

**Government of Nepal
Ministry of Physical Planning and Works
Department of Roads**

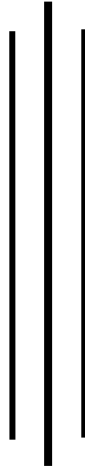


Environmental & Social Management Framework

A guide to the environmental and social
issues associated with new road
construction and upgrading

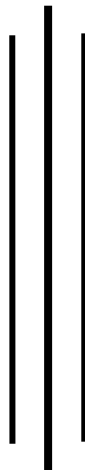
April, 2007

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List of Acronyms

ADB	Asian Development Bank
AF	Affected Families
BOT	Build -Operate -Transfer
CBOs	Community Based Organizations
CBS	Central Bureau of Statistics
CDC	Chief District Officer
CDO	Chief District Officer
CF	Community Forest
CFC	Compensation Fixation Committee
CFUG	Community Forest User Group
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DDC	District Development Committee
DDC	District Development Committee
DDG	Deputy Director General of Department of Roads
DFID	UK Department for International Development
DFO	District Forest Office
DG	Director General (of Department of Roads)
DHV	DHV Consultants, The Netherlands
DoLIDAR	Department of Local Infrastructure and Agricultural Road
DoR	Department of Roads
DPSU	District Project Support Unit
DWSC	Department of Watershed and Soil Conservation
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMAP	Environmental Management Action Plan
EMP	Environmental Management Plan
EPA	Environmental Protection Act,1996
EPR	Environmental Protection Rules,1997 (amended 1999)
ESA	Equivalent Standard Axle
ESMF	Environmental and Social Management Framework
FRCU	Foreign Cooperation Unit (of DoR)
FS	Feasibility Study
GDP	Gross Domestic Product
GESU	Geo-Environment and Social Unit, DoR
GIS	Geographic Information System
GoN	Government of Nepal
GPS	Global Positioning System
GTZ	"Deutsche Gesellschaft für Technische Zusammenarbeit" (German Technical Cooperation)
ha	Hectare (= 19.64 ropani)
HMGN	His Majesty's Government of Nepal (now GoN)
HMIS	Highway Management Information System
HRD	Human Resource Development
ICB	International Competitive Bidding
IEE	Initial Environmental Examination
IPDP	Indigenous People's Development Plan
JICA	Japan International Cooperation Agency
LAA	Land Acquisition Act
LCF	Local Consultative Forum

LFB	Local Forum of Beneficiaries
LRO	Land Revenue Officer
MoEST	Ministry of Environment, Science and Technology
MoF	Ministry of Finance
MoLD	Ministry of Local Development
MoPE	Ministry of Population and Environment (now included in MoEST)
MoPPW	Ministry of Physical Planning and Works
msl	Mean sea level (altitude in m)
mt	metric ton
NEPAP	Nepal Environmental Policy and Action Plan
NGO	Non Governmental Organization
NPC	National Planning Commission
NTFP	non-timber forest product
OP	Operational Policy
OPN	Operational Policy Note
ORN	Overseas Road Note, TRL, UK
PAF	Project Affected Families
PAP	Project Affected Persons
PIP	Priority Investment Plan
PIU	Project Implementation Unit
PRA	Participatory Rapid Appraisal
PSC	Project Supervision Consultant
PWD	Public Works Directive
RAP	Resettlement Action Plan
RIDP	Rural Infrastructure Development Project
RMDP	Road Maintenance and Development Project
RoW	Right of Way
RP	Resettlement Plan
RPF	Resettlement Plan Framework
RRA	Rural Rapid Appraisal
Rs	Nepalese Rupees [rate of exchange per 15 Nov.06: 1 US\$ =70.6 Rs]
SA	Social Assessment/ Analysis
SAP	Social Action Plan
SIA	Social Impact Assessment/ Analysis
SIA	Social Impact Analysis
SLC	School Leaving Certificate
SPAF	Seriously Project Affected Families
SPAP	Seriously Project Affected Population
SRE	Senior Resettlement Expert
SRN	Strategic Road Network
SWRP	Sector Wide Road Program
SWRP& PIP	Sector Wide Road Program and Priority Investment Plan
TA	Technical Assistance
ToR	Terms of Reference
UN	United Nations
VCDAP	Vulnerable Community Development Action Plan
VCDF	Vulnerable Community Development Framework
VCDP	Vulnerable Community Development Plan
VDC	Village Development Committee
Vpd	Vehicles per Day
WB	World Bank
ZOI	Zone of impact

Chapter 1

1 Background and Rationale for an Environmental and Social Management Framework for the SRN Project

1.1 Introduction

This Environmental and Social Management Framework report (ESMF) is prepared for the Department of Roads (DoR) to compile in an overview and guidance manner, various safeguard and compliance aspects of environmental and social issues related with the Sector Wide Road Program and the Priority Investment Plan Study for Nepal's **Strategic Road Network (SRN)** planning for 2007 to 2016. The Study commenced in September 2005 and was completed in December 2006.

1.1.1 Background

At present the National Road Network has altogether 15,308 km roads, including 4,522 km blacktop, 3,646 km gravel and 7,140 km earth roads. Put alternatively, the National Road Network comprises 15,308 km roads including 4,977 km strategic roads 1,984 km urban roads and 8,347 km district roads. GoN has proposed Strategic Road Network of about 12,600 km in the coming decade.

Nepal's economic and social development cannot be seen separately from its geography and accessibility. Adequate road connectivity and quality of roads are directly related with the country's productive sectors such as agriculture, market, commerce, industry, and social sectors including education, health, communication, livelihood and quality of life. Good road connectivity is notably linked with poverty alleviation. Among Nepal's 75 district headquarters, 17 are not connected by a motorable road, and 60 percent of the main road network and almost all rural roads are dry-weather tracks that are not operational during the rainy season. Based on the GoN policy and focus to achieve poverty alleviation also through transportation network development, road network in Nepal has grown immensely over the past half century. Nevertheless, in hills, an estimated 39% of the population (5 million) live at more than 4hrs walk from all weather roads (AWR) and in the Terai, 13% (1.4 million) live at more than 2hrs walk from the nearest AWR. Many in these isolated communities rely on foot trails and mule tracks, and have to walk to reach the nearest dry-season road. Inadequate and inefficient rural transport service therefore is a major factor constraining the use of social services and markets by communities, including education, medical facilities and agriculture markets. This problem is particularly acute in remote areas and is a contributing factor to rural poverty. The strategic planning of DoR recognizes the need for improving both strategic as well as rural transport connectivity in the country.

Road construction incurs various environmental and social impacts, including both beneficial as well as adverse ones. Particularly in a country like Nepal, which has young and fragile geology, widespread poverty in the mostly remote rural regions, vulnerable communities, rich natural biodiversity, road construction can

bring significant adversities to the local, regional and national environmental setting and socio-cultural fabric of the affected population.

A common weakness generally observed in Nepal rural road development programs is inadequate integration of environmental and social recommendations into project plans, designs and bill of quantity. This is partly because of late commissioning of environmental and social studies. The ESMF is meant to suggest mechanisms, in line with the current legal and policy framework, to make this effective. With foresight, appropriate research and diligent planning and implementation of mitigation measures and monitoring, many, if not all, of the adverse impacts can be minimized or avoided or dealt with positive and constructive ways.

Next to environmental study performance the environmental monitoring in road development programs is one of the weakest areas in Nepal. Therefore, this ESMF makes efforts to recommend strengthening the respective institutions in this regard, particularly the Geo-Environment and Social Unit of the DoR and selected units/departments within the MoPPW.

1.2 Project Description

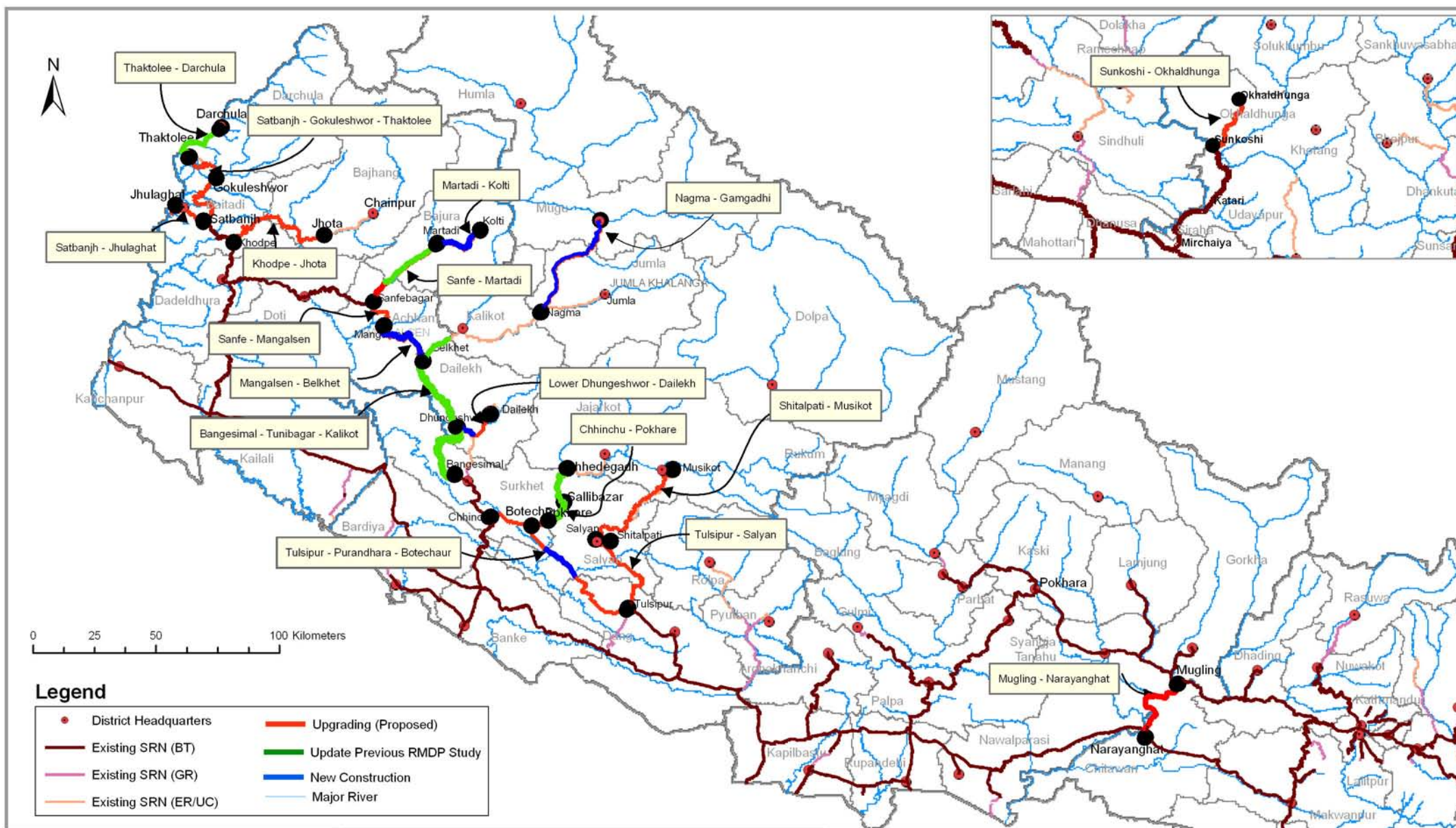
The Department of Roads (DoR) is the main agency responsible for planning, design, operation and maintenance of the Strategic Road Network (SRN) throughout Nepal. The This study, which is funded under a loan¹ from the World Bank / International Development Association (IDA), is designed to assist the DoR and Government of Nepal (GoN) with the preparation of sector wide investment plan and the development of the SRN over the next ten years.

In the period since the previous planning study was completed in 1972, the rural road network has expanded dramatically but there has been only relatively modest progress on the extension of the strategic network and substantial areas of the country are still without all-weather motorable road access. Therefore, this core of this program is to identify further strengthening of the Strategic Road Network throughout the country by selecting corresponding road sections (hereunder referred as SRN sub-projects). The present Study, of which the EMSF is a vital part for the loan effecting, aims to assist in this process and to prioritize extensions and improvements to the network over the period to 2016.

The Study aims to assist the GoN in the process of reviewing the extent of the SRN, which is the prime responsibility of DoR, and is preparing a long-term plan for the future development of the road network. The Study will also identify and prepare detailed feasibility studies for an initial 87 km of new construction and 728 km for upgrading, which will be proposed for funding under the next IDA credit for Nepal. The locations of the proposed sections for the SRN are illustrated in Fig. 1.1.

¹ Nepal, Road maintenance & Development Project: Loan: IDA Credit 3293-NEP

² Priority Investment Plan Project, WSA, February 1997



1.3 Rationale and Approach for the Environmental and Social Management Framework

Road construction activities bear the risks for potential environmental impacts likely to occur in the physical, biological, social, cultural and sometimes archaeological spheres. Landslides, slope failures, soil erosion, loss of national park, forest and agricultural lands and interference with water courses, irrigation facilities, run-off and sedimentation are among the major impacts resulting from road construction that need thorough addressing in design and construction, incorporating proven mitigation measures that will bring adverse effects down to acceptable levels.

Awareness and appreciation of the opportunities and risks involved due to road project implementation are often beyond the comprehension of local people. They may greet the new construction with high expectations, or anxiety, suspicion, concern or resistance. It is among the principal objectives of this ESMF to provide decision makers, engineers and supervisors of road maintenance works with a reference document that will demonstrate the government's proponents efforts to address properly the potential risks associated with road works, and to divulgate the management options and environmental/social safeguard measures to the broad public to gain full understanding and support of those using the national road network.

1.3.1 Key Objectives of the ESMF

The ESMF intends to provide technical and managerial inputs and guidance into the design of the strategic roads (both designated for rehabilitation and, to lesser extent, to new construction, in the Western Districts of Nepal), through identification of key environmental and social issues related to the foreseen projects (hereunder referred as "SRN sub-projects"), mitigate potential impacts and concerns and, devise opportunities to enhance the benefits. The framework integrates in a step-wise approach the most important environmental and social considerations into all stages of project preparation, implementation, monitoring and operation and is applicable to all future sub-projects funded under the SRN program. Based on both the Consultants' ToR and discussions held with the Client (DoR/WB), the key objectives to be addressed in the ESMF are:

- Review GoN's existing policies, regulations, operational guidelines and institutional arrangements to address and mitigate environmental and social impacts of national roads.
- Assess the compatibility of the core principles of GoN policies with policies of the donor agencies, identify gaps, and present recommendations for addressing the gaps.
- Describe the tools and procedural steps to assess the environmental and social issues for all project-related activities, and describe stepwise the corresponding management requirements in the entire project cycle.
- Prepare a screening and consultation framework for environmental and social assessment of the proposed sub-projects; this framework shall include all parties involved, particularly focusing on service providers to ensure that the safeguard measures prescribed in the EMAPs are duly followed and enforced.
- Refer to established principles relating to environmental and social safeguard mechanisms to be incorporated in DoR's road development programs; The Code of Good Practice compiled in this document (Annex 2) and the Social Assessment and Consultation Frameworks (Chapter 6 to 8) shall form an instrumental basis in carrying out new road development projects.
- Planners and users of this ESMF should also consult other documentation that will give ample accounts on lessons learned with respect to

environmental and social safeguard aspects, and how to avoid adverse impacts and how to enhance beneficial ones. In this context, special reference is made to a supplementary report referring to 'Lessons of Experience – Case Studies of Complemented Projects' prepared and submitted in Sept. 2006 by the Consultants, as well as to the 'Project Completion Report for RMDP, prepared by SMED/CEMAT in June 2005.

- Assist the GESU of DoR in the preparation of IEEs, EIAs and SIAs to be used as standard operational assessment and management models for future sub-projects becoming selected under the SRN road program.
- Prepare an exemplary matrix of mitigation measures to manage the identified impacts.
- Identify practical, feasible, credible and cost effective measures to offset or to reduce adverse environmental and social impacts to acceptable level, and ways to enhance positive impacts. As applicable, also address secondary, induced and cumulative impacts that may be associated with the forthcoming road construction activities.
- Make specific reference to the public consultation process and the consultation framework, describing adequate participatory mechanisms particularly with respect to local employment, gender issues, empowerment and local control instruments.
- Prepare a Resettlement Policy Framework.
- Prepare a Vulnerable Community Development Framework.
- Recommend measures to strengthen project implementation mechanisms and institutional arrangements at different phases of the project cycles, with respect to the Environmental and Social/ Resettlement Management Plans.
- Provide a detailed account on strengthening the institutional capacity of DoR, in specific of the unit in charge, the GESU. Based on a need assessment (Chapter 10) This should be followed by a an in-house training program on environmental and social impact assessment skill development.³

1.3.2 Methods Applied to Prepare the ESMF

The methodology adopted for preparation of the ESMF included:

Review of relevant GoN environmental and land acquisition legislation and operational guidelines;

- (i) Review of pertaining operational guidelines from various donor agencies (WB, ADB, JICA, DFID) being actively involved in the country's road and transport sector programs⁴;
- (ii) Consultation of meteorological, hydrological, and geological source information (atlases, thematic maps, scientific data compilation, statistical material etc.) for the said regions;
- (iii) Site-specific E&S assessments, collecting environmental and social baseline data for sub-projects selected by the Client;
- (iv) Identification of stakeholders and carry out public consultation at selected sites on environmental and social issues⁵;

³ Prepared and submitted by the Consultants in a separate document.

