Re	Awareness, Enforcement of law and order, Provision of training for skill	DTO	DDC/DoLIDAR
Operation of Road	Road Accidents	Increase in accidents	D	M	L	LT	IR	Appropriate road safety measures, Safety signs along the road. Delinator will be placed at both side of bridge.	DTO	DDC/DoLIDAR

7.4 Mitigation Cost

150. 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, land slide rehabilitation will be incorporated in the project cost. Therefore, most of the mitigation measures suggested would be a part of main project cost. All proposed mitigation measures will be integrated in the project design so that these measures may automatically form part of the construction and operational phases of the project. The indicative cost for environmental enhancement and mitigation is presented in the **Table 7.4**.

Table 7.4: Cost Estimate for Environmental Enhancement and Mitigation Measures

SN.	Environmental Protection Measures	Estimated Budget (NRs.)	Remarks
1. Benefits Augmentation Measures			
1.1	Training to DC/DTO/DPO/DIST to conduct environmental monitoring and reporting	50,000.00	To be included in project cost
1.2	Training to Naike of RBGs	50,000.00	To be included in project cost
1.3	Enhancement in Technical Skills (Bio-engineering)	100,000.00	To be included in project cost
	Sub-Total (1)	**200,000.00**	
2. Adverse Impacts Mitigation Measures			
2.1	Bio-engineering work/Road side tree plantation	2489389.44	To be included in project cost
2.2	RBG Insurance	400,000.00	To be included in project cost
2.3	Information Signboard (6 nos)	50,000.00	To be included in BoQ
2.4	Compensation for properties (Land, Structures, Trees and Crops)	5,000,000.00	T o be included in Resettlement plan
2.5	Restoration or relocation of affected infrastructures, spoils disposal site management and rehabilitation, reinstate of quarry etc.	500,000.00	To be included in BoQ
2.7	Compensatory plantation of 17638 no. of trees (17188 no. of trees from forest and 450 no. of trees from private land) Re-plantation / Re-forestation	749615.00	To be included in project cost
2.8	Social Cost (Health / HIV AIDS / STD prevention awareness; other awareness program such as adult literacy'; support to local school etc.).	1,000,000.00	To be included in Social plan, project cost
2.9	Occupational health and safety; First aid boxes, campsite sanitation (Pit latrine); solid waste management, Safety measures for workers (Helmets, gloves, masks, boots, etc,)	500,000.00	To be included in BoQ
	Sub-Total (2)	**10689004.44**	
	Total	**10889004.44**	

7.5 Implementation of Mitigation Measures

151. The mitigation measures will be integrated into project design and tender documentsso 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.

152. 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

153. 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.

154. 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.

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

Table 7.5: Environmental Monitoring Cost

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

156. Thus, total environmental monitoring and management cost is NRs. **6389004.44** including cost of resettlement and bio-engineering.

7.6.2 Types of Monitoring and Monitoring Parameters

157. There will be basically three types of monitoring:

a. Baseline, compliance and impact, Enviromental monitoring for the sub project area.

b 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.

c 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 Sulichour-Badachaur Namja-Sirp-Pang 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	Alignments incur minimum requirements to acquire land from forest, agri. land, and minimum nos. of tress to clear.	Look the alignment on topo map with landuse resources; verify it by walkthrough along final road alignment	preconstruction phase	PCU / CISC; DoLIDAR
Land and property acquisition and compensation Voluntary land acquisition	Proponent with assistance of DIST	Cadastral records, Land and properties acquisition procedures; Procedures followed during voluntary donation of Land; Preparation of inventory of structures likely to be affected Payment of compensation	Public consultation, photos; geo-referencing; Check inventory against cadastral records and discuss with land owners Check record of pending compensation	pre-construction phase before construction begins	CFC / PCU (CISC) / DOLIDAR / MoLD
Compliance to Environmental Protection Measures, including pollution prevention, water and soil management, slope stabilisation, cut and fill, waste management, spoils, sensitive habitats and critical sites, protection of fauna and flora	Contractor /RBG	Arrangement specified in the Code of Practice and in Manuals relating to environmental protection; EMP detail in IEE Document; records and observations on pollution, waste management, spoil deposit. Protection of wildlife and sensitive habitats, forests; and Use of fuelwood for heating and cooking.	Site inspection; Discussion with local people; Records; Photos; Sampling and laboratory tests.	During construction period and include in monthly report	DPO / DIST at district and PCU/CISC at center
Protect environment from air & noise pollution	Contractor / RBGs	Dust level and noise level at work sites, major settlements and sensitive spots like health centres and schools; Crusher operated during night	Visual observation, Observation of good construction practices and disssion with residents and workers; DIST to measure air/noise level at sensitive spots.	Once in a month during construction; measurement once during peak construction	DPO / DIST at district and PCU/CISC at center
Protect water bodies from pollution	Contractor / RBG DPO / DIST	Visual observation, observation of open defecation and pit toilets at work sites/waste management/spoil disposal around water sources; Parameters like pH, hardness, DO, Turbidity for drinking water.	Site inspection, test of site-selected samples of local streams water using standard field kit, record of waterborne disease	Observation once in a month during construction; Upon demand for testing with field kit	DPO / DIST at district and PCU/CISC at center
Use of local labour, particularly	DPCC / VICCC /	Percentage of employment of local labour,	Verification from records	During the entire	DPO / DIST at

Parameters/Issues	Responsible Implementing Agency	Verifiable Indicators	Verification Methods	Schedule	Responsible Monitoring Agency
vulnerable groups and women	RBGs / Contractor	especially vulnerable groups and women and their wage rate.		period where labour work is contracted	district and PCU/CISC at center
Awareness and orientation training on road construction locally employed labourers	DPO / DIST	Training programmes for skill development, occupational safety and environmental protection associated with road construction works; employment generation skill	Training records, assess feedback from participants	Beginning of construction and during construction	DPO / DIST at district and PCU/CISC at center (DTO)
Compliance to occupational health and safety matters	DPO / DIST; Contractor (if involved)	Health and safety regulations, first aid and medical arrangements, contingency plan, number and type of safety equipments such as mask, helmet, glove, safety belt.	Spot checks at work sites, accident records, safety equipement at site; discussion with workers	throughout construction stage	DPO / DIST at district and PCU/CISC at center
Vegetation clearance	Contractor; DPO / DIST	Actual number of trees felled during construction works	Record, inspection and interview with local people and CFUGs	Before construction work	DPO / DIST at district and PCU/CISC at center; CFUGs
Measures to avoid pressure on forest and wildlife	Contractor / RBG / DIST	Use of firewood or fossil fuel by construction crew, events of hunting and poaching of wildlife	Record verification, interview with local people and CFUGs	Once a month during construction	DPO / DIST at district and PCU/CISC at center / CFUGs
Restoration, rehabilitation, reconstruction of all infrastructure services disrupted or damaged during the construction work	Contractor / RBG / DIST	Continued services by the facilities and functional public life	Site observation; Public Consultation Meetings	Once in 15 days during construction	DPO / DIST at district and PCU/CISC at center
Clean up and reinstatement of the construction sites (camps, quarries, borrow pits)	Contractor	Decommissioned sites indicate no adverse/residual environmental impacts, and are rehabilitated to the satisfaction of the supervisor and land owners	Site observation; Comparing photos; Consultation with land owners	At end of construction period	DPO / DIST at district and PCU/CISC at center

Table 7.7: Impact / Effect Monitoring for Sulichour- Badachaur Namja-Sirp-Pang Road Construction Works

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

8.0 Conclusion and Recommendations

8.1 Conclusion

158. The IEE study of the proposed Sulichour -Badachaur-Gumchal-Harjang-Syuri-Gam road Subproject does not pass through any environmentally sensitive area, and have minimal adverse impact associated with loss of forest and agricultural land. Most of the adverse impacts predicted are of low significance and short term as well as reversible. The new road construction 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.

159. 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

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

161. A key consideration in selecting the road alignment is to minimize the acquisition of valuable agricultural and forest land. However, some agricultural and forest land and some houses will have to be acquired for construction of the proposed road. The detail will be given in resettlement plan to ensure that the persons affected by these loses are properly compensated.