⁴ Key documents included the Land Acquisition Act (1977) and the World Bank's Operational Policy 4.12 on Involuntary Resettlement and Operational Directive 4.20 on Indigenous Peoples

⁵ Carried out in randomly selected sample subprojects in the Terai and Hill Districts. Details see the social impact assessment reports of the PIP Consultations were held with different stakeholders, including VDCs, DDC's, Local Road User Groups (LRUG), local NGOs, as well as other government departments. Separate interviews were held with vulnerable groups, women, disabled and landless.

- (v) Conduct primary field investigations on the environmental and social setting in the feasibility study candidates;
- (vi) Identification of local adverse environmental and social impacts and strategies of how they could be minimized or mitigated;
- (vii) Identification of positive impacts and how they could be enhanced;
- (viii) Incorporation of the consultation and field observation findings/records into the proposed designs;
- (ix) Establishment of indicators and mechanisms for monitoring and evaluation; and,
- (x) Discussions with the Client to identify needs for institutional strengthening with respect to the EA arrangements.

The environmental and social screening criteria to identify the sub-project's environmental and social impacts have been discussed with the Client and with World Bank and are integrated in this ESMF. The social screening criteria will identify the loss of land, assets, structures, livelihoods, the willingness of affected people/communities to voluntarily donate any required land, the presence of indigenous, ethnic, vulnerable people and other significant social impacts. Social screening will also enable the categorization of subprojects based on their levels of impacts. Where the extent of adverse social impacts is minor and no displacement or loss of assets or livelihoods expected, no further action is required. However, where the social screening indicates that land acquisition, relocation, or loss of assets is unavoidable, appropriate mitigation instruments (sub-project resettlement action plans) will need to be prepared.

Environmental and social screening has been carried out as part of the feasibility studies for selected sub-projects. As far as the social assessment is concerned, the following approach has been adopted:

- (i) Identification of social Impacts in sample sub-projects: Key beneficial parameters to be assessed were enhanced access to motorable transport and social services, reduction in travel time and transport costs, and employment opportunities for work on project through beneficiary communities. On the perception of adverse project, key parameters assessed were land acquisition, compensation and resettlement.
- (ii) Development of Social Impact Management Guidelines: The social issues identified provided the analytical underpinnings for preparing appropriate mitigation strategies. A Resettlement Policy Framework (RPF) has been prepared to define the policy and institutional framework to guide the compensation/entitlement for loss of land, assets, livelihoods and other social impacts. Similarly, a Vulnerable Community Development Plan (VCDF) has been prepared to address impacts on vulnerable groups and ensure their inclusion in the project activities.
- (iii) The ESMF is applicable to all proposed subproject activities and through all stages of the subproject cycle: pre-planning, planning and design, implementation, and post-implementation.

1.3.3 Sources of Information

Related to specific aspects, sources of information were as follows:

- (a) Physical Resources
 - Land, Water and Air
 - Maps (thematic / GIS maps), Satellite images etc.
 - Survey data from geological and hydrological studies

- Climate and statistical data published by Bureau of Statistics
- Other published documentation on these subjects.

(b) Biological Resources

- Scientific publications on local biota surveys
- Species distribution maps
- Ecological studies carried out in the project area (particularly when protected areas are in close vicinity, e.g. Rara Lake)
- Direct observations carried out by specialized surveyors
- Accounts on habitats and species given by local residents contacted during public consultation processes
- Other relevant documentation.

(c) Socio-economic and Cultural Resources

- Scientific publications on previous local surveys
- Published demographic data and maps
- Household surveys carried out by the Consultants Field Team

1.4 Potential Users of this Environmental and Social Management Framework

The Report is prepared as an after due discussion with the Client at DOR and the donor at the office of World Bank. It was advised to the Consultant to prepare the document in such a way that stakeholders affiliated or affected by the forthcoming sub-projects of the SRN, as well as other road projects of similar size and regional setting, will make use of this report in various aspects of managing the environmental and social implications during planning, design and implementation of the envisaged program.

The ESMF is applicable to all proposed subproject activities and through all stages of the subproject cycle, i.e. from pre-planning, planning and design, implementation to post-implementation. The design flow of ESMF activities will be coordinated and integrated into the project cycle. This does not waive the necessity of any project proponent to refer and comply with the national regulatory provisions as outlined in Chapter 2 of this ESMF.

The mainstreaming of environmental and social aspects in the project cycle will be achieved through:

- Incorporation of environmental and social activities in the Operational Guidelines for each sub-project.
- Development of supportive programs in the areas of vulnerable communities' development, resettlement and rehabilitation, and monitoring and evaluation.
- Establishment of appropriate institutional arrangements for environmental and social impact management.
- Development of a communications/information dissemination strategy.
- In-house training and capacity building on environmental and social impact management.
- Intensive use and application of the guidelines prepared by previous efforts of the Geo-Environment Unit, namely the 'Environmental Management Guidelines May 1997', and the 'Reference Manual for Environmental and Social Aspects of Integrated Road Development, 2003'.
- Intensive use and application of the 'Roadside Bio-Engineering Manual 1999' prepared under DFID funding,
- Intensive consultation of all documentation available on Good Practice in road construction under local conditions, particularly referring to the ODA Manual on 'Principles of low cost road engineering in mountainous regions (ORN # 16) and other principles provided in Annex 2 of this document.

- Consultation of the completion documents that were recently developed under the RMDP Program.

The concepts and procedures presented in this framework is intended to help DoR, stakeholders and project proponents to fulfil their environmental and social responsibilities as required under the National Environmental Impact Assessment Guidelines of 1993 and GoN policies and regulations detailed in Chapter 2. The focal addressee within the DoR is the GESU (Geo-Environment & Social Unit) who is responsible for supervising and managing E&S aspects in all phases of strategic road network development. Details are given in Chapter 9 and 10 of this ESMF

This ESMF will help keep the overriding E&S responsibilities firmly in mind during the scoping process while writing the Terms of Reference (ToR), while conducting the Initial Environmental Examination (IEE) or the Environmental Impact Assessment (EIA) with reference to the proposed and sector-wide road development. It will also aid in the process of compliance monitoring in regards to each project's Environmental Management Action Plans (EMAP), Social Action Plans (SAP) and related plans and resettlement (RP/RAP).

Table 1.1 Main Stakeholders and Users of the ESMF

1) ROAD AGENCY : DEPARTMENT OF ROADS	
<ul style="list-style-type: none"> • Planning and Design Branch <ul style="list-style-type: none"> ▪ Geo-Environment & Social Unit ▪ Monitoring and Evaluation Unit ▪ Road and Traffic Unit ▪ Roads Sector Skills Develop. Unit ▪ Highway Management Information System Unit 	<ul style="list-style-type: none"> • Foreign Cooperation Branch <ul style="list-style-type: none"> ▪ Road Project managers • Maintenance Branch <ul style="list-style-type: none"> ▪ 5 Regional Road Directorates ▪ 25 Divisional Road Offices
2) GOVERNMENT LINE AGENCIES	
<ul style="list-style-type: none"> • Ministry of Physical Planning and Works <ul style="list-style-type: none"> ▪ Nepal Roads Board (in a supervisory role) • Ministry of Labor and Transport Management <ul style="list-style-type: none"> ▪ Dept. of Transport Management 	<ul style="list-style-type: none"> • Ministry of Local Development <ul style="list-style-type: none"> • Department of Local Infrastructure Development and Agricultural Roads (where agricultural roads and/or other local infrastructure are affected) • Ministry of Water Resources
3) OTHER RELEVANT GOVERNMENT MINISTRIES	
<ul style="list-style-type: none"> • Ministry of Forest and Soil Conservation <ul style="list-style-type: none"> ▪ Dept of Forests ▪ Department of National Parks and Wildlife Conservation ▪ Department of Soil Conservation and Watershed Management 	<ul style="list-style-type: none"> • Ministry of Culture, Tourism and Civil Aviation <ul style="list-style-type: none"> ▪ Department of Archaeology • Nepal Electricity Authority / Dept. of Electricity Development • Nepalese Army
4) CONSULTANTS	
<ul style="list-style-type: none"> • Environmental/EIA Consultants • Social/SIA Consultants 	<ul style="list-style-type: none"> • Technical/Engineering Consultants • Legal Consultants
5) CONTRACTORS	
<ul style="list-style-type: none"> • Construction Implementing Contracts 	

6) COMMUNITY LEVEL STAKEHOLDERS	
<ul style="list-style-type: none"> • Local Authorities (LAs) <ul style="list-style-type: none"> ▪ District Development Community ▪ Village Development Community ▪ Municipalities • Community Based Organizations • Non-Governmental Organizations 	<ul style="list-style-type: none"> • Local Constructive Forums • Compensation Determination Committee (CDC) • Road Neighbors • Political Leaders and Representatives
7) PRIVATE INVESTORS	
<ul style="list-style-type: none"> • Private Investors under BUILD OPERATE AND TRANSFER (BOT) • Private Investors under BUILD OWN OPERATE AND TRANSFER (BOOT) 	

1.5 Structure of the ESMF Document

This Environmental and Social Management Framework Report, following this introductory section, contains further 10 Chapters:

Chapter 2: Proposed Methodological Framework for SRN-related Environmental Assessment Studies: contains details of the necessary activities carried out during various stages of the project planning, study, design and implementation. This chapter contains major framework conditions to be provided by the ESMF. It stepwise details on carrying out environmental and social assessment in projects for sector wide application, guiding the user on what to be conducted with what methodology at various stages of the EA study, including the environmental auditing. It also provides the basic principles for planning, implementing and monitoring mitigation measures while considering this road development project.

Chapter 3: Legal Framework: Policies, Regulations and Guidelines: Review of the Legal Framework: Policies, Regulations and Guidelines of the Government of Nepal, and those of the major donor agencies, that bear relevance to the forthcoming SRN program.

Chapter 4: Identification of Potential Environmental and Social Impacts in SRN Sub-Projects: Describes in specific details the various impacts that may occur due to implementation of the envisaged road sub-projects. It contains both beneficial as well as adverse impacts experienced in different ecological settings of the country. Experiences of other / similar road projects implemented in Nepal have also been included. However, additional compilation of the impacts based on the experience of this Study as well as past studies conducted in the country is still being carried out.

Chapter 5: Public Consultation Framework: presents the specific public consultation framework that needs to be applied while carrying out the respective EAs for the corresponding sub-projects. It also includes the consultative procedures required for different project implementation phases as outlined in the Environmental Management Plan and in the Social Action Plan.

Chapter 6: A Compendium of Environmental and Social Impacts Mitigation Measures in Road Projects Planned under SRN: Provides technical aspects how to maximize beneficial impacts and how to avoid or minimize of adverse impacts under the typical setting in the forthcoming road development program.

Chapter 7: Resettlement Policy Framework: contains the framework prepared for carrying out land and property acquisition, compensation and resettlement during project implementation. It follows the GON and WB policy and provisions. The National Resettlement Policy Framework is currently being prepared by National Planning Commission, and is expected to be finalized within couple of months. Once this is finalized, the RPF will also refer to this binding document.

Nevertheless, the draft version of this has already been followed while preparing this RPF under the current study.

Chapter 8: Vulnerable Community Development Framework: contains the framework prepared for vulnerable community development while carrying out EA and their implementation in road projects under a sector wide concept.

Chapter 9: Institutional Arrangement for ESMF Implementation: contains an assessment of the institutional arrangements and managerial procedures necessary for implementation of the overall sector wide environmental and social management framework in the envisaged SRN sub-projects.

Chapter 10: Institutional Strengthening of DoR: This chapter identifies gaps and needs related to institutional strengthening of DoR, focusing on the units responsible for environmental and social components of road and traffic management planning and supervision.

Attached appendices are:

ANNEX 1: The Consultant's Terms of Reference for Preparing the ESMF

ANNEX 2: Environmental Code of Practice – a Practical Guidance: Provides technically specified solutions illustrating the general principles of environmentally sound and sustainable planning, design and construction of road structures. It also refers to drainage and flood prevention, roadside planting, work safety and health concerns, and protection of wildlife and cultural assets. The guideline is referring to a number of manuals already available at the GESU of DoR, and provides a number of modifications of other useful guidelines.

ANNEX 3: Glossary for Technical Terms used in the ESMF

ANNEX 4: Reference List

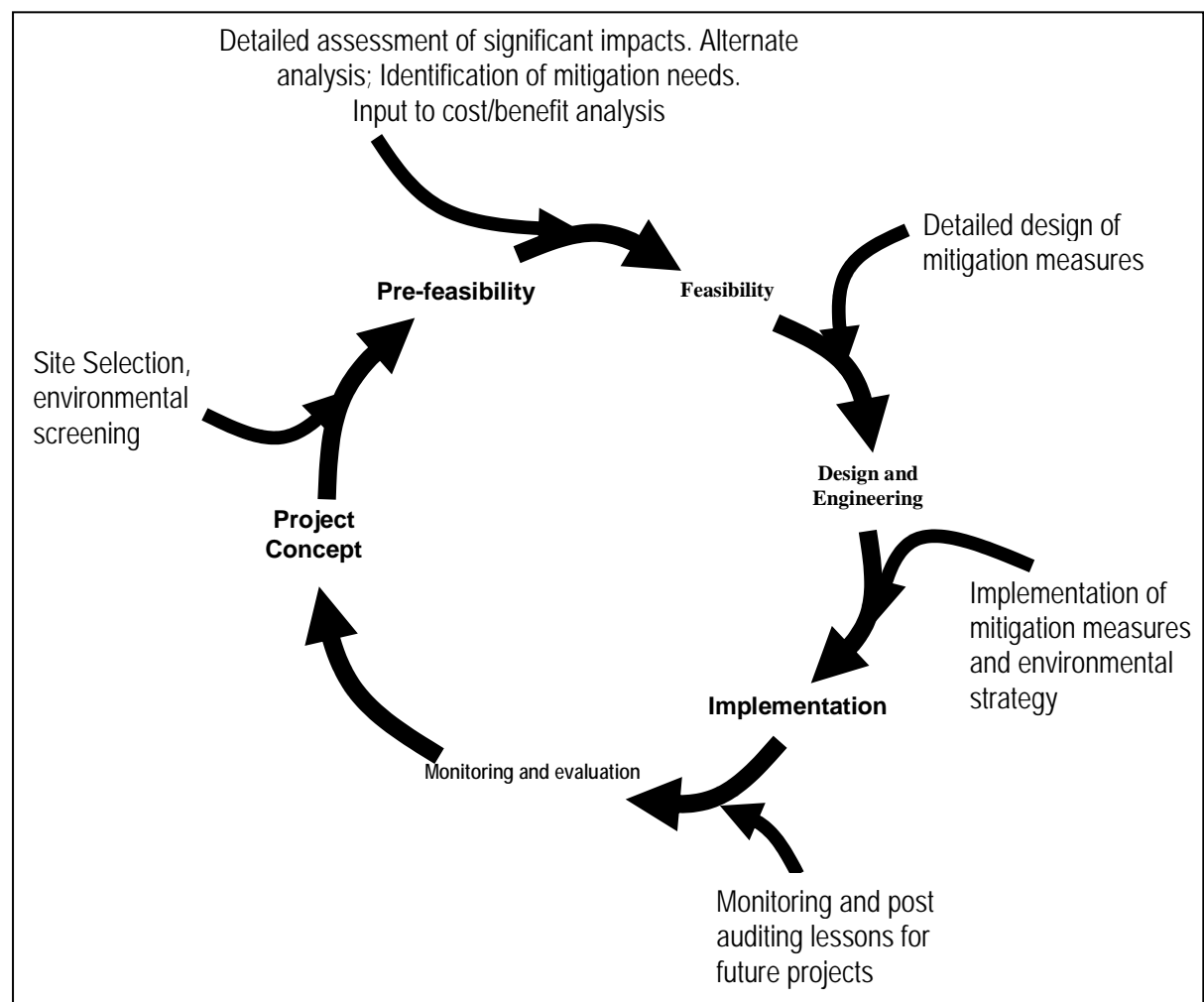
Chapter 2

2 Proposed Methodological Framework for SRN-Related Environmental and Social Assessment Studies

2.1 Embedding the EA Studies in Project Cycles for DoR Projects

This section provides an overview of the sequential methodological steps that are to be followed in each assessment exercise that bears relevance to both the environmental and the social impacts that are likely to occur in the forthcoming road development projects under the SRN Program. The process is in line with the current operational guidelines provided by GoN's *Manual for environmental and social aspects of Integrated Road Development, MoPPW/DoR, 2003* that require the integration of the EA process in project cycles (Fig. 2.1).

Fig. 2.1: Integration of the EA Process in Road Project Cycles



The methodology outlined in this Chapter is intended to assist the IEE, EIA or SIA practitioner as well as the designers, engineers, supervision and monitoring personnel involved in these projects. It gives practical guidance on the process required by the legal provisions (see Ch. 3) from field identification, preparation of assessment reports, submission and approval, to the implementation of the prescribed management options. The assessment process itself is summarized in the GoN's Public Works Directives 2002, as shown in Tab. 2.1.