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ANNEXES

Annex I: Terms of Reference

Annex II: Rapid Environmental Assessment (REA) Checklist

Rapid Environmental Assessment (REA) Checklist

Instructions:

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

Country/Project Title: Rolpa,Nepal / RRRSDP

Name of the sub Project: Sulichour - Badachour-Sirp-Pang Road

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

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

Source: Field survey, April, 2010

Annex III: Abstract of Cost

Rural Reconstruction and Rehabilitation Sector Development Program
Rolpa
Summary of Cost (Item-wise)
Sulichour-Badachour Namja-Sirp- Pang Road Sub Project
Chainage: 0+000 to 20+200
District: Rolpa

SN	Description of works	Unit	Estimated Quantity	Rate/Unit (NRs) In Figure	Amount (NRs)
A.					
1	RBG Insurance				400,000.00
2	Occupational Health and Safety				500,000.00
B.	**Roadway Works**				-
2	Clearing and grubbing including the cutting of trees having girth of less than 30 cm when measured at 1 m above the ground. ***[1] DoLIDAR***	Sqm.	15375.00	9.06	139297.00
3	Compensatory Plantation (Cutting of trees in nos. 225 from Private land and in nos. 625 from Forest land)	Nos.	17638.00	42.50	749615.00
4	Excavation in roadway, drain and foundation for gabion, dry and cement masonary retaining wall structures including removal and satisfactory disposal and stacking or hauling (to sites of embankment construction) of suitable cut materials as required and also the disposal of the unsuitable cut materials in specified manner. This further covers trimming and finishing of the road way. For (2) DoLIDAR				
	a) ordinary soil	Cum.	45751.20	113.30	5183610.00
	b) hard soil	Cum.	123617.8	135.96	16807076.00
	c) ordinary rock	Cum.	31678.12	453.20	14356523.00
	d) medium rock	Cum.	26308.15	906.40	23845707.00
	e)hard rock	Cum.	1775.85	3852.20	6840929.00
	f) E/W excavation for Structure	Cum.	426.60	135.96	58000.00
5	Construction of roadway in embankment and miscellaneous backfilling areas with approved material obtained from roadway excavation including average transportation distance up to 50 m along the lead route, spreading in layers, watering and compaction; ***[2} DoLIDAR***				
	a) ordinary soil	Cum.	164764.19	56.65	14998891.00
C.	**Structure Works**				
7	Heavy Coated GI wire gabion boxes, hexagonal mesh size (100x120mm), mesh wire 10SWG selvedge wire 8SWG, binding wire12SWG including transportation, waving, packing with rubble stones, laying them in final position, stretching, binding them together and tying down lids (17-1.4, 17-5, 17-6 DoLIDAR)	Cum.	7358	4503.00	17507665.00
8	Dry stone masonry works for dry wall including transportation	Cum.	4624.92	1388.50	6421706.00
	waving, packing with rubble stones, laying them in final position. (8 DoLIDAR) (400 to 600 m distance)				
9	Dry stone masonry works for dry stone causeway including transportation, placing	Cum.	50.2	71,362.75	3,582,410.00
	A Total				**116575042.00**

10	Bio-engineering works/Road side plantation**(3% of B**	Lumpsump			2489389.44
	B Total				**119064431.40**
11	**Provision for tools and equipments(3% of B)**				2489389.44
	C Total				**121553820.80**
12	**Provision for UC's operational expenses(3% of C)**				36466614.60
	D Total				**158020435.40**
13	**Provision for Contingencies(5% of D)**				7901021.72
	E-Grand Total				**165921457.20**
	Total Length of Road		20.2		
	Cost Per Kilometer				**8213933.51**

ANNEX-IV: RRRSDP Environmental Checklist

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

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

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

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

2. Economic activities/main occupation

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

3. Existing services and infrastructures

S N	Service/Infrastructure Category	Settlement Code											
		A	B	C	D	E	F	G	H	I			
1	**EDUCATION**												
1.1	Campus (no.)/Higher secondary Students (no.)												
1.2	High School (no.)/ Lower secondary Students (no.)												
1.3	Primary School (no.) Students (no.)												
2	**HEALTH**												
2.1	Hospital/health centre (no)Capacity (beds)												
2.2	Health Post (no.) Sub-Health Post (no.)												
3	**COMMUNICATION**												
3.1	Telephone/fax												
3.2	Mobile/CDMA												
3.3	Post Office												
4	**ELECTRICITY SUPPLY**												
4.1	from Micro-hydro												
4.2	from Mini-hydro												
4.3	from National Grid												
4.4	from Solar System												
4.5	from Diesel Generator												
5	**BUSINESS & COMMERCE**												
5.1	Hotels & Lodges (no.)												
5.2	Restaurant & Tea Stall												

S N	Service/Infrastructure Category	Settlement Code											
		A	B	C	D	E	F	G	H	I			
	(no)												
5.3	Grocery Shops (no.)												
5.4	Other Shops (no.) (e.g.stationery, medicine,tailoring, etc.)												
6	**DRINKING WATER SUPPLY SCHEMES**												
6.1	Gravity-Flow Scheme (capacity)												
6.2	Tube-wells (no.)												
6.3	Spring/Dug-wells (no.)												
7	**IRRIGATION SCHEMES**												
7.1	Surface Irrigation (ha.)												
7.2	Groundwater (ha.)												
8	**OTHER INFRASTRUCTURES**												
8.1	Micro-hydro scheme (no. & capacity.....kw)												
8.2	Water Mill (no.)												
8.3	Suspension Bridges (no.)												
8.4	Wooden Bridges (no.)												
8.5	Other Bridges (specify)												
9	**INDUSTRY**												
9.1	Weaving Industry (no.)												
9.2	Rice & flour Mills (no.)												
9.3	Other Industries (specify)												
10	**FINANCIAL INSTITUTIONS**												
10.1	Bank (no.)												
10.2	Cooperative												
11	COMMUNITY USE												
11.1	Ghat (no.)												
11.2	Hatia/Bazaar (no.)												
11.3	Playground (no.)												
11.4	Community Centre no.)												
11.5	Others (specify)												

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

4. Land holding pattern

Land holding	Settlement Code (HH No.)										Remarks
Pattern	**A ( )**	**B ( )**	**C ( )**	**D ( )**	**E ( )**	**F ( )**	**G ( )**	**H ( )**	**I ( )**		
Landless											
less than 1 ropani)											
1 to 5 ropani											
5 to 10 ropani											
10 to 20 ropani											
20-50 ropani											
> 50 ropani											

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

5 Food grain availability

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

Source:

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

S. No.	Type of Agriculture Production	Settlements									
		A	B	C	D	E	F	G	H	I	
1.0	**CEREALS**										
1.1	Rice										
1.2	Wheat										
1.3	Maize										
1.4	Millet										
1.5	Junelo										
1.6	Phaper										
1.7	Others (list)										
2.0	**CASH CROPS**										
2.1	Oil Seeds										
2.2	Beans/Dal										
2.3	Tobacco										
2.4	Potato										
2.5	Vegetables										
2.6	Fruits										
2.7	Tea/Coffee										
2.8	Amliso										
2.9	Sericulture										
2.10	Others (list)										
3.0	**LIVESTOCK & FISHERIES**										
3.1	Cattle (cows & buffaloes)										
3.2	Horses, Mules										
3.3	Yak										
3.4	Goat										
3.5	Sheep										
3.6	Rabbit										
3.7	Pig										
3.8	Fisheries										
3.9	Poultry										
3.10	Bee-keeping										
3.11	Others										

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

7. Migration for employment

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

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

(b) Seasonal migration in search of work.

Month	No. of Total HH	Destination	Purpose

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

_____

B. DEVELOPMENT POTENTIAL ACCORDING TO SETTLEMENT

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

S. N.	Name of Area	Description of Development Potential

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

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

C. Historic and Cultural Resources Within The Settlement

Type of Resource	Name/specification	Affecting activities	Location from project

Annex V: Public Notice

Annex VI: Deed of Enquiry (*Muchulka*)

Annex VII: Name of the Organizations

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

SN	Name or Organization	Address	Remarks
1	District Agriculture Development office	Liwang	
2	District Forest Development office	Liwang	
3	Office of Village Development Committee, Mijhing	Mijhing	
4	Office of Village Development Committee, Badachaur	Badachaur	
5	Office of Village Development Committee, Sirp	Sirp	
6.	Office of Village Development Committee, Pang	Pang	