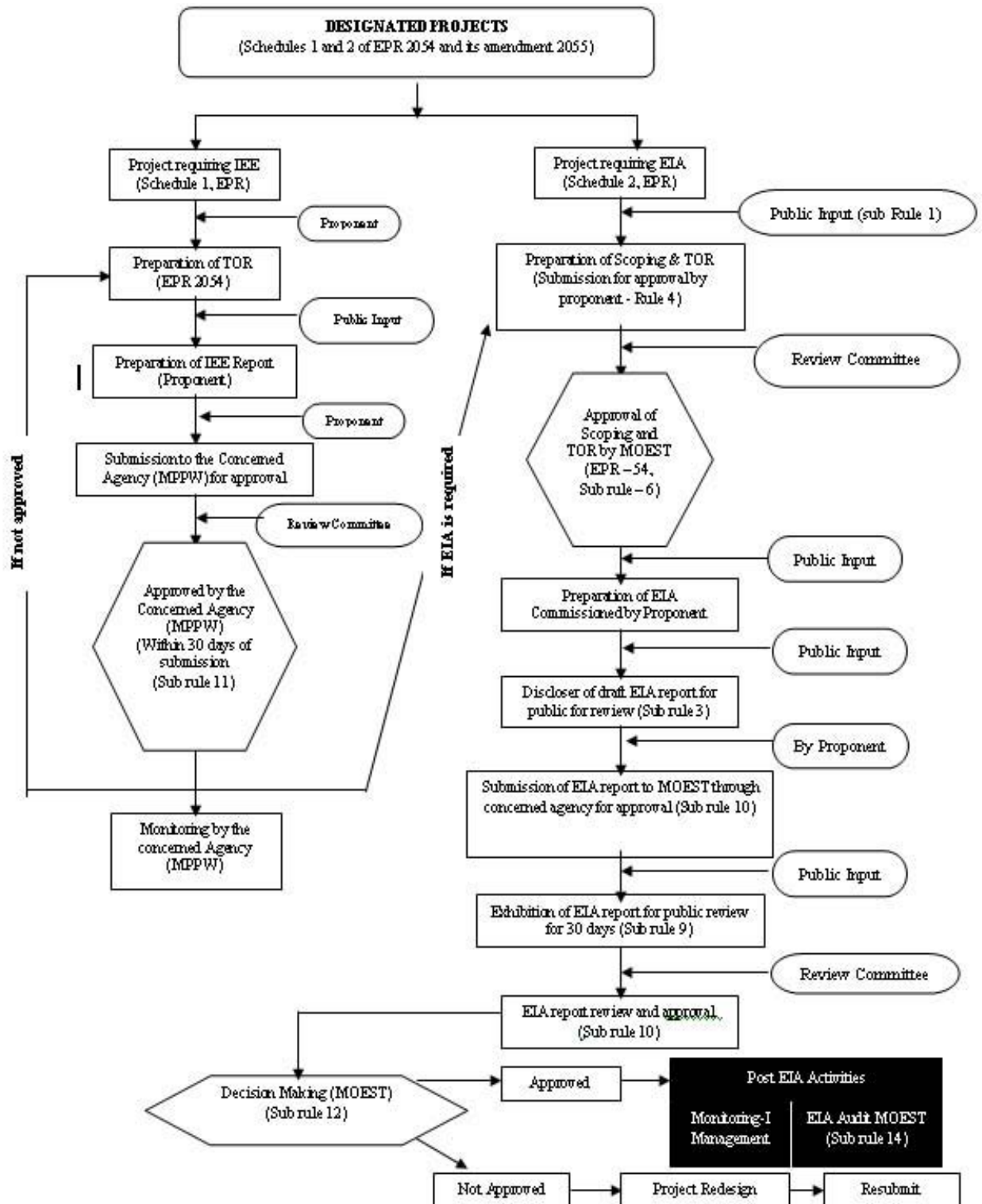
Table 2.1: Environmental and social assessment and management steps for the proposed projects under the SRN Program

Stages in Project Cycle	Steps in the Assessment Process
Project Identification / Pre-Feasibility Study <PWD p. II, ch. 1.	1. Environmental Screening , and 2. Initial Social Assessment; → both need to decide on further needs for an IEE, or a full EIA.
Feasibility Studies <PWD p. II, ch. 1.	3. Initial Environmental Assessment (IEE) : basic impact assessment, its findings and recommendations to be incorporated into Design. 4. Environmental scoping and 5. Social scoping : → identify significant potential impacts and project alternatives, and propose ToR for the-identified type of EA and SIA.
Environmental and Social Assessment <PWD p. II, ch. 3 and ch 4.	6. (Pre-)Terms of Reference (ToR) for the intended IEE/EIA/SIA Study 7. Baseline Data Collection : identifies current and future environmental conditions related to the proposed project. 8. Identify Environmental Impacts : predicts impacts in terms of characteristics such as magnitude, extent and duration in quantitative terms as far as possible; include the analysis of potential cumulative/induced impacts. Assess also alternatives including preferred and 'no action' options. 9. Develop Management & Mitigation Measures : to avoid, reduce and minimize adverse impacts and enhance beneficial impacts→ Prepare an EMP matrix and work out and cost proposed actions 10. Public Consultation and Participation : to be conducted at various stages in the assessment process to ensure quality, comprehensiveness and effectiveness, and that stakeholders' views are adequately-followed up 11. Prepare EA Report : summarizes all information obtained, analyzed and interpreted in a report form suggested by the approving authorities. The EA Report should contain a non-technical summary including methods used, results, interpretations and conclusion.
Project Appraisal /Approval <PWD p. II, ch. 5.	12. Review and Approval of the EA Report : review by MoPPW for IEE and MoEST for EIA of the report to assess if all possible issues have been adequately addressed and to facilitate the decision-making process; decide if project should proceed, or if further alternatives must be explored.
Implementation Plan <PWD p. II, ch. 6. Engineering Design <PWD p. II, ch. 7.	13. Prepare Environmental Action Plan (EMAP) : determines specific actions to take during engineering design, construction, and operational and maintenance stages to minimize or mitigate impacts, and to address cumulative/induced impacts..
Engineering Design & Construction of Works <PWD p. II, ch. 7,11.	14. Environmental Monitoring : determines compliance with EMAP and of impacts. Monitoring includes also effect monitoring (on the bio-physical and social environment, to be measured by objectively verifiable indicators as described in the EMAP. This section must define schedules and respective responsibilities for monitoring and supervision activities.
Post-Construction Activities & Audit <PWD p. II, ch. 12,16.	15. Environmental Audit : conducted by an independent/contracted firm immediately after construction and two years later, to come forward with recommendations that have to be followed up by pre-identified line agencies

2.2 Specific Activities and Responsibilities in the EA Process

The linkage of the stepwise assessment activities for road development projects in Nepal is illustrated in the following diagram:

Fig. 2.2: Steps to Conduct an IEE or EIA Study



The major activities and the relating responsibilities as well as an estimation of the time required for each sub-activity are shown in Table 2.2:

Table 2.2: The six major activities and responsibilities during different project stages for conducting road EA studies in Nepal

Stage	Steps / Activites	Description	Responsibility	Estimated Time
Step 1: Screening				
Planning and Pre-feasibility	Undertake Screening	Prepare a document containing environmental information covering potential environmental impacts, mitigation measures, evidence of public consultation, etc Take no further action for projects, which do no require EA	DoR as Proponent or accredited professionals	3 weeks
Step 2: Scoping to identify type of EA Study				
Pre-feasibility/ planning	Scoping Exercise	Identify, by using checklists and based on preliminary field examination the necessity to conduct an IEE or an EIA, as per EPR	Proponent assisted by professionals	3 to 4 weeks
		Produce Environment related document to competent authority for approval		
Step 3: Terms of Reference for EA Studies				
Pre-feasibility/ planning	Preparation of Terms of Reference	Define the main Environmental Concerns and Issues related to proposed road, which must be addressed by EA	DoR/GESU assisted by Prof. EA Team	3 to 6 weeks
	Approval of TOR	Review, Comment and Approve Terms of Reference	MPPW for IEE MoEST for EIA	
Step 4: Preparatory Work for EA studies				
Pre-feasibility and Planning	Assigning the work	Determine whether to conduct EA using in-house staff, or whether to outsource it	GESU/DoR GESU/DOR	4 weeks
	EA Team Formation	Form Team as per TOR	EA Team	
	prepare Work Plan	Establish a work plan that gives appropriate weight to all activities	EA Team	
Step 5: Undertake EA Studies				
Desk Studies				
Planning and Design	Secondary Source of Information	Collect and review appropriate published data, such as maps, reports, etc	EA Team	2 weeks
	Initiation, Interaction and Consultation	Discuss the proposed road and its potential environmental impacts with knowledgeable persons and concerned stakeholders		
	Preparation of Information Summary	Draft a summary of the information that is relevant to the project and its possible environmental effects		
	Selection of methods and techniques	Determine the methods by which the field work for EA will be conducted		
	Improve Work Plan	Revise the work plan on basis of desk studies		
Field Work				
Planning and Design	Field Equipment	Collect and Arrange Field Equipment required for EA studies	EA Team	2 weeks
	Field Survey for Collection of Baseline Information	Walkover survey, interacting with local communities, and investigate the issues identified during desk study Collect baseline environmental information in terms of physical, biological, and socio-economic and cultural aspects		
Data Analysis and Interpretation				
Planning and Design	Identification of Environmental Impacts	Establish what environmental Impacts will occur as result of interaction of environmental setting and road construction and operation activities		
	Impact Prediction	Establish the extent of environmental consequences of the road construction and operation		

Stage	Steps / Activities	Description	Responsibility	Estimated Time
	Assessment of significance of impact	Judge whether the consequences are significant enough to require action to be taken	EA Team	4 weeks
	Mitigation Measures	Design Mitigation Measures: to avoid, reduce, minimize and compensate for adverse environmental and social impacts; and maximize beneficial impacts.		
	Environmental Management Plan	Prepare EMP covering Monitoring and Project Management to ensure the implementation of mitigation measures.		
	Public Consultation	Occurs at various stages in the assessment process to ensure quality, comprehensiveness and effectiveness, and that stakeholders' views are adequately addressed.	EA Team, DoR/GESU	2-3 weeks
Project Appraisal/Approval	Review and Approval of EA Report	Check completeness, adequacy, credibility, facilitate the decision-making process; decide if project should proceed, or if further alternatives must be examined.	GESU/DoR will review, comment and forward to MoPPW for review, comment and approval for IEE Report. For EIA, MoPPW will forward it for review, comment and approval to MoEST.	6 weeks
		Approval of EA Report/Rejection	MoPPW or MoEST	
Design, Implementation	Implementation of EMP, Monitoring	determines compliance with EMP	DoR/GESU; MoPPW	Entire construction period
Step 6: Post Construction Audit				
Environmental Audit	Auditing	Environmental Audit: conducted two years after project completion	MoEST for EIA Study	During Operation period

2.2.1 The Procedural Steps in Road IEEs and EIAs

The following describes in more details the single steps outlined in the previous table:

STEP 1: ENVIRONMENTAL SCREENING

Screening in GoN is based on project-type threshold criteria, whereas most of donors' approach is screening on the basis of potential environmental consequences. According to GoN approach, IEE is required for Minor Feeder Roads. However, the common approach proposed in donors guidelines is to deal on case-by-case basis. The forthcoming IEEs/EIAs will have to be fully in line with the legal provisions given by GoN in order to obtain timely approval.

At the initial stage of the project planning, information on the detailed project design will not be available, but the basic nature of the project will be known (for example, a strategic road or a district road). The area of land which is likely to be converted into road and the alignment along which the project is being proposed to be implemented are taken into account. At this stage, the "screening" exercise is mainly meant to pre-identify the likelihood of environmental and social impacts associated with the planned project activities, at all of its phases. The screening process at this stage is best performed with the help of established (or prescribed) environmental screening checklist to ensure some form of completeness.

At this early stage, quick environmental overview/reconnaissance or preliminary environmental study can indicate, whether any of the alternatives proposed are environmentally harmful, such as

- identification of "viable" alternatives (from an environmental viewpoint), and
- provision of an early indication of likely significant impacts for further EIA work.

STEP 2: PROJECT SCOPING

In Nepal, projects to be considered for application of IEE and EIA are listed in the Schedule 1 and Schedule 2 related to Rule 3 of Environmental Protection Rule, 1997 (first amendment, 1999) of GoN. The legal criteria are shown in Tab. 2.3. Accordingly; all road development projects must be considered for conducting either an IEE or a full EIA, depending on their length, project costs and, above all, if they are new constructions or just rehabilitation and upgrading works. For the sub-projects pertaining to this ESMF, all but one fall in the category of IEE.

Table 2.3: Legal Criteria for Selecting an IEE or EIA in the Road Sector, and comparison of requirements prescribed by the GoN and the WB

Type of Project	Type of EA Required	EA Category as per WB
Construction of National Highways	EIA	A
Construction of Major Feeder Roads	EIA	A
Construction of Minor Feeder Roads	IEE	B
Construction of District Roads	IEE	B
Construction of Urban Roads	IEE	B
Construction of Rural Roads	IEE	B
Construction of 1 to 5 km long Ropeways	IEE	B
Construction of more than 5 km long Ropeways	EIA	A
Construction of 1 to 5 km long Cable Car	IEE	B
Construction of more than 5 km long Cable Car	EIA	A
Construction of Major Bridges	IEE	B
Construction of Minor or Medium Bridges	EXEMPTED	C
Construction of Tunnels	IEE	B
Routine, Recurrent, Periodic, and Emergency Maintenance	EXEMPTED	C
Upgrading, Rehabilitation and Reconstruction of National Highways and Feeder Roads	IEE	B
Any Project which requires Deforestation, Clearance Felling or Rehabilitation of National Forest of an Area up to 5 Hectares	IEE	B
Any Project which requires Deforestation, Clearance Felling or Rehabilitation of National Forest of an Area more than 5 Hectares	EIA	A
Any Projects which is to be constructed within Sensitive Area (Historical, Cultural and Archaeological; Ecologically Sensitive and Wetland Area; National Park, Wildlife Sanctuaries and Conservation Area; Semi-arid, Mountainous and Himalayan Regions; Flood-Prone and other Dangerous Areas; Residential, School and Hospital Areas; Areas that are main source of public water supply)	EIA	A
Project with investment cost of Rs. 10 million to 100 million	IEE	B
Project with investment cost of over Rs. 100 million	EIA	A

Source: EPR, 2054 (Schedule 1 & 2 pertaining to Rule 3), and MoPE 'Additional Notice', Nepal Gazette August 23, 1999. See also Public Works Directives, 2002, Part I, §3.2 (p. 3-1)

The objectives for Scoping are:

- Provide an opportunity for the Proponents, Consultants, relevant authorities and interested and affected parties to exchange information and express their views and concerns regarding a proposal before an IEE/EIA is undertaken; and
- Focus the study in reasonable alternatives and relevant issues, to ensure that the resulting IEE/EIA is useful to the decision maker and addresses the concerns of interested and affected parties, as well as to facilitate an efficient EA process that saves time and resources while reducing the risk of costly delays.

STEP 3: TERMS OF REFERENCE FOR EA STUDY

The Rule 5 under Section 2 of the Environmental Protection Rule 1997 requires that the project prepares his own 'Terms of Reference' in the format prescribed in Schedule 3 before going ahead with an IEE or EIA. The approval of going ahead is given by MoPPW in case of IEEs, and by MoEST in case of EIAs.

Accordingly, the ToR Document to be submitted (to either MoPPW or MoEST) should contain adequate information on

- Intended project activities, Location and magnitude, beneficiaries
- Systematization of working procedures
- Delineation of specific activities to be undertaken,
- Embedding of the proposed EA study into the context of existing policies, rules and administrative procedures
- Setting out of time requirement of expert manpower
- Technical guidance to proponent/consultants

The Proponent responsible for submission of the ToR Report should answer the following questions:

- Who will do it?
- Why will it be done?
- How will it be done?
- When will it be done?

Experience shows that the provisions given in the EPR with respect to the format (Table 2.4) of the Terms of Reference for EA studies are meticulously to be followed to avoid rejection of approval and delays in the planning and execution of the proposals.

Table 2.4: ToR for EA Studies in Nepal Requiring Approval of MoPPW or MoEST

Section No.	Table of Content
1	Name and address of the individual or institution (proponent) preparing the IEE/EIA report
2	Proposals: a. General introduction b. Relevancy of the proposal
3	Procedure to be adopted while preparing the IEE report
4	Policies, laws, rules, and manuals to be taken into account while preparing the IEE/EIA report
5	Preparation of the IEE report: a. Time b. Estimated budget

Section No.	Table of Content
6	Specific impact of the implementation of the proposal: a. Social and Economic b. Cultural and Physical c. Chemical d. Biological
7	Alternatives for the implementation of the proposal: a. Design b. Project site c. Technology, procedure of operation, time schedule, raw materials to be used
8	Matters concerning prevention of impacts from implementation of the proposal on the environment
9	Matters to be monitored while implementing the proposal
10	Other necessary matters

(Ref.: EPR 1997 Schedule 3)

Publish Public Notice: Within the process of preparing the ToR and screening for the baseline conditions, the public general has to be informed about the planned activities. The Proponent (DoR in case of SRN) shall inform the VDCs/Municipalities, DDCs and other important stakeholders, individual or organizations concerned the implementation of the project and its impacts through a 15-day notice to be published in a national daily newspaper and notified at VDC/Municipality, DDC, school, hospital/health post. Comments and suggestions received through such a notice needs to be included in the IEE/EIA report.