Source: Field Survey, April, 2010

Annex VIII: List of persons consulted

List of persons consulted

S.N.	Name	Address	Designation	Contact No.
District Level				
1	Ramesh Neupane	Office of District Development Committee,Rolpa	Local Development Officer	
2	Rajendra Koirala	District Agriculture Development Office,Rolpa	Sr. Agriculture Development Officer	
3	Sesh Dutta Chaudhary	District Watershed and Soil Conservation Office,Rolpa	Soil Conservation Officer	
4	Pashupati Koirala	District Forest Office,Rolpa	District Forest Officer	
Mijhing VDC				
1	Bhakta Bhadur Bista	Mijhing-4	President of VICCC	9741128768
2	Kalpana Bista	Mijhing-4	Business	
3	Fageswar Sharma	Mijhing-4	Teacher	
Badachaur VDC				
1	Panna Lal Khadaka	Badachaur-2	Farmer	
2	Dil Bdr. B.K.	Badachaur-4	Farmer	
Sirp VDC				
1	Kaviram Basnet	Sirp-4	Farmer	
2	Chuman Shing Khadaka	Sirp-4	Farmer	
3	Lilaman Khadaka	Sirp-4	Farmer	

Source: Field Survey, April, 2010

Annex IX: Summary of meeting minutes with local people

Table showing summary of meeting minutes

Date	Place	Type of Participants	No.	Issues raised
2066/11/22	Mijhing	Project Affected Families, and local people	25	Cash compensation should be provided for land and crop, free distribution of seedlings for private planting, good drainage system, protection of water sources.
2066/11/24	Badachaur	Project Affected Families, and local people	21	Cash compensation should be provided for land and crop, free distribution of seedlings for private planting, good drainage system, and protection of water sources.
2066/11/26	Sirp	Project Affected Families, local People	30	Cash compensation should be provided for land and crop and free distribution of seedlings for private planting
2066/11/28	Pang	Project Affected Families, local People,	29	Road must be constructed, compensation of land and crop is not a priority; mitigation measures could be implemented to minimize the environmental impacts.

Annex X: Recommendation Letters from VDCs

Annex XI

XI a. Distribution of households by major occupation

XI b. Number of households belonging to different food security category

XI c: Land holding pattern of settlements within ZoI

XId: Summary of public services & infrastructures

Annex XIa: Distribution of households by major occupation

SN	VDC	Settlement/ Code	Number of HH and Percentage of Population engaged in					
			Agriculture & Livestock	Labour & Porter	Business/ Commerce	Cottage Industry	GO/ NGO Employees	Total HH
1	Mijhing	Barjibang	1/9.09%	3/27.27%	5/45.45%	0/0%	2/18.18%	11
2	Badachaur	Tullo-Namja	125/63.13%	47/23.73%	25/12.62%	0/0%	1/0.5%	198
		Sano-Namja	75/68.80%	26/23.85%	3/2.75%	0/0%	5/4.58%	109
3	Sirp	Salldada	45/73.77%	10/16.39%	1/1.63%	0/0%	5/8.19%	61
		Khetachaur	35/62.5%	17/30.35%	2/3.57%	0/0%	2/3.57%	56
		Ouwaldada	65/70.65%	23/25.0%	4/4.34%	0/0%	0/0%	92
		Pakhepato	28/53.84%	20/38.46%	2/3.84%	0/0%	2/3.84%	52
4	Pang	Chindar	80/65.57%	40/32.78%	0/0%	0/0%	2/1.63%	122
		Pangdada	90/55.9%	61/37.88%	10/6.21%	0/0%	0/0%	161
		Total	544	247	52	0	19	862

Source : Field Survey,April,2010

Annex XI b: Number of households belonging to different food security category

SN	VDC	Settlement	Number of HHs having food sufficiency for				Total HHs
			Sufficient for whole years)	Sufficient for 9 months	Sufficient for 6 months	Sufficient for 3 months	
1	Mijhing	Barjibang	5/45.45%	2/18.18%	3/27.27 %	1/9.09 %	11
2	Badachaur	Tullo-Namja	45/22.72%	49/24.74%	80/40.40%	24/12.12%	198
		Sano-Namja	64/58.71%	33/30.27%	6/5.50%	6/5.50%	109
3	Sirp	Salldada	14/22.95%	22/36.06%	18/29.50%	7/11.47%	61
		Khetachaur	15/26.78%	28/50.0%	7/12.5%	6/10.71%	56
		Ouwaldada	16/17.39%	20/21.73%	34/36.95%	22/23.91%	92
		Pakhepato	14/26.92%	6/11.53%	28/53.84%	4/7.69%	52
4	Pang	Chindar	42/34.42%	40/32.78%	25/20.49%	15/12.29%	122
		pangdada	60/37.26%	44/27.32%	44/27.32%	13/8.07%	161
	Total		275	244	245	98	862

Source: field survey, April, 2010

Annec XI c: Land holding pattern of settlements within ZoI

Land holding Pattern	Settlement Code (HH No.) A (11)	B (198)	C (109)	D (61)	E (56)	F (92)	G (52)	H (122)	I (161)	Total	Percentage
Landless	2	5	3	1	0	1	0	12	21	24	2.78
less than 1 ropani)	5	52	23	21	22	23	20	87	123	342	39.67
1 to 5 ropani	3	62	62	12	15	56	15	15	12	308	35.73
5 to 10 ropani	1	42	21	17	13	12	11	8	5	129	14.96
10 to 20 ropani	0	25	0	10	6	0	6	0		47	5.45
20-50 ropani	0	12	0	0	0	0	0	0		12	1.39
> 50 ropani	0	0	0	0	0	0	0	0			0
Total	11	198	109	61	56	92	52	122	161	862	

Source: Field Survey, April, 2010

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Annex XId: Summary of public services & infrastructures

S N	Service/Infrastructure Category	Settlement Code A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	**EDUCATION**															
1.1	Campus (no.)/Higher secondary	-	-	-	-	-	1	-	-	-		-	-	-	-	-
1.2	High School (no.)/ Lower secondary	1	1	1	1		1	-	-		-	-		-		
1.3	Primary School (no.)	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-
2	**HEALTH**															
2.1	Hospital/health centre (no)Capacity (beds)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.2	Health Post (no.) Sub-Health Post (no.)	-	-	1		-	1	-	-	-	-	-	-	-	-	-
3	**COMMUNICATION**															
3.1	Telephone/fax	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.2	Mobile/CDMA	√	√	√	√	√	√	√	-	-	-	-	-	-	-	-
3.3	Post Office	1	-	1	-	1	-	1	-	-	-	-	-	-	-	-
4	**ELECTRICITY SUPPLY**															
4.1	from Micro-hydro	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.2	from Mini-hydro	√	√	√	√	√	√	-	-	-	-	-	-	-	-	-
4.3	from National Grid	√	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.4	from Solar System	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.5	from Diesel Generator	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5																
5.1	Hotels & Lodges (no.)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.2	Restaurant & Tea Stall (no)	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.3	Grocery Shops (no.)	1		1	1		1		-	-	-	-	-	-	-	-
5.4	Other Shops (no.) (e.g. stationery,	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

S N	Service/Infrastructure Category	Settlement Code														
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
	medicine, tailoring, etc.)															
6	**DRINKING WATER SUPPLY SCHEMES**															
6.1	Gravity-Flow Scheme (capacity)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.2	Tube-wells (no.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.3	Spring/Dug-wells (no.)	1	1	-	-	1	1	-								
7	**IRRIGATION SCHEMES**															
7.1	Surface Irrigation(ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.2	Groundwater (ha.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	**OTHER INFRASTRUCTURES**															
8.1	Micro-hydro scheme (no. & capacity.....kw)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.2	Water Mill (no.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.3	Suspension Bridges (no.)	-	1	1	-	-	-	-	-	-	-	-	-	-		
8.4	Wooden Bridges (no.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.5	Other Bridges (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	**INDUSTRY**															
9.1	Weaving Industry (no.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.2	Rice & flour Mills (no.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9.3	Other Industries (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	**FINANCIAL INSTITUTIONS**															
10.1	Bank (no.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10.2	Cooperative	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	**COMMUNITY USE**															
11.1	Ghat (no.)	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
11.2	Hatia/Bazaar (no.)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11.3	Playground (no.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11.4	Community Centre (no.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11.5	Others (specify)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Source: field survey, April 2010