STEP 4: PREPARATORY WORK FOR EA STUDIES

The main achievement in this step is to obtain the approval from the respective governmental authority (see above) to go ahead with the EA study as specified and approved in the ToR.

At the same time this phase of the EA comprises basic administrative activities while preparing the logistics for carrying out the field studies, identifying the personnel for the EA and providing contractual arrangements.

Other keystone activities represent the search and provision of access to baseline information and compilation of a project data base that will serve subsequently for planning, designing, supervision, monitoring and auditing purposes.

STEP 5: UNDERTAKE THE ENVIRONMENTAL ASSESSMENT

The field survey teams are well advised to utilize all forms of documentation techniques that will facilitate further works, for example taking (digital camera) photos, geo-reference¹¹ sites proposed for construction, and consult reference literature/data on physical, biological, social and cultural elements in the planned road area. It is also recommendable to define for certain aspects the extend of potential impacts, the so-called zone of impact. This may vary from few meters

¹¹ Using GPS techniques (Global Positioning System)

next to the road formation (e.g. accident risks, roadside vegetation clearing, encroachment) to few and dozens of kilometres (e.g. water pollution, effects by migrant workers and land values).

a) for IEE Studies:

(1) Baseline Information Collection

Baseline information on bio-physical, social, socio-economic and cultural environment is collected from secondary sources and field investigations. The information is required for collected for two main purposes:

- to provide a description of the status and trends of environmental factors against which predicted changes can be compared and evaluated in terms of importance; and
- to provide a means of detecting–changes by monitoring once a project has been initiated.

(2) Identification and Analysis of Potential Impacts

A checklist, as the one provided by the *GoN Public Works Department in their Procedural Directives Part II, Chapter 3 Environmental Assessment, January 2002*, shall serve for the EA Team as basis to identify potential impacts that are linked to the proposed project activities, and that shows the different natural and human sectors being potentially affected.

(3) Outline of Major/Relevant Mitigation Measures

Mitigation measures should be designed to maximize project benefits and minimize or even set-off undesirable impacts. A wide range of mitigation measures may be proposed, but the following are relevant to most rural infrastructure development projects. Such measures may include:

- project alternatives in terms of scale, technology used, location, alignment, design and time schedule to minimize impacts;
- preventive and corrective measures;
- compensatory measures to restore, rehabilitate or replace damaged resources.

(4) Preparation of a Monitoring Plan

Supervision and monitoring are essential means to ensure that the project is carried out in the way the environmental and social management plan prescribes. Monitoring will also refer to effect monitoring, i.e. to identify whether the proposed mitigation measures are sufficient to alleviate or set off the anticipated negative impacts and to enhance beneficial impacts. The monitoring will also provide feedback to improve the infrastructure quality and/or to modify some mitigation measures.

(5) IEE-Report Preparation and Approval

The IEE Report follows a standard format provided by the ministerial guidelines and the EPR 1997, including proponent, project description, basic information about the bio-physical and socio-economic conditions and the likely nature and scale of impacts that could be expected with the proposed project. Accordingly, the report shall also identify the management options (personnel, type if measures, required technologies, implementation, supervision monitoring and monitoring responsibilities) for a set of feasible and credible mitigation measures. The environmental and social management options shall be documented with sufficient data, maps and other sources of verification. Table 2.5 below summaries the content of an IEE Report, as prescribed in Schedule 5 related to Rule 7 of the EPR.

The Ministry of Physical Planning and Works (MoPPW) is the Concerned Agency as per EPR, and is authorized to review and approve the IEE Report. The MoPPW has the mandate to approval/rejection within 21 days of submission. In case the IEE recommends further EIA study to be undertaken, the proponent has to carry out the full scale EIA which comes under the jurisdiction of MoEST.

Table 2.5: Table of Content of an IEE Report pertaining to SRN sub-projects

Ch	Sub-Chapters Required in IEE Report
1	1. Name and address of individual or institution preparing the report (proponent)
2	2. Executive Summary, indicating <ul style="list-style-type: none"> - Proposal and detailed particulars of the area where the project is implemented - Objectives of proposal - Impacts on Land-use - Adverse impacts on environment, impacts on human life, population pressure - Damage to be suffered by local goods or objects - Other necessary matters
3	3. Technical Information <ul style="list-style-type: none"> 3.1 Type of proposal and Project Description (nature, location) 3.2 Technology and materials to be used 3.3 Emissions resulting from the implementation of the proposal 3.4 Energy to be used 3.5 Manpower requirements 3.6 Resources required for the implementation of the proposals 3.7 Other necessary matters
4	4. Impacts of implementation of the proposal on the environment: <ul style="list-style-type: none"> 4.1 Physical impacts 4.2 Biological impacts 4.3 Impacts on social, economic, and cultural domain
5	5. Alternatives for implementation of the proposal
6	6. Measures to reduce or control the impact of implementation of the proposal on the environment
7	7. Matters to be monitored while implementing the proposal
8	8. Other necessary matters
9	9. (or Annex): Data, maps, photographs, tables, charts, graphs, etc. as required

[Ref.: in accord with EPR 1997, Schedule 5]

To summarize, an IEE is essentially a miniform of EIA which involves impact identification, mitigation measures, monitoring and public involvement. However, as the impacts and mitigation measures of the project implementation are generally identified as moderate and/or manageable, detailed investigation, as required in EIA, is not required to be undertaken in IEE. Information is mainly retrieved from secondary sources, with limited efforts in field studies. Household level survey is not necessary and Focus Group Discussions are generally sufficient for collecting primary information. In most cases where road upgrading is the main activity of a proposed project, an IEE is sufficient enough to provide a definite solution to cope with anticipated environmental problems, and even to describe all necessary arrangements for dislocation of people should this be an essential requirement for, e.g. widening a road to the desired formation width. Under the condition that this will affect only a very limited number of houses and people (up to 100, as specified threshold in the EPF, 1977)) an EIA is generally not required and an IEE will suffice. Regardless of whether an IEE or EIA is carried out, each will result in a detailed, site-specific Environmental Management Action Plan (EMAP) that forms the basis for supervision and monitoring (both the effects and the compliance monitoring).

The scoping exercise must be based on a rapid site reconnaissance survey conducted by professional EA practitioners.

b) For EIA Studies:

(1) Screening and Scoping

The screening process is similar to the procedures described above for IEE Studies. However, the scoping exercise for EIA involves the presentation of more detailed background data, and a comprehensive Public Consultation and notification process that should also include a workshop to be held at that stage.

Following the Scoping, equally the proponent must write and submit the Terms of Reference for the EIA, as described above. The results of the scoping should provide an opportunity for the Proponents, Consultants, relevant authorities and interested and affected parties to exchange information and express their views and concerns regarding a proposal before an EIA is undertaken. The scoping will focus on feasible, credible and cost-effective alternatives for the proposed project, and identify means to ensure that the resulting EIA is useful to the decision maker and addresses the concerns of interested and affected parties, as well as to facilitate an efficient EIA process that saves time and resources while reducing the risk of costly delays. The scoping exercise for EIA includes the activities that are stepwise shown in the following Box 2.1:

Box 2.1

The Scoping Process for EIA Studies

(i) Presentation of Background Material for the Proposal

Prepare, in Nepali language, relevant material including purpose and need for the project, proposed actions, location, timing and method of operation, likely impacts on affected bio-physical and social environment. It should be clear and concise, avoiding unnecessary technical and scientific terms. This document should be made available to the public and adequate time should be given for them to read it thoroughly.

(ii) Involvement-Identification and Notification

A Scoping List should be prepared which should include a list of authorities, interested parties and affected groups or communities that are likely to be involved in the Scoping process, methods of notifying them, methods to inform them about the proposal and solicit their comments and concerns, and a determination of the stages where their inputs are required.

(iii) Participation in Scoping

Public Notice: It is mandatory as per EPR, for the proponent to publish a public notice in national daily newspaper, requesting concerned people, VDCs / Municipalities, schools, health posts, hospitals and organizations to provide suggestions and comments in writing within fifteen days of the date of first publication of this notice.

(iv) Public Meeting(s):

Gathering, at site, interested and affected communities to present and exchange information and views on a proposal. In public meetings, local and illiterate stakeholders can also voice their concern. This method supplements public notices and is very effective for ensuring local public involvement. The presence and concerns of all people participating in meeting should be recorded. An adequate number of meetings should be organized, if applicable, in form of workshops.

(v) Site Reconnaissance

A rapid site reconnaissance should be carried out by professional experts to determine significant environmental impacts. During such survey, the scoping notice is published in the office of VDC, DDC, school, health post, post office etc of the project area and 'public deed of act' (Muchulka) of such propagation of notice is collected. Similarly, scoping meetings are held and concerns recorded. Rapid walkthrough survey of the project area is carried out and information collected from public and secondary sources are verified, and new issues are recorded.

Preparation of the Scoping Document: Based on the information disseminated and response of stakeholders, the proponent will prepare a Scoping Document that presents in an overview manner the major issues of public concern, evaluate the significance of issues on the basis of available information, establish priorities for environmental assessment, develop strategy for addressing priority issues, and prepare a plan for public involvement, and prepare Scoping Document. A sample table of content of such Scoping Document for a typical road project EIA is given in Box 2.2. Note that the format is prescribed by EPR 1997. Documents deviating from this standard format are likely to be rejected by the reviewing agencies.

Box 2.2

Standard Content for a Scoping Document for EIA Studies

Executive Summary, Abbreviations

1. Introduction

- 1.1 Background
- 1.2 The Proponent
- 1.3 Project Description
- 1.4 Policies, laws, Guidelines
- 1.5 Objectives of the Scoping
- 1.6 Project Area Delineation

2. Existing Environmental Condition

- 2.1 Physical Environment
- 2.2 Biological Environment
- 2.3 Socio-economic Environment
- 2.4 Cultural Environment

3. Scoping Methodology

- 3.1 Literature Review
- 3.2 Public Notice
- 3.3 Walkover Survey
- 3.4 Issues Prioritization Methods

4. Issues Identified and Raised Stake holders

- 4.1 Issues Identified
- 4.2 Issues Raised by Stakeholders

5. Issues Prioritized for EIA Study

- 5.1 Physical Issues
- 5.2 Biological Issues
- 5.3 Socio-economic Issues
- 5.4 Cultural Issues
- 5.5 Management Issues

6. Work Schedule

Annexes: Road Design Standards adopted,
Photos, Maps,
List of Contact Persons
Public Notices,
Suggestions / Comments / Issues,
Composition and schedule of Study Team

(2) Baseline Information Collection

The baseline information on bio-physical, social, socio-economic and cultural environment is more detailed and complex than the one required for an IEE. Basic data are not collected from secondary sources but extensively from observations and public consultation events during the field investigations. Tabulated data should always indicate the source and be incorporated as Annexes to the Main EIA Report.

Baseline data are required, among others, for the various aspects of the **physical** environment (including unstable and erosion-prone areas, drainage and flood pattern, hydrological and climatic conditions, soil, geology and seismicity).

As for the **biological** resources, information shall include main vegetation pattern (diversity, used species, timber volume, NTFP, medicinal plants) and ecologically sensitive areas (protected areas, forests, wetlands), rare and threatened species, human uses of natural resources and natural impacts without the project.

With regard to the **socio-economic** and **cultural** environment, basic data will include demographic features, infrastructure, utilities, business, trade, community properties, agricultural and other livelihood, gender issues, indigenous and vulnerable groups. The development trends need to be described, as well as current forms of settlement and trade structures. Information needs also be collected for the cultural environment, focusing on those assets that are likely to be affected by the project.

The information is required for two main purposes:

- Know the status of environmental conditions of the project areas and indication of trend of resources use,
- Detect of resources likely to be affected by the project activities,
- Develop important reference points for environmental monitoring, and
- Provide relevant information for the decision making process.

The baseline information should be sufficiently analyzed before identification, prediction and evaluation of environmental impacts. One of the most useful instrument while processing these baseline data is the creation of thematic/GIS maps that refer to the most important factors being investigated for likely project-induced impacts. Thematic maps and site photographs are among the best sources of later verification and monitoring the project's effects.

(3) Project Description

A list of project activities for construction and operational period needs to be prepared referring to the list of impacts that are likely to be induced by the project. The list should ideally follow the chronological and logical sequence of the planned activities. A sample matrix is presented in Table 2.5 above. The following information related to project description for impact identification of SRN needs to be compiled:

- Nature of the Project and its geographic location (including maps);
- Construction technology (machine, labour based, mixed, etc),
- Resources consumed including possible sources (community land, utilities, water, sand, gravel, clay, timber, bitumen, etc);
- Implementation mechanism (through local institutions, users' committee, contractors, mixed);
- Description of the EA team carrying out the environmental and social planning, design and implementation arrangements;

- Institutions involved in project implementation (roles, strength and weakness) at different project stages, as well as supervision and monitoring arrangements;
- Maintenance approach (fund, institutional mechanism, human resources).

(4) Identification and Analysis of Project Alternatives

This part of the EIA Report consists of a comprehensive discussion of pros and cons for alternative alignment of the proposed road (in map and description). It has to provide the explanation and argumentation for choice of options, taking into account the respective environmental, socio-economic and cost considerations. For each alternative, the potential impact on the environmental and social setting needs to be discussed. Alternative assessment may include:

Project Alternative

- Alternative Route and Location
- Alternative Design and Construction Methods
- Alternative Resources (alternative construction materials)
- Do nothing Alternative.

(5) Identification and Analysis of Potential Direct and Indirect Impacts

For the chosen project area all receptors of project-induced impacts need to be discussed separately. This section of the report needs also the description and definition of the predicted zone of project influence. Typically, receptors include water, air, soil, forest, fauna, flora, human beings, cultural assets, structures, buildings etc. The principal task of this section is to **identify, predict and evaluate** the intensity, extent and duration in which a project activity will have an impact on a receptor or multiple receptors, and multiple activities having impacts on receptor, or how receptors(s) might have on project and its activities. The resulting impacts (positive and negative) will be categorized, preferably in a matrix form (see below) as direct, indirect, combined/cumulative, synergistic, short termed, medium termed, long termed, reversible, irreversible, severe, moderate and insignificant (see Box 2.3).

Box 2.3

Types of Impacts Commonly Associated with Road Construction Projects

Direct Impacts: Alteration of the existing environmental conditions as a direct consequence of project activity. These are site specific impacts such as if the road passes through forest and trees or vegetations are cleared as part of site clearance.

Indirect or Induced Impacts: Such impacts occur when the effect of project activity on one component produces repercussions on other components. A direct impact may also induce indirect or secondary impacts on environment. For example landslides that occur due to construction of road may lead to damage of cultivated land and eventually loss of agricultural production.

Cumulative Impacts: This is referred as the combination of impacts of two or more projects or combination of impacts of several activities of one project.

Reversible Impacts: Impacts generated by particular action of project can be minimized through mitigation measures or by nature itself.

Irreversible Impact: Impacts generated by project action that is unlikely (or cost-ineffective) to be replaced by mitigation measures or by nature itself over the time.

Beneficial Impacts: Road projects will generate various beneficial impacts on environment and society and will contribute to improve the quality of human life. For

example, the road construction will increase the quality of life in terms of decrease in transportation cost, time and improve safety.

Adverse Impacts: Road also bears the risk for various negative impacts on the environment and local population. For example loss of forest for site clearance may lead to increase in time for collection of fuel and fodder for local communities.

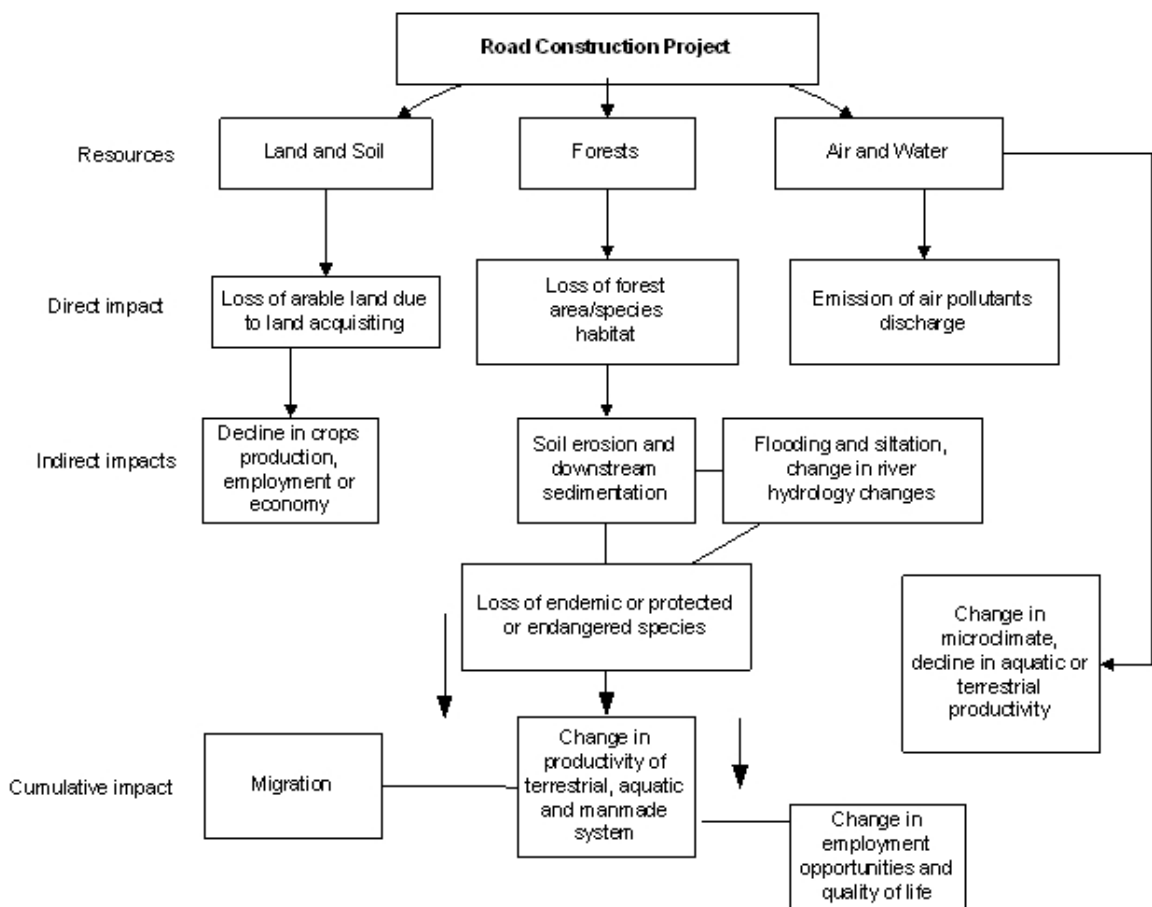
Magnitude of Impacts: Defined as the severity of each potential impact, to be categorized as high, medium and low, or other conventional forms of scaling.

Extent of Impacts: Road Impacts may range from its origin to different place depending upon the type and nature of project. The spatial extent or **Zone** of influence of an impact can be categorized as site specific (limited), local (e.g., within a watershed or community), regional (e.g., beyond a watershed or community), national (affecting natural or socio-cultural resources on a national scale), and transboundary.

Duration of Impacts: Impacts may have temporal dimensions (time factor) that should be considered during impact assessment. The duration (when and how long it will last) of impacts can be categorized in terms of short term (3 to 9 years), medium terms (10 to 20 years), and long term (more than 20 years) after project completion.

A sample of direct, indirect and cumulative impacts that are likely to occur in any of the proposed SRN sub-projects is presented in Fig. 2.3.

Fig. 2.3: Schematic Diagram on Possible Environmental Impacts of Road Development Activities



At this early conception period the most analytic tool are environmental impact checklists that will allow the EIA team to carry out a comprehensive check of the likely impacts associated with the proposed projects, and to prepare for appropriate mitigation and monitoring of these impacts at the different stages when they occur. To assist the EA practitioners, a checklist already used in various road construction projects in Nepal, funded by World Bank, is presented hereunder:

Table 2.6: Checklist for Environmental Impact Prediction during different Project Phases

[Abbr. For Impact Prediction: L = long-term; M = medium-term; S = short-term]

a. Construction Phase

Project Undertaking	Baseline Information	Possible Impact	Field Analysis	Impact Prediction			Mitigation/Comment
				L	M	S	
Operation of quarries and borrow pits	Physical Environment						
	Location/topography/soil/geology	Disruption of natural land contour resulting slope instability and landslide/ erosion	Quarrying method and possibility of slipping of overburdens Quantify specifications like restriction to small area, confined to existing quarry sites, not close to tree cover, 60 m away from dwellings, 200 m away from archaeological and cultural sites				
	Natural drainage pattern	Disturbance to natural drainage patterns resulting in water logging	Water logging, groundwater level disturbance				
	Water bodies nearby	Contamination of surface water bodies	Turbidity, observation of harmful / toxic substances				
	Biological Environment						
	Forest located along the alignment,,area/type/condition	Removal of vegetation	Any vegetation removal from quarry site, their quantity				
	List of locally found & endangered species	Disturbance to wildlife population; Creation of mosquito breeding grounds	Potential for development of breeding sites for waterborne disease vectors. Wildlife sighting in the area according to locals				
Spoil and construction waste disposal	Physical Environment						
	Location/Topography	Scouring of valley side slopes resulting landslides and erosion	Spoil disposal practice adopted by the project. Landslides Spoil disposal practice (designated site/compaction/leveling/rehabilitation with planting vegetation)				
	Land used/Area	Destruction of property (agriculture land, irrigation etc.)	Land use nearby disposal site				
	Natural drainage pattern	Disruption of natural drainage	Water logging Cross road drainage / side, drainage/surface drainage construction				
	Water bodies	Siltation of surface water	Turbidity				

	Biological Environment						
	Location/vegetation type	Disturbance to vegetation	Area of vegetation disturbed and condition				
	Locally found aquatic life in the Water bodies	Disturbance to Aquatic life due to siltation	Turbidity of the water bodies/change in availability of aquatic life				
Work camp operation	Physical Environment						
	Use of machineries and local ambience	Short-term air and noise pollution from machine operation	Site observation				
	Water bodies nearby	Contamination of water bodies due to run-off	Water quality of the nearby stream				
	Area and type of land occupied or hired	Temporary loss of land	Location of work camp				
	Water bodies nearby	Contamination of water	Runoff to water bodies nearby, sanitary condition, water quality Provision of rehabilitation after the project completion				
	Biological Environment						
	Location/vegetation type	Disturbance to vegetation due to site clearance	Area of vegetation disturbed and condition				
	Local wildlife including endangered species	Possibility of illegal hunting/trapping/fishing	Illegal hunting, trapping of wildlife				
Labor camps	Physical Environment						
	Area and type of land occupied or hired	Temporary loss of land (agriculture land/forest land)	Previous land use of the camp/condition of the camp site				
	Location	Solid waste disposal issues	Waste disposal site and waste disposal system Provision of rehabilitation after the project completion				
	Biological Environment						
	Area/Type/condition of forest nearby	Pressure to the forest vicinity for fuel wood	Fuel wood consumption by workers Condition of forest in vicinity				
	Locally found fauna including endangered ones	Possibility of illegal hunting/trapping/Fishing / trading	Illegal hunting, trapping and trading of wildlife				
	Local aquatic organisms	Impact due to surface and ground water contamination from unsanitary disposal of toilet waste	Number and condition of toilets at camp				
Stockpiling of construction materials	Water bodies nearby	Siltation of surface water resulting from uncontrolled runoff from storage piles	Visual turbidity of surface waters Disturbance to tree and vegetation Disturbance to houses and prime agricultural land				

b. Operation Phase

Project Undertaking	Baseline Information	Possible Impact	Field Analysis	Impact Prediction			Mitigation/ Comment
				I	M	S	
Operation of traffic and Maintenance works	Traffic volume	Road safety	Accidents resulting in hospitalization/loss of life Installation of traffic signs				
	Traffic volume	Air Pollution Noise pollution	Traffic generating significant dust and vehicular exhaust, and noise				
	Condition of the forest in vicinity	Illegal harvesting of forest resources	Condition of forest in vicinity of road alignment Complains from Users groups				
	Local fauna including endangered species	Illegal hunting and trapping of wildlife	Illegal hunting and trading of wildlife				
	Natural drainage pattern	Disturbance to natural drainage	Formation of water ponding and waterborne diseases Design of drainage slope Groundwater fluctuations				
	Topography/slope /slope stability measures adopted in construction	Slope instability	Landslides Erosion or gully development Debris falling or being washed on to farmland				

c. Specific Social and Socio-Cultural Components

5. Specific Social and Socio-Cultural Components

Component	Baseline Information	Possible Impact	Impact Prediction			Mitigation Comment
			I	M	S	
Resource Use						
Forestry	Existing CFUGs/LF nearby the alignment and other components of the road	CFUG and LF user groups affected due to acquisition of their forest land				
	Flow of the migrants/their sources of forestry product	Conflict for the use of forestry resources between locals and in-migrants, depletion of NTFP resources; invasive species				
Agriculture	Existing cropping pattern and agricultural practices	Disturbance to agricultural production, influx of invasive species and pests				
Water supply and use	Existing water supply system	Disturbance/demolition of water supply infrastructures; groundwater changes leading to drinking water and irrigation problems				
Land use by migrants	Changing land use pattern	Acquisition of land and property; social conflicts, resettlement issues				
Health	Existing medical facilities/ Prevaling diseases; type and number of complains	Introduction and spreading of communicable diseases				
Socio-Economic						
Population/ Demography	Possibility of flow of migrants	In-migration affecting the local social and economic conditions				
Community Infra-structure	Existing Public infrastructure and that might be affected by	Acquisition of public infrastructure				
	Existing public service facilities	Local public infrastructure unable to cope with increased population				
Employment /Income	Existing occupation/availability of skilled /unskilled laborers	Less employment opportunity to locals				
Cultural Heritage						
	Existing important sites in the area	Sites of historical / cultural/ architectural / archaeological importance being disturbed				

(6) Conduct Public Consultation and Disclose Notice

Most of the international donor agencies financing road development programs put emphasis on a thorough consideration of the vision and comments of all kind of stakeholders related to the project. The EA team therefore needs to identify the spectrum of stakeholders potentially affected by in the planned activities, and to devise mechanisms for public hearings and meetings.

The EIA should consider the broad public's perspective and include them in the assessment process. In particular, suggestions forwarded by the stakeholders consulted should be incorporated to the extent possible into the environmental and social management planning. It is recommended in this framework to compile the obtained information in a tabular form, indicating date of consultation(s), location, number of participants (male/female), issues raised by the consulted stakeholders and measures to be followed up in the environmental management planning. It is essential that the EMAP reflects the perceptions, concerns and suggestions as much as they are feasible, credible and site-specific.

The agenda and the result of the public consultation activities carried out under each EIA/SIA needs to be well documented and made public for receiving comments. In accord to the EPR regulations, the duration of the public notice is 15 days. Received comments need to be incorporated in the project's design and management plan (see below).

(7) Identification of Suitable Management and Mitigation Measures

The principles adopted for this ESMF are that all proposed mitigation measures are designed to recommended actions that reduce, avoid or offset the potential adverse environmental consequences of the proposed project activities. The proposed actions must be feasible, credible, manageable and cost-effective. A fundamental requirement is that all proposed mitigation would lead to more environmental and social sustainability.

The approaches for mitigation measures are ruled by the following considerations:

- (i) Seek alternatives to avoid particular impacts: Consider alternatives to a proposed project activity, and examine alternative ways to achieve the objectives to maximize benefits and minimize undesirable impacts.
- (ii) Arrange compensation where particular impacts are unavoidable : Restore damaged resources, such as, water source, irrigation system, forest. Proper rehabilitation scheme, such as, skills training, new employment. Adequate compensation payments to affected persons for damage or loss of property, livelihood and provision of rehabilitation measures.
- (iii) Take Corrective Measures to reduce unavoidable effects: Consider corrective measures to reduce adverse impacts to acceptable standards, such as, remove, store and reuse top soil material during construction, use spoil material to reclaim low and degraded land, replace or relocate community water source, assist in school expansion to handle influx of laborers' children, and others.
- (iv) Implement Preventive Measures to avoid some impacts altogether. Pre-preparation for minimizing adverse impacts, such as, implement health education program, initiate public awareness programs.

Mitigation measures foreseen may fall in three categories:

- Avoidance: for example changing a road route or prohibiting blasting;
- Rectification and abatement measures, e.g. planting vegetation on cut slope, use retaining walls to protect slope failure, restoring disturbed natural drainage line or damages resources, landscaping;
- Compensation. For example afforestation to compensate forest land occupied by a project or paying cash compensation, off-site program to enhance some other aspect of environment.

In a more generic way, commendable mitigation measures suitable for the proposed SRN sub-projects may look as those presented in the following table. More specific details for mitigation measures are presented in Chapter 6 of this document.

Table 2.7: Recommended Environmental and Social Mitigation Measures

Category	Potential Problem	Recommended Mitigation Measures
Slope stability	Landslides or other forms of mass instability on the slopes	Geological/geo-morphological studies conducted to investigate and recommend best available options. Civil engineering structures and bio-engineering measures used. Measures taken to avoid undercutting of slope toes. Quarrying prohibited in river beds, where flood discharge is significant. Selection of appropriate construction equipment
	Development of erosion or gullying	Check dams and bio-engineering measures used as necessary.
	Road crosses major areas of deep-seated instability	Width and surfacing slander (relaxed for short lengths, as required).
Spoil disposal	High volume of waste/spoil	Minimize spoil by balancing cut and fill wherever possible
	Spoil tipped away from designated areas	Safe tipping areas identified and enforced.
	Spoil failing or being washed on the farmland	Spoil traps constructed. Land owner compensated.
Water management	Scour and erosion below unprotected drainage out falls	Mattresses check dams and other protection measures constructed as necessary. Cascades constructed, to be as long as necessary.
	Disruption of drinking or irrigation water	Measures to resolve these problems incorporated into project works, or compensation paid.
Land use	Houses need to be removed	Compensation paid to house owners.
	Loss of agricultural land	Compensation paid to land owners.
	Loss of forest land	Forest User Groups compensated for trees and products lost. Check impacts are limited to compensated trees and products.
Plants and wildlife	Large numbers of trees being removed	Felled trees replaced, using the same species, if appropriate, at 1:25 ratio as per the policy of Dept. of Forest. Trees planted wherever land is available.
	Disturbance to wildlife	Damage to wildlife habitats avoided as far as possible. Habitats re-created on marginal roadside land.
Quarries and borrow pits	Pollution, disturbance and danger from quarry operations	Construct bunds to screen noise and dust. Enforce access restrictions.
	Safety risks from abandoned quarries or borrow pits	Quarries made safe by re-grading slopes and installing structures as necessary.

Category	Potential Problem	Recommended Mitigation Measures
	Land seriously disturbed or lost from production	Quarry and borrow areas rehabilitated to productive plantations using bio-engineering techniques.
	Quarries continue to be used by unauthorized persons	Unauthorized quarrying stopped, where necessary by working with the VDC or DDC Authority
Stone crushing & asphalt plants	Dust and noise pollution	Plants re-sited or compensation arranged if pollution is caused. Observe minimum distances to human settlement; Use filters, earth bunds and plant hedges/bushes/trees to reduce emissions.
Hazardous materials and Work Safety	Accidents; Spills, leaks or injuries from any type of hazardous material (e.g. bitumen, cement, paint, explosives, fuels, lubricants)	Checks to ensure that storage is good and that there are no losses or leaks. Checks to ensure that all provisions made in the health & safety provisions made in the Contracts are followed, especially ensuring/monitoring that protective clothing and safety measures are used. Ensuring that the contractors will have insurance provisions for all laborers.
	Bleeding bitumen	Appropriate chippings spread and rolled into the affected areas.
Camp operation	Pollution from work and labor camps	Checks to ensure that camps are not polluting neighboring areas, especially from sewerage and rubbish disposal.
	Laborers cut trees for firewood	Kerosene stoves and kerosene provided to laborers.
	Land remains damaged after construction	Checks to ensure camp areas are fully restored, including re-top soiling and tree planting if appropriate.
Dust and noise	Dust generated from construction works	Speed controlled using speed bumps. If water is available, the road surface should be sprayed on a frequent schedule.
	Dust from a road with an earth or gravel surface	Permanent speed bumps installed in villages and bazaars to reduce traffic speeds in inhabited areas. Bitumen surface constructed in bazaars, with speed controls. Dense vegetation planted on roadside.
	Noise from large work sites	Large earth bunds constructed and vegetated to reduce noise. Work schedule to minimize disturbance, ban night work hours.
Social Issues and Work Conditions	Positive impact of road confined to wealthier sections of society	Other agencies encouraged to develop activities beneficial to poor and excluded sections of society.
	Local people excluded from project activities	Designs incorporate methods within the skills of local people. Contractors encouraged using local labor wherever possible.
	Promises were made to local people during feasibility and planning phases	Checks to ensure that the promises are fulfilled; if they prove to be not possible, reasonable alternatives must be negotiated.
	Significant disparities emerge in levels of compensation	Compensation levels rationalized to ensure reasonable parity.
	Road Safety: faster traffic resulting from a new, smoother road surface	Traffic safety measures installed, such as warning signs, delineators and barriers. Awareness of road safety raised among affected communities Road safety audits carried out and recommendations implemented.
	Child Labor; in spite of legal provisions	Ensure legal provisions defined in the Child Labor Act are duly followed and included in the Contracts. Stern supervision and monitoring of contractors during construction phase.
	Gender biased wages, unfair payment to women labor	As above, stringent monitoring of contractors that provisions made in the Contracts for equal and fair payment to women labor are followed. Establishment of grievance offices. Ensuring that each claim is documented and followed up.
	Spread of STDs due to labor influx	Include awareness campaigns both at labor and local community level, to be carried out by contractors and NGOs.

To become meaningful all proposed or identified mitigation measures must be integrated into project design, the tender documents and in the works contracts (see Box 2.4). They should follow the guidelines to be established by DoR/GESU for good and proven technical practices as outlined in the Environmental Code of Practice (see Annex 2)

Using this approach, the mitigation measures will automatically become part of the project construction and operation phase. By including mitigation measures in the contract or in specific items in the Bill of Quantities, monitoring and supervision of mitigation implementation will be covered under the engineering supervision provisions of the contract. For this the provisions mentioned in Public Works Directives of the Government of Nepal must be followed.

Box 2.4

**Environmental and Social Safeguard and Mitigation Measures
must be included in:**

Project Design: Mitigation measures should be integrated in the design of the project itself. The need to adhere to the Environmental Code of Practice. Such approach will enhance the mitigation measures in terms of specific mitigation design, cost estimation of the mitigation measure, and specific implementation criteria. Integration of mitigation measures in the design phase will also help in strengthening the benefits and sustainability of the project.

Project Work Contracts: The project contractor should be bound by the parameters contractual clauses identified in the environmental and social assessment pertaining to specific mitigation measures in the contract. It needs to be ensured that the contractor is aware and understand the respective contractual clauses and obligations. The final acceptance of the completed works should not occur until the environmental clauses have been satisfactorily implemented.

Bill of Quantities: The tender instruction to bidders should explicitly mention the site-specific mitigation measures to be performed, the materials to be used, the specified and excluded sites for material retrieval, labour camp specifications, arrangements, and waste management and disposal areas, as well other site-specific environmental requirements. Such a definition would clearly exhibit the cost requirement to undertake mitigation measures, which otherwise might be lost as the bidders in an attempt to be more competitive may not include the price realistic enough to fund mitigation measures and other protection measures.

Supervision and Monitoring: The purpose of supervision is to make sure that specific mitigation parameters identified in the environmental and social assessment and as bound by the contract is satisfactorily implemented. Likewise, monitoring is necessary such that the mitigation measures are actually put into practice.

(8) Preparation of the Environmental/Social Management Action Plan (EMAP)

An Environmental Management Action Plan (EMAP)² consists of the descriptive set of mitigation, monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental impacts, offset them, or reduce them to acceptable levels. The guiding principles and technical solution aspects, tailored for Nepalese conditions, are reflected in the Environmental Code of Practice outlined in Ch. 2.3. and Annex 2 of this ESMF. Any construction will not begin before an EMAP is prepared and approved by the concerned agency.

The EMAP shall also clearly identify the roles and responsibilities of institutions and involved (contractual) parties to carry out the management activities, and define the location of verification of the prescribed measures. It is recommended that the implementation tables being prepared for the forthcoming sub-projects under the SRN Program utilize a standard tabulated format in presenting the arrangements for implementing the mitigation measures, as shown in Table. 2.8:

Table 2.8: Mitigation Implementation – Description of Arrangements

Mitigation Activity	Implementation Responsibility			
	Project Design	Contract	Bill of Quantity	Monitoring
Slope stability	Specify bio-engineering and relevant techniques.	Contractor must comply with clauses pertaining to safeguard and mitigation clauses in the contract.	Identify stabilization area. Provide list of species to for planting requirements	Disallow non-permissible species Adequacy, quality of vegetation. Survival rate of plants.
Spoil disposal	Identify mass balance techniques. Safe tipping areas identified and enforced. Design spoil traps.	Do	Quantify disposal and extraction volume.	Presence of scouring, erosion, damage to property, water supply disruption. Complaints from local people
Water management	Design safe discharge drainage and techniques (check dam) to natural water course.	Do	Physical works for safe discharge drainage listed.	Evidence of fresh surface erosion, presence of gullies, increase in water turbidity, loss of agriculture forest land. Slope condition. Public complaints.
Land use	Explore use of marginal land. Check impacts are limited to compensated trees and products.	Do	-	Quantify actual land use pattern for construction and other activities. Public complaints.
Plants and wildlife	Consider construction affecting forests and productive crop lands.	Do, especially exclude hunting and collecting activities	-	Check habitats re-created on marginal roadside land.
Quarries and borrow pits	Design bunds to screen noise and dust. Design re-grading slopes. Use bio-engineering techniques for rehabilitation.	Do	Quantify restoration costs and present technical specifications.	Check for water ponding, formation of gullies, water turbidity. Check unauthorized quarrying activities.
Stone crushing and asphalt plants	Specify noise and emission requirements; Specify siting criteria	Do	Amount to be included in contractor's own expense.	Control siting and emission. Dust control equipment being utilized. Public complaints.

² Sometimes referred as to Environmental Management Plan (EMP)

Mitigation Activity	Implementation Responsibility			
	Project Design	Contract	Bill of Quantity	Monitoring
Hazardous materials	Specify storage facilities for explosives and toxic materials. Identify and restrict locations. Specify protection/safety measures	Do	Amount to be included in contractor's own expense through rate for supplying materials.	Checks to ensure that storage is good and that there are no losses or leaks. Checks to ensure that protective clothing and safety measures are used.
Camp operation	Identify camp grounds. Specify minimum hygienic and sanitation requirements, water supply, medical care, contingency planning	Do	Amount to be included in contractor's own expense through work camp item expense. Specify awareness campaigns.	Latrine construction and effective waste disposal. Check disruption in water supply. Fire extinguishers; Replantation, rehabilitation of site. Ensure HIV/AIDS prevention campaigns
Dust and noise	Indicate use of modern and safe pollution control equipment.	Do	Specify buffer areas. Amount to be included in contractor's own expense through work camp item expense.	Air pollution control equipment. Dust deposition on crops and vegetation. Survival rate of plants. Public complaints.
Social issues and Work Conditions	Incorporate socially acceptable design specifications.	Do	-	Check issues pertaining to social concern.
	Work safety and health	Do	Specify in detail	Regular and unannounced checks, interviews, review documented complaints
	Gender wage rates and child labor prevention	Do	Specify in accordance with laws and regulations	Regular and unannounced checks, interviews, review documented complaints
	STDs prevention	Do	Specify in contracts, assure NGO participation in awareness campaigns	Do

It is essential that all proposed supplementary programs (e.g. community awareness, training, public health, road safety etc, livelihood programs, agricultural / forestry extension etc) are clearly described in the main text of the environmental management plan, and worded out as well-defined action which describe scope, specific aspects to be addressed, implementing schedule, implementing agency and responsible monitoring agency. Care has to be taken that all proposed actions are included and itemized in the detailed cost estimate at the end of the EMAP descriptive part. The above elements are summarized in the following Box 2.5:

Box 2.5

Components that need to be addressed in the forthcoming EMAPs for SRN Sub-Projects

a) Mitigation: The EMP identifies site-specific, cost-effective and detailed measures that will reduce the identified adverse environmental impacts to acceptable levels. The EMP should include compensatory measures in case mitigation measures are not feasible, cost-effective, or sufficient. The proposed measures shall follow the established **Environmental Code of Practice** (see below, Ch. 2.3)

b) Monitoring: Environmental monitoring during project implementation should include a systematic assessment of key environmental indicators that determine the degree of environmental impacts of the project and the effectiveness of mitigation

measures. Such information enables the borrower and the Bank to evaluate the success of mitigation as part of project supervision, and allows corrective action to be taken when needed. Therefore, the EMP identifies monitoring objectives and specifies the type of monitoring, with linkages to the impacts assessed in the EA report and the mitigation measures described in the EMP.

c) Capacity Development and Training: To support timely and effective implementation of environmental project components and mitigation measures, the EMP draws on the EA's assessment of the existence, role, and capability of environmental units on site or at the agency and ministry level. If necessary, the EMP recommends specific, targeted training for project staff, contractors, and community groups, to ensure the implementation of EA recommendations. In addition, the EMP, when necessary, should provide specific recommendations for operational arrangements to carry out mitigation and monitoring measures.

d) Implementation Schedule and Cost Estimates: For all mitigation, monitoring, and capacity development, the EMP provides (a) an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and (b) cost estimates and sources of funds for implementing the EMP. These figures are also integrated into the total project cost tables.

(9) Monitoring

Lessons learned from the WB-supported Road Maintenance and Development Project show that without proper and timely monitoring, and clear instructions and contractual obligations most Contractors carrying out road works in Nepal do not put strong inclination to observe the provisions made in the EMAP.

Monitoring is an important element of environmental and social management, as well as identifying and reacting to project-induced changes in the socio-economic and cultural environment. To improve the implementation and quality of mitigation measures, the following activities must be undertaken during environmental monitoring.

- Elaborate quantifiable monitoring indicators.
- Determine indicators to be used, by means of establishing objectively verifiable parameters that can be easily measured and reported by non-technical third parties.
- Draw rational conclusions and recommend improved corrective measure to Implementing Agencies.

This ESMF recommends that the monitoring staff shall use standard checklists and formats for site surveys. Most monitoring activities relate to quantifying the observed impacts, and to verify the nature and extent of impacts, photos, parameter tests, local accounts by stakeholders and technical/social experts, and geo-referencing the observed site/area with GPS. The monitoring shall also include specific cause-effect analyses for the impacts observed. The following table shall serve as guidance for the Field Teams to consider practical and easily verifiable parameters to be typically monitored under the prevailing conditions in Western and Central Nepal:

Table 2.9: Monitoring Indicators Selected for this IEE

Monitored Sector	Parameters Selected for Monitoring
Soils, Landslides, Erosion Waste management Sites	<ul style="list-style-type: none"> Number, location and extent of slope failures Cause analysis for slope failure Natural/man-made Area (ha) of land, forest and properties affected Nos and extent of gully erosions and pavement failures Nos and extent of road subsiding effects Suitability of corrective/bio-engineering measures Nos of days and nature of traffic delays due to slides Sites and suitability for safe disposal of wastes and garbage
Monitored Sector	Parameters Selected for Monitoring
Bio-engineering	<ul style="list-style-type: none"> Nos and plant species selected for bio-engineering, disaggregated by protective function magnitude of local seismic activities and respective damage to structures, including road
Seismicity	<ul style="list-style-type: none"> Nos and magnitude of local seismic activities and respective damage to structures, including road
Water Pollution, Water Resources and their uses: Surface/ ground water Irrigation waters Drinking water Public taps	<ul style="list-style-type: none"> Nos and extent of water-logging at operative and/or decommissioned construction sites Incidents & trends in development of waterborne diseases Nos of days and nature of traffic delays due to water logging and inundation Blockage of waterways - extent and secondary impacts Water pollution incidents due to unsafe disposal of waste and spoil, analysing effects on local fisheries Observations on car washing practices in rivers, and analysis of potential environmental effects Damage to farm lands due to water shortage or pollution Catch particulars and economics of local fisher folk Trend analysis for local fisheries Records of seasonal groundwater fluctuations Laboratory tests for drinking water quality, determining pH, particulars, turbidity, BOD, fecal bacteria, NH_x, NO_x, SO_x, PO₄, hydrocarbons, selected heavy metals.
Air and Noise Level In relation to traffic volume	<ul style="list-style-type: none"> Point source measurements in dB (A) at settlement sites/sensitive spots for noise level at 2, 5 and 15 m from road shoulder Qualitative analysis of dust development at selected sites/sensitive spots Traffic volume measurements
Road Safety	<ul style="list-style-type: none"> Speed measurements at selected spots Nos and type of road accidents recorded in the Traffic Police/DO and in local health service centres Suitability of local road signs Records on public road safety awareness campaigns
Wildlife % Habitat Disturbance Impacts on Forest Resources Plantations	<ul style="list-style-type: none"> Nos and extent of road accidents inflicting wildlife DFO records of illegal timber extraction and wildlife trade Nos, extents and causes for forest fires Observations and handling of invasive species Success/failure of roadside/compensatory planting & nurseries
Socio-economic Development near road alignment	<ul style="list-style-type: none"> Demographic, economic and education data Nos and extent of new settlements /types and ethnic groups Nos and extent of new businesses /types and ethnic groups Nos and extent of new services and utilities
Resettled Households and livelihood restoration	<ul style="list-style-type: none"> Nos of HH and site analysis of the area receiving the resettlers HH questionnaire to identify livelihood conditions of resettlers Income situation and opportunities for the resettlers Verification of compensation and assistance to resettlers

Community awareness programs relating to environment protection and avoidance of social conflicts	<ul style="list-style-type: none"> ▪ Nos/schedule of campaigns and nos of beneficiaries ▪ Revision of training agenda & propagated information material ▪ Questionnaire evaluation, interviewing selected participants on the impacts of the training provided by NGOs and Contractors ▪ Nos/quality of erected signboards for environmental education ▪ Nos of beneficiaries having received awareness training against the spread of HIV/AIDS and girl/boy trafficking ▪ Records from locals and local police concerning social conflicts
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The detailed monitoring aspects are briefly discussed thereunder.

Monitoring activities for typical road development projects, including the SRN Program, encompass three types:

- (i) Pre-Construction and Baseline Environmental Effects Monitoring
- (ii) Construction Phase Monitoring; this is generally sub-divided in two related activities:
 - Compliance Monitoring
 - Impact/Effect Monitoring on Environmental / Social Changes
- (iii) Operational Phase Monitoring; this is generally sub-divided in two related activities:
 - Compliance Monitoring during Maintenance and Road Operation Activities
 - Impact/Effect Monitoring on Environmental / Social Changes attributable to the project.

ad i) Pre-Construction and Baseline Monitoring

The core of these monitoring activities focus on

- verification that the EA mitigation recommendations relevant to the Contractor's responsibility are incorporated in the tender, BOQ item rates and in the work contract specifications;
- verification that all government permits and approvals are in place prior to construction;
- verification that land, property and crop and livestock disturbance compensation valuations have been completed satisfactorily prior to construction;
- verification that all the necessary sub-plans within the framework of the environmental mitigation plan have materialised, such as:
 - Acquisition, Compensation, and Rehabilitation Plan or Resettlement Action Plan;
 - confirm that all procedures regarding land acquisition and compensation have been properly set out and followed, and that the construction mitigation plan is in place;
 - the Indigenous People Development Plan is prepared;
 - Tree Restoration and (if applicable) a Re-vegetation Plan;
 - Gender Development Plan;
 - all necessary activities are in place, associated with planned job opportunities for local community members, community;
 - awareness programs (e.g. on health, road safety, environmental protection), voluntary social service program.

The rationale for baseline monitoring at this early stage is to compare the environmental conditions in the project area prior to implementation of project related activities against the impacts occurred due to implementation of the project. This will primarily help to identify needs and possibilities to modify

mitigation measures at an early stage to avoid any disastrous consequences. The same approach also applies during Environmental Audit to be carried out two years after completion of each road project. These monitoring activities will also indicate how accurate was the impact prediction, and how efficient were the corresponding mitigation measures. The main monitoring instrument is the set of indicators identified in the EMAP.

An important verification instrument are thematic (GIS) maps, especially those referring to ecologically, sociologically and culturally sensitive areas, as well as maps showing the pre-construction land-use activities and community properties.

ad ii) Monitoring Activities during Construction Phase.

Compliance monitoring will be done by the Project Management (in-house or appointed individual professional or professional organization), and closely monitored by the DoR/GESU at the central level to ensure that EMAP recommendations are complied.

The main parameters for measurement will include, among others:

- Verification that the EA mitigation recommendations relevant to the Contractor's are understood well by the contractors and his foremen / field supervisors
- health and sanitation aspects with respect to the ongoing construction works;
- waste management precautions and procedures;
- use, storage and handling procedures for hazardous and construction material;
- social impacts and/or imbalances associated with the ongoing activities;
- Gender issues observed;
- employment pattern and schedules;
- restriction of children's work.

The impact monitoring during this project phase focuses on pre-identified (in the EMP) indicators to assess whether the impacts have been accurately predicted, and whether the mitigation measures are sufficient and effective. Effect parameters would include, among others:

- quality and quantities (at different seasons) of water resources at critical adjacent areas like crossing of major water bodies;
- quality and quantities (at different seasons) of potable water supply to work camps and affected villages;
- disposal areas and hazardous waste dump areas for leaching or run-off;
- natural and/or artificial re-vegetation at erosion-prone areas;
- status and disturbance of flora and fauna in areas adjacent or in the reach of influence of the construction activities;
- status of forests and forest species diversity, including community forests;
- status and/or maintenance requirement for re-vegetation and slope stabilization;
- effects of project-related employment and resettlement on both environmental and human resources the local (or host) communities depend on.
- public safety and security aspects with respect to the construction works under way;
- public health;
- community conflicts and social imbalances.

ad iii) Monitoring Activities during Operation Phase

Like in the construction phase monitoring, there will be compliance and impact effect monitoring. The compliance monitoring will focus on determining that the prescribed mitigation and enhancement measures are duly carried out during road maintenance and operation of the road. The responsibility of operation phase monitoring lies with District or Division Road Office/DoR. The monitoring will again focus on key indicators to assess whether the impacts have been accurately predicted and whether the mitigation measures are sufficient and effective. The main parameters for monitoring in this phase will include:

- Life standards and level of acceptance of resettled households to their new homes and communities;
- quality and quantities of potable water supply to affected villages and, temporarily, to maintenance worker colony
- forest, water resources, soils and land use changes;
- status and potential damage to community forestland;
- effects of access and control measures on forest, wildlife habitats and populations;
- illegal hunting, trapping and trading of wildlife and tree felling;
- public safety and security issues related to the road project;
- health and sanitation issues related to the road project;
- effects of project-related employment and resettlement on both environmental and human resources the local (or host) communities depend on.

The foreseen methods for monitoring the implementation of mitigation measures or environmental effects should be as simple as possible, consistent with collecting useful information, so that community members can apply them themselves. For example, they could just be regular observers of subproject activities or sites during construction and operation. Most observations of inappropriate behaviour or adverse effects should lead to **common-sense solutions**.

All monitoring activities described and proposed need to be included in the Environmental and Social Management section for cost estimation. Based on previous experience (RMDP) and on consultations with various stakeholders that often it was not possible for contractors to implement the environmental management measures as no budgetary provision is made to cover the extra costs involved in carrying out environment management works. The cost of mitigation measures and environmental monitoring should therefore be incorporated within the project cost estimates. Furthermore, if the in-house DoR staff is not capable to carry out environmental monitoring, the project should hire professionals from private sector to ensure independent compliance and impact monitoring activities. All environmental costs should be presented in EXCEL work sheets, and follow the chronological itemization of all proposed activities that need to enter the project's budget.

To summarize the above monitoring aspects, Tab. 2.10 provides a matrix for the Monitoring Framework for environmental parameters. Concerning the monitoring framework for social parameters, especially those linked to resettlement and vulnerable groups, reference is made to Chapter 9 of this ESMF.

Table 2.10: Framework for Monitoring Environmental Aspects

Issue	Verification	Schedule	Responsibility
A. Pre-Construction Phase			
Integration of local people's environmental concerns.	Review design reports, discussion with local stakeholders.	During the study and design process and prior to approval.	Project Management (PM) while preparing Env. & Social Screening.
Undertaking required level of environmental assessment	Review of screening, scoping, and IEE/EIA documents	Prior to project approval.	Project Management (PM) in coordination with GESU/DoR and MPPW while reviewing and approving IEE and MoEST while approving EIA.
Potential loss of land, properties and business	Thorough field and HH survey, documentation of potential losses.	Prior to project approval.	Project Management (PM) while preparing Env. & Social Screening.
Likely Resettlement	Identification of resettlement issues and potential resettlement options/sites	Prior to project approval.	Project Management (PM) while preparing Env. & Social Screening; GESU/DoR
Incorporation of mitigation measures and environmental codes of conduct into designs	Review detail design/drawings and Contractors' BOQ of the project to ensure EMP provisions are included.	During project approval.	PM; GESU/DoR
B. Construction Phase			
Site selection of work camps Site selection for asphalt mix plant and crusher	Find environmentally acceptable sites to prevent emission and other impacts on public	Before mobilization and construction of camp	PM/DoR, Consultant, Contractor
Construction and location of drainage facilities	Site inspections at places where such drains are required.	During active construction.	PM/DoR, Consultant, Contractor
Proper use of explosives/blasting.	Site observation and discussion with local residents, workers. Public alert; Contingency planning.	Whenever blasting takes place.	PM/DoR, Consultant, Contractor
Care and safe storage of top soil for later use.	Inspection of site clearance practices, top soil storage sites.	As necessary, Bi-Weekly during construction.	PM/DoR, Consultant, Contractor/RBG
Care for vegetation in the RoW and immediate vicinity.	Inspection of site clearance activities.	Weekly during construction.	PM/DoR, Consultant, Contractor/RBG; Independently monitored by DFO.
Safeguarding of Community Infrastructures	Site observation., discussion and seeking of feasible solutions	During and immediately after construction in the water source vicinity.	PM/DoR, Consultant, Contractor, CBO/VDC.
Safe disposal of excavated materials and other construction wastes.	Use of permitted disposal sites and observation of disposal practice.	Weekly.	PM/DoR, Consultant, Contractor/RBG
Impacts on agricultural land due to spoil disposal/soil erosion/water Logging due to construction.	Site observation and discussion and finding of feasible solutions with local residents.	Weekly.	PM/DoR, Consultant, Contractor
Proper reclamation of disposal sites.	Observation of finished disposal sites.	Before starting disposal, middle of completion, and after completion	PM/DoR, Consultant/RBG, Contractor, Land Owner, VDC, CBO
Care for local utilities	Observation; Protection of local utilities and discussion with local people.	Weekly.	PM/DoR, Consultant, Contractor/RBG, VDC, CBO

Issue	Verification	Schedule	Responsibility
Plantation of vegetation in the cut slope.	Site inspection; As applicable, generate social forestry program	Periodically, as per adequate season.	PM/DoR, Consultant, Contractor/RBG, social forestry program
Timely construction of other slope protection measures, such as, retaining walls.	Community-based planting / slope maintenance program	Immediately after construction.	PM/DoR, Consultant, Contractor community program
Proper siting of food stalls, Camp sanitation facilities	Observation of those sites.	Weekly.	PM/DoR, Consultant, Contractor
Quality of surface water, and groundwater level changes	Use field kit/visual observation.	Weekly or when construction taking place near water body.	PM/DoR, Consultant, Contractor
Air pollution near settlements.	Observation of good construction practices; discussion with residents and workers.	Periodically (weekly)	PM/DoR, Consultant, Contractor
Damage to private properties.	Observation and discussion with property owners.	Upon demand, bi-monthly	PM/DoR, Consultant, Contractor
Protection of culturally sensitive spots.	Site observation, discussion with local residents.	Upon demand, Monthly.	PM/DoR, Consultant, Contractor, VDC/DDC
Operation and closure of quarries and borrow pits requirements related to location, vegetation protection, soil conservation, erosion control, siltation, stability	Site inspection, discussion with workers and local people.	During quarry operation or bi-weekly.	PM/DoR, Consultant, Contractor/RBG
C. Operation Phase			
Encroachment/degradation of forest.	Visit identified forest, discussion with local people, forest user groups, local forest authority.	Half Yearly.	District Road Office/DoR, VDC, CDO local forest authority
Encroachment into common property.	Discuss with local people, prior mapping and seek consensus with community leaders.	Upon demand, half-yearly	District Road Office/DoR, VDC, CDO
Inappropriate use of marginal lands.	Discuss with local people, reference to prior mapping.	Upon demand, half-yearly	District Road Office/DoR, VDC, CDO
Surface flow interruption and its consequences.	Visit the area, mapping, discussion with local people.	Upon demand, half-yearly	District Road Office/DoR, Contractor
Air pollution, vehicular emission, noise, traffic volume.	Travel along the road, discussion with local people, pedestrians, passengers, transport operators.	Upon demand, half-yearly	District Road Office/DoR, CBO/NGO
Maintenance of road and road structures.	Inspection of road and road structures, check maintenance record.	Annually	District Road Office/DoR, Contractor/RBG
Condition of environmental mitigation measures used in the road.	Inspection of such measures and discussion with maintenance workers.	Annually	GESU/DoR
Landscape aesthetics.	Observation, views of local people and tourists	Annually	GESU/DoR

(9) EIA-Report Preparation and Approval

The borrower's decision to proceed with a project, and the Bank's decision to support it, is predicated in part on the expectation that the EMAP will be executed effectively. Consequently, the World Bank expects the EMAP to be site specific and detailed in its description of the individual mitigation and monitoring measures and its assignment of institutional responsibilities, and it must be integrated into the project's overall planning, design, budget, and implementation.

The following table summarizes the content of an EIA Report, tailored for the proposed SRN sub-project and in accord with the prescribed in Schedule 5 related to Rule 7 of the EPR:

Table 2.11: Table of Content of an EIA Report pertaining to SRN sub-projects

Standard Format Required for EIA Reports	
1. Name and address of individual or institution preparing the report (proponent)	
2. Executive Summary , in Nepali and English, indicating	<ul style="list-style-type: none"> ▪ Name and location of the proposed project ▪ Brief description of the project ▪ List of development permits or public financial assistance ▪ Summary of identified alternatives ▪ Summary of potential environmental impacts ▪ - List of key mitigation measures
3. Detailed Description of the Project	<ul style="list-style-type: none"> ▪ Type, size, and proposed use of project ▪ Objective and anticipated benefits of the project ▪ Description of physical characteristics of the project and its surrounding, illustration with location map and site plan in appropriate scale and level of details ▪ A time table, approximate cost, and methods and timing of construction of the project. ▪ Other necessary matters
4. Existing Environmental Condition – Description and analysis of physical, biological, chemical, economic, and social condition of the project site, surroundings and the region.	<ul style="list-style-type: none"> ▪ Physical Environment – topography, geology, seismicity, hydrology (surface and ground water), climate, air quality, and noise, ▪ Biological Environment - Plants, animals and habitats, national parks, sanctuary, rare and endangered species, sensitive ecological areas ▪ Socio-economic and cultural- Population, settlement, community Infrastructures (Irrigation, drinking water, schools, etc), Agricultural land, Potential for development (cash crop, industry, etc), recreational resources, scenic qualities, open spaces, historical, cultural and religious sites,
5. Impact Identification, prediction and Evaluation – Analysis of positive, negative, direct, indirect, extent, duration, reversibility and magnitude. The impact should be identified in relation to the construction, and operation stages	<ul style="list-style-type: none"> ▪ Physical ▪ Biological ▪ Socio-economic and Cultural
6. Alternatives of Project	<ul style="list-style-type: none"> ▪ Project Alternative ▪ Alternative Route ▪ Alternative Design and Construction Methods ▪ Do Nothing Alternative

7. Mitigation Measures – make reference to the Environmental Code of Practice
<ul style="list-style-type: none"> ▪ Beneficial Impacts in pre-construction, construction, and operation phases of project <ul style="list-style-type: none"> - Physical - Biological - Socio-economic and cultural ▪ Adverse Impacts in pre-construction, construction, and operation phases of project <ul style="list-style-type: none"> - Physical - Biological - Socio-economic and cultural • Implementation schedule and responsibilities of the proposed mitigation measures
8. Environmental Management Plan
<ul style="list-style-type: none"> • General • Environmental Monitoring Plan (compliance and impact monitoring)
9. Review of Policy and Legal Provisions
10. Conclusion and Recommendations
11. References – documents and data sources used for this EIA
12. Appendices
<ul style="list-style-type: none"> • Photographs • Response to the comments • Supporting Documents, baseline data, maps, drawings, etc • Details of Public Consultation/List of people participated • Copy of questionnaire/Checklists/Formats/Charts • Climatic Records • Records of Flora and Fauna • Records of Geological data • Air, noise and water quality data • Copy of approved Terms of Reference

[Ref.: in accord with EPR 1997, Schedule 5]

2.2.2 Environmental Auditing

Praxis and legal provision in Nepal require that an Environmental Auditing should be carried out two years after the project comes into in operation. Information from baseline data and data on monitoring should be utilized for carrying out the Environmental Auditing. The responsible agency for carrying out the Environmental Audit is the MoEST.

The environmental auditing should gather information on the following areas:

- The condition of natural/social/economic resources prior to the project implementation and after project construction is completed;
- Whether impacts forecasted by IEE/EIA occurred and, if so, the extent of these impacts;
- Whether or not the mitigation measures implemented are effective to control adverse impacts or enhance beneficial impacts;
- Whether or not all landscape degraded due to project implementation have been restored to their original/better conditions;
- Long-lasting and residual environmental, social and economic impacts resulting from the work forces at the time of construction;
- The overall effect on the local economy of project implementation;
- Have land acquisition compensation and resettlement been achieved according to RAP principle, and are there any resettlement related outstanding disputes?

Specifically, the following activities, and others as deemed necessary, need to be addressed for environmental auditing:

- How have the environmental conditions changed from the baseline conditions?
- Are there problems relating to slope stability in the project area?
- How slope stability and erosion control measures adopted by the project been effective in minimizing slope stability, erosion and landslide?
- Are there any bare or degraded areas around the project? What is the condition of the quarry sites, borrow areas, and spoil disposal areas?
- What are the conditions of local forest?
- How are the families resettled by project adapting to their new host communities?
- How have the local construction workers adapted to the loss of their jobs following the end of construction activities?
- What is the attitude of the local people towards the project?
- What has been the impact of the project on local and national economy?
- Were compensation payments sufficient to replace lost assets?
- Did transfer and relocation payments cover the costs?
- Were business displacement allowances for reestablishment of enterprise and crop production distributed? How was the fund utilized?
- Have enterprises affected received sufficient assistance to re-establish themselves?
- Have vulnerable groups been provided income earning opportunities? Are these effective and sustainable?
- Are jobs (e.g. road maintenance, roadside planting, slope protection) provided to PAPs to restore pre-project income levels and maintain their original living standards?

Table 2.12 provides the framework for planning the Environmental Audit in the forthcoming SRN Sub-Projects:

Table 2.12: Environmental Audit Plan

Parameters	Indicators	Location	Method	Sources
A. Physical Environment				
Disposal of Construction Spoils	Initiated Erosion, affected aesthetic value, forest, and agricultural land	Designated Sites	Observation/Interview	Local People and Observation, Photos
Side Casting of Excavated Soils and Wastes	Initiated Land Erosion, local drainage	Along the road alignment	Observation/Interview	Local People and Observation, Photos
Erosion and Slope Stability	Erosion and unstable areas on natural slope	Along road alignment	Observation and Measurement	Local Information, photographs, observation
	Adequate drainage facilities such as side drain, catch drain, and others	Along the road alignment	Observation, photographs, etc	Local Information, photographs, observation
Air Quality	Total Suspended Solid, Sox, Nox, dust from construction activities in houses, vegetation, surrounding areas	Along the road alignment	Visual inspection, measurement,	Measurement results information form local people
Noise	Noise level and their comparison with ambient standards	Along the road alignment	Measurement	Measurement results and information

Parameters	Indicators	Location	Method	Sources
Vibration on Structures	Any case of hearing impairment, crack existed in houses, and compensation	Construction sites, location of cracked buildings	Interview, observation	Local People, observation
Water Quality	Temperature, TSS, DSS, Sodium, Oil, grease,	Major Drainage	Water Sample collection and testing	Analysis of Data
B. Biological Environment				
Loss of Timber	Volume of fuel wood trade, location of timber depot, fuel wood sale, in project area	Project site, Road checkpoints, market, and settlement areas	Records, Observation	Local people, photos, available information, observation, Dist. Forest office
	Nos. of stumps of cut trees in nearby area forest	Near by forest areas	Examination of forest	Local People, observation, Photos + Satellite Images / GIS Maps
Alternative Energy for cooking for labor	Volume and type of fuel used in the project area	Project site	Record from contractors	Local People, observation
Harvesting and trade of medicinal plants	Sale of medicinal herbs increased	Project site and market	Information from local people	Local People, Dist. Forest office
Physical Condition of forest	General Condition of forest in nearby	Forest in nearby the project	Observation	Information, local people
Wildlife	Wildlife hunting, tapping, poaching, by work force	Forest area near the project site	Interview with local people,	Observation, interview with local people, Dist. Forest office
	Trading of wildlife product (dried meat, hides, and furs)	Project site and market	Observation, interview	Local people, Dist. Forest office
	Frequency of birds, mammals seen in the project area	Project area	Observation, records of quantitative sampling if at hand	Local people, Dist. Forest office, scientific reports
C. Socio-economic and Cultural Environment				
Employment	Number of local labor employed in the project construction	Project site	Analysis of records and interview	Records from contractors, DDC, and local people
	Nos of women in work forces and fair wages	Project site	Records	Records, local people
	No child work	Project site	Records	Records, local people
Trade commerce and industry	Nos. of shops increased, decreased, nos. of shops still in operation	Road sides and in project site	Records, interview	Local people, Photos
	Nos of industries in vicinity of project	Project site and surrounding	Records, interviews,	Observation, local people, DDC, Photos
	Rental of houses, land spaces after the project	Local Area	Interview	Local tenants, local people, DDC, Photos
Compensation	Use of compensation received	Local area/out of area	Interview	Local Affected People, Photos
Occupational Health and Safety	Types and number of accident occurred during construction	Project site	Interview, records	Records from local health facilities, police, contractors and local people
	Adequacy of occupational safety measures, STD prevention campaigns	Project Site	Record Review Campaigns	Record from Contractors and local people

Parameters	Indicators	Location	Method	Sources
	Facility of first aid emergency services provided	Project Site	Interview, records	Records from contractors and local people
	Compensation to the loss of life or disability	Project Site	Interview, records	Records from contractors, DDC and local people
Resettlement Success/Failure	Status and living condition of displaced or affected persons	Project Site and/or Resettlement Site(s)	Interviews, detailed HH surveys, income analyses, grievance records	HH survey data, local statistics and administration offices, photos
Damages and Compensation	Types of damages on personal properties	Project site and its vicinity	Interview and observation	Local People, observation, records, Photos
	Damages to local infrastructures such as foot trail, irrigation, etc	Within the project area	Interview and observation	Local People, observation, records, Photos
	Compensation for maintenance and rehabilitation of infrastructures	Project Area	Interview and Records	Local People, observation, records, Photos
	Losses caused by blasting, vibration and noise compensation paid	Project Area	Interview and Records	Local People, observation, records, Photos
Coordination and Communication	Coordination among local authorities, projects, contractors, labor	Office of local authorities CBOs Headquarters	Records	Local authority, CBO/NGO and other stakeholders
	Information Dissemination to local people about the project	Project Site and vicinity	Meetings	Local People
Socio-economic Change	Change in land use pattern	Project Area	Interview/survey	Local people, VDC, Photos + Satellite Images / GIS Maps
	Change in local economy (changes in standard of living)	Project Area	Interview /survey	Local people, VDC
Local Price Escalation	Rise in price of essential commodities as compare to before the project	Local Market	Market Survey	Local people, VDC

2.3 Environmental Code of Practice

An important aspect in securing the incorporation of environmental and social sustainability in any road development project in the country is to adhere to the extent possible to a Good Code of Practice³. The addressing of environmental issues in the forthcoming SRN sub-projects shall therefore adhere to specific code of practice which is detailed in Annex 2 of this ESMF.

It is suggested to use this Annex as a field guide to planners, engineers, contractors and those involved in supervision and monitoring to incorporate commonsense as well as critical thinking and established technical solutions in the project design and implementation arrangements. It is believed, that the incorporation of the proposed procedures will yield tangible benefits for long periods in terms of environmental and financial sustainability.

³ This Code of Conduct has also been utilized in a WB-financed program relating to the Rural Access Improvement and Decentralization Project DoLIDAR, 2005

The following tabular overview provides a summary of proposed code of practice to be observed in the SRN sub-projects, referring to Annex 2 for more details.

Table 2.13: General Environmental Codes of Practice for the SRN Program

Environmental Issue	Potential Impact	Code of Practice
Pre-construction and Construction Phase		
Land Use and RoW	<ul style="list-style-type: none"> Road alignment may pass through dense settlements leading to high levels of land acquisition, displacement, compensation and public dissatisfaction Road alignment may pass through cultivated and forested land resulting in a permanent loss of the resources. While the landowner has to part away with his land ownership, the environmental effects can amplify if proper operation and maintenance schedules are overruled. 	<ul style="list-style-type: none"> Plan road alignment to minimize RoW within settlements. Reduce RoW to the minimum required, but to keep options for future widening if regional development potential indicates. Plan road alignment to minimize loss of farmland and forest resources. Avoid width of road of more than 4.5 m in hilly area. Demarcate RoW to avoid encroachment.
Material Use	<ul style="list-style-type: none"> Excess extraction of local resources, such as wood, sand, soil, boulders, etc. Degradation of forests, erosion and landslide at steep locales due to stone extraction. Change in river/stream ecosystem due to unchecked sand extraction. 	<ul style="list-style-type: none"> Extract materials only on need basis. Avoid sensitive areas, such as steep slopes and water-ways.
Slope Stability	<ul style="list-style-type: none"> Extraction of forest products and cutting of trees in the steep slopes increases soil erosion/landslide due to loss of soil binding materials. Wrong alignment can trigger slope failure Haphazard disposal of construction waste can disturb slopes Improper drainage facilities can result in erosion and landslides 	<ul style="list-style-type: none"> Extract carefully and secure the top soil within 25 cm from the surface. Limit down grading of the road to 5 %. If down grading exceeds 7 %, construct side drainages Keep optimum balance in extraction and filling of soil works. geo-hazardous assessment /mapping Use designated disposal site and avoid side-casting of spoil Provide proper drainage Bio-engineering on exposed slopes
Wildlife	<ul style="list-style-type: none"> Wildlife habitats at forests, shrub land along road alignment are affected from the road construction activities. Wildlife and human conflicts increase as wildlife might destroy the crops or attack the construction worker. 	<ul style="list-style-type: none"> Avoid as much as possible areas with high biodiversity. Efficient movement of machinery and other traffic. Control poaching activities and regulate movement of labor force and their dependents into the forest area. District Forest Office and its subsidiary body should be involved in monitoring the activities of the construction workers and officials to forbid wildlife harassing, trapping, poaching, trading.
Drainage	<ul style="list-style-type: none"> Higher flow rate of surface water and water logging induce land slides, erosion. Quality of road diminishes due to poor drainage such as water logging, immense flow rate of surface water. 	<ul style="list-style-type: none"> Cross drainage outlets must be channeled to confirmed natural drains. If slope exceeds 5%, construct flow control devices every 20m.
Protection of Vegetation	<ul style="list-style-type: none"> Protected areas and highly forested areas. Degradation of forest areas. Degradation of agricultural land. 	<ul style="list-style-type: none"> Use minimum and efficient use of wood products for construction. Initiate plantation at damaged and damage prone areas. Increase liability of local forest user groups. Avoid protected areas or densely forested areas

Environmental Issue	Potential Impact	Code of Practice
Disposal of Construction Wastes	<ul style="list-style-type: none"> Dumping of wastes along the road or elsewhere. 	<ul style="list-style-type: none"> Selected spoil dumping sites be used. After disposal, the area should be leveled and compacted. Conserve the soil by planting indigenous plants including grasses. Wastes could also be used as leveling materials along the roadside.
Disposal of Sanitary Wastes	<ul style="list-style-type: none"> Unmanaged sanitary waste disposal creating health problems and public nuisance. 	<ul style="list-style-type: none"> Demarcate proper sanitation area Check for hygiene of work force.
Impacts on amenities along RoW	<ul style="list-style-type: none"> Road crossings at water supply, irrigation lines may be disturbed/damaged. 	<ul style="list-style-type: none"> Avoid as much as possible the crossing over such amenities.
Pollution	<ul style="list-style-type: none"> Dust generation from construction activities, construction vehicular movement increases air pollution. Noise pollution likely from construction machinery operation and vehicular movement. Sanitary problems likely at the construction and workforce quarters. 	<ul style="list-style-type: none"> Possibly construction period should be during August to December when soil moisture content is highest. Consider construction of road at 50 m from settlement. Enforce speed limit of vehicles and construct the road according to volume and size of traffic movement.
Social and public health issues	<ul style="list-style-type: none"> Disparities in employment opportunities Gender biased labor and wages Child labor STD propagation due to labor influx 	<ul style="list-style-type: none"> Ensure national policies and regulations regarding employment (local communities, gender, children) are duly respected Carry out regular health awareness campaigns among labor forces and local communities, involving experienced locally working NGOs.
Operation Phase / Maintenance Works		
Encroachment	<ul style="list-style-type: none"> Unmanaged settlement, construction along the RoW. 	<ul style="list-style-type: none"> Establish RoW properly and enforce its limits.
Interruption of Water Flow along RoW	<ul style="list-style-type: none"> Concentrated flow left unattended might have severe impact at the downhill alignment of the road. 	<ul style="list-style-type: none"> Cross drain structures, namely pipe culverts, slab culverts, box culverts, need to be maintained. Outlet of these structures would be carrying the concentrated run off flow of the respective catchment, which will be quite high during rainy season, which in turn requires proper planning of drainage systems.
Pollution/Vehicular Emission	<ul style="list-style-type: none"> Dust generation from vehicular movement increases air pollution. Noise pollution from vehicular movement. 	<ul style="list-style-type: none"> Enforce speed limit of vehicles. Maintain traffic size movement. Discourage use of horns.
Landscape Aesthetics	<ul style="list-style-type: none"> Road construction is likely to increase landscape scars along the road alignment. In addition if the construction spoils are disposed off improperly, the ground vegetation would be destroyed which will be visible from a distance. 	<ul style="list-style-type: none"> Such damage cannot be avoided but can be minimized through re-plantation of indigenous species and greenery development.

Chapter 3

3 Legal Acts, Policies, Regulations and Guidelines

3.1 Principal Guiding Documents for IEE, EIA and SIA (including Resettlement) Related to the Road and Transport Sector Development in Nepal

A. Government of Nepal (GoN)

3.2 Relevant Acts, Regulations and Guidelines

3.2.1 Constitution of Kingdom of Nepal, 1990

Article 26 (4) of the Constitution of the Kingdom of Nepal, 2047 BS as supreme law of the land, proclaims that: “the state shall give priority to the protection of the environment and also to the prevention of its further damage due to physical development activities by increasing the awareness of the general public about environmental cleanliness, and the state shall also make arrangements for the special protection of the rare wildlife, the forest and vegetation”. Thus, the provision clearly indicates the need of environmental impact assessment to be carried out for development projects, as it is the only proven tool for identifying potential impacts long before they arise and for suggesting preventive mitigation measures.

With respect to property rights and land selling, the Constitution provides the following: Article 17 (1) of the Constitution establishes property rights to every citizen of Nepal whereby every citizen is entitled to earn use sell and exercise their right of property under existing rules and regulations. Article 17 (2) states that except for public welfare, the state will not acquire or obtain or exercise authority over individual property. Article 17 (3) adds that in case the state acquires or establishes rights over individuals’ property for public welfare, the state will compensate for the loss of property and the basis and the procedure for such compensation will be specified under relevant acts. The basis of compensation and the procedures for delivering compensation for any property acquired by the State shall therefore be as prescribed by the law.

3.2.2 Local Self-Governance Act, 1999

The Local Self-Governance Act, 1999 empowers the local bodies for the Conservation of soil, forest and other natural resources and implements environmental conservation activities. Sections 28 and 43 of the Act provide the Village Development Committee a legal mandate to formulate and implement programs related to protection of environment and bio-diversity. Similarly, Sections 189 and 201 of the Act provide that the District Development Committees are liable to formulate and implement programs related to protection of environment and give adequate priority for protection of environment during formulation and implementation of district level plan (s). As this is the national level priority road project, the respective VDCs and DDC can regulate soil and

water conservation activities that support to stabilize the road slopes and minimize likely adverse impacts on the road and by the road.

3.2.3 Nepal Environmental Policy and Action Plan (NEPAP), 1993

The Nepal Environmental Policy and Action Plan (NEPAP) were endorsed in 1993 to institutionalize environmental protection in the development processes. It basically addresses industrial and urban development, as well as infrastructure development. The action plan for infrastructure development in NEPAP recommended development of EIA guideline for road sector, among others. Subsequent document NEPAP II has been prepared which includes recommendations for implementing environmental programs and action plans.

3.3 Environmental and Natural Resources Protection

3.3.1 The Environmental Protection Act, 1996 (EPA)

The Environmental Protection Act, 1996 and Environmental Protection Regulation, 1997 (first amendment, 1999) contain several provisions to institutionalize the integration of environmental aspects in development projects including road sector, and empowers the then Ministry of Population and Environment (MoPE) and now the Ministry of Environment, Science and Technology (MoEST, as MoPE has been recently annexed to Ministry of Science and Technology- MoEST) to approve EIA report. Similarly, in case of IEE level study, the line Ministries, which is Ministry of Physical Planning and works (MoPPW) for the proposed Project, is authorized to approve the Final IEE Report. Following are the highlight of the EPA, 1996.

The Act recognizes the interdependence between development and the environment and shows the concerns for minimizing the impacts of environmental degradation on people, animal, and plant species and their physical surroundings,

The Act obliges the proponent to undertake IEE and EIA of proposal, plans or projects which may cause changes in existing environmental condition and authorizes the then MoPE (now MoEST) to clear all EIA and line ministries for IEE study. It empowers the then MoPE (now MoEST) to prohibit the use of any matter, fuel, equipment or plant, which has adverse effects on the environment. The Act makes provisions that polluters or liable persons for environmental and private property damage have to compensate affected persons from polluting activities. The Act empowers GoN to provide additional incentives to any industry, occupation, technology or process, which has positive impacts on environmental conservation. It also makes provision to establish an Environmental Protection Fund to be used for environmental protection, pollution control and heritage conservation, and gives the government the authority to declare specific areas as environmentally protected area.

3.3.2 The Environmental Protection Rule, 1997 (first amendment, 1999) (EPR)

With respect to the forthcoming needs of IEE, EIA and SIA for the SRN sub-projects, this regulatory provision bears the principal provisions for any project proponent involved in this program. In the process of implementing EPA (1996) effectively, the Environmental Protection Rule (EPR) has been enforced in 1997 and amended in 1999. EPR contains the elaborative provisions on the process to be followed during the preparation and approval of projects requiring EIA and IEE including scoping document, terms of reference, information dissemination, public consultation and hearing, and environmental monitoring and auditing. EPR calls for the public consultation prior to the preparation of scoping document and Terms of Reference and public hearing prior to the approval of EIA Report.

The environmental laws stipulate the requirements and procedures for the approval process of the Environmental Assessment. Section 3 to 6 of the EPA, 1996 and Rule- 3 to 11 of the EPR, 1997 contain such provisions, Rule 12 of the EPR, 1997 (first amendment 1999) requires the proponent to comply with the matters mentioned in the report and other conditions, if any, prescribed by the approving agency or concerned agency, while Rule 13 and 14 are related to environmental monitoring and environmental auditing.

The environmental legislation empowers concerning Ministry to monitor the environmental activities including mitigation measures and the then MoPE (now MoEST) for environmental auditing. For IEE, the concerning Ministry, which is Ministry of Physical Planning and Works in case of the proposed Project, is authorized to approve the Final IEE Report. The EPR also lists the environmental screening through depicting the types of development activities requiring IEE or EIA Level Study. It also gives an outline of content of Terms of Reference document, IEE and EIA Report.

The preparation of Environmental Management Plan (EMP) is determined as a key part of the EIA report. The proponent is required to implement the mitigation measures, while the environmental monitoring works should be performed by the concerned agency (ministries), and auditing by the Ministry of Population and Environment (the then MoPE (now MoEST) in accordance with the provisions of the EPR, 1997.

The environmental law has made the public consultation a pre-requisite to all the prescribed projects to provide different stakeholders an opportunity to raise their concerns right from the Project Scoping stage to the approval of EIA Report. Provision of intense public participation and consultation has been made mandatory for EIA through Public consultation during Scoping and Public Hearing after Draft Report Preparation. Such participation of the related stakeholders take place during entire period of preparation of EIA report. Section 18 of the EPA, 1996 empowers the prescribed authority to close down such act immediately and impose fine up to one hundred thousand rupees in case any person implements a proposal requiring environmental assessment without any approval or carries any act in contrary to the approved proposal.

3.3.3 Soil and Watershed Conservation Act, 1982

In order to properly manage the watersheds of Nepal, the Soil and Watershed Conservation act, 1982 was enacted. Section 3 of the act empowers the government to declare any area as a protected watershed area. Section 4 of the act provides that a watershed conservation officer has the authority to implement the following works in protected watershed areas:

- Construct and maintain dam, embankment, terrace improvements, diversion channels and retaining walls
- Protect vegetation in landslide-prone areas and undertake afforestation programs, and
- Regulate agricultural practices pertinent to soil and watershed conservation.

Under Section 10 of the act, power is extended to the Watershed Conservation Officer to grant permission to construct dams, drainage ditches, canals, cut privately owned trees, excavate sand, boulders and soil, discharge solid waste, and establish industry or residential areas within any protected watershed. The Act outlines the essential parameters necessary for proper watershed management (including rivers and lakes). The act is applicable to protected watersheds.

3.3.4 Forest Policy, 1993

The forest policy is attracted when a development project directly or indirectly impacts on the forest resources. The forest policy is directed, inter alia, to contribute food production through effective interaction between forestry and farming system, to protect land against degradation by soil erosion, landslide, and other effects of ecological disturbances, and to conserve ecosystem and genetic resources. However, the forest policy re-emphasizes to avoid forest destruction or tree cutting while constructing infrastructures during implementation of project other than forest sector. The policy has prioritized the protection of *Siwalik*, the geologically vulnerable area, with a view to ensure watershed conservation, and maintenance of water recharge. The policy also stresses conservation of endangered species. It has reiterated that forest area will not be used for any activities other than prescribed in Operational Forest Management Plan. The forest policy emphasizes the implementation of community and private forestry development programs, national parks and conservation areas management programs, soil and watershed conservation program, management and development of medicinal plants, and conservation of biological diversity.

3.3.5 Forest Act, 1993

The Forest Act, 1993 recognizes the importance of forests in maintaining a healthy environment. The Act requires decision makers to take account of all forest values, including environment services and bio-diversity, not just production of timber and other commodities. The basis of Act is resource oriented rather than use oriented.

The Forest Act, 1993, (amendment, 1998) contains several provisions to ensure the development, conservation, management and sustainable use of forest resources, based on an approved work plan. The work plan should contain a list of activities that should be implemented in the different forest categories - national forests, community forests, leasehold forests, private forests, and religious forests. Section 23 of the Act empowers the government to delineate any part of the national forest, which has 'special environmental, scientific or cultural importance', as a protected forest. Section 49 of the Act prohibits reclaiming lands, setting fires, grazing cattle, removing and damaging forest products, felling trees of plants, wildlife hunting and extracting boulders sand and soil from the National forest without the prior approval. However, the government may enforce Section 68 of the Forest Act to provide parts