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Annex XII: List of trees to be removed

Details of affected trees

S.N	Name of the owner	Total no. of trees	Local Name	Scientific Name	Location	Chainage	Remarks
1	Badachaur Community forest	412	Salla	*Pinus roxburghii*	Badachaur	1+020+to3 +400	
2	Khageder Baniya	56	Salla	*Pinus roxburghii*	Namja	3+400 to 5+300	
3	Champh Bdr. D.C.	46	Katus, Chilaune	*Castanopsis indica, Schima wallichii*	Sirp	12+110-14+180	
4	Bhansari Khadaka	23	Uttis, Chilaune	*Alnus nepalensis, Schima wallichii*	Ouwaldada	15+000-17+360	
5	Dugra B.K.	46	Uttis	*Alnus nepalensis*	Dal Khola	18+220-18+530	
6	Chander Bdr. Gharti	54	Uttis, Salla	*Alnus nepalensis, Pinus roxburghii*	Pangdada	18+630-18+970	
7	Pang Community Forest	213	Salla	*Pinus roxburghii*	Pang	18+600 to 20+500	
	Total	850					

Source: field survey, April, 2010

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

Annex XIII: Photographs

Annex XIV: Summary of Cross Drainage Structures

Summary of Drainage works along the road alignment

Chainages	Necessary Structures for Mitgation Measures
0+300	cross-drainage structure
0+650	200m side drain on right sides
2+867	Dry stone causeway
4+500-4+900	side drain on right sides
4+800	Dry stone causeway
5+480-5+570	90m side drain on right sides
6+820-6+920	side drain on right sides
7+355	Dry stone causeway
8+110-8+510	side drain on right sides
8+510-10+00	side drain on left sides
10+020+11+700	side drain on left sides
12+800	side drain on left sides
14+550	Management of kulo at right side
15+500	Dal Khola ,Dry stone causeway

Source: Field Survey,April 2010

Annex XV: Structure for Slope Stabilization

Recommended structures necessary for slope stabilization at various places

Chainages	Necessary structures/Mitgation Measures
0+900	Need check wall at D/S beyond retaining wall.(4m*7m) and U/S both
1+160-1+190	Need gabion breast wall (GBW) at upper side(4m*30m)
0+660-0+672	3m*12m dry wall
1+380+1+400	2m*20m breast wall on ride side and dry wall on left side
1+780-1+800	2m*20m gabion breast wall (GBW) on right side
1+960-1+980	2m*20m gabion breast wall (GBW) on right side and provide gabion structure on left side
2+220-2+250	6m*30m gabion retaining wall on left side and breast wall on right side
2+300-2+370	3m*70m breast wall on right side
2+380-2+400	6m*20m gabion toe wall on left side
2+600-2+680	3m*80m gabion breast wall
2+870-2+290	Required gabion check wall at D/S0.8m*20m and rectification of existing check wall with extension at U/S (U shape)
2+940-3+012	3m*72m gabion breast wall on right side and gabion retaining wall
3+110-3+200	3m*90m breast wall
3+500-3+560	2.3m*60m gabion work on left side and breast wall on right side
3+610-3+660	1m*50m dry wall on left side
4+350-4+400	2*50m gabion wall on left side and breast wall on right sides
4+780	2m*30m gabion retaining wall on left side
4+850	4m*40m gabion retaining wall on left side
4+900	5m*8m gabion retaining wall on left side
7+200-7+270	1m*70 m dry wall on both sides
7+400-7+440	2m*40 m Dry wall
7+790	3*10m gabion wall
8+100-8+150	1m*50m dry wall
9+120-9+170	1m*50m dry wall
10+950-10+000	2m*50m breast wall
12+090-12+100	1m*10m dry wall
15+500-15+550	2m*50m breast wall
18+480-18+500	4m*20m gabion wall

Source :Field Survey, April 2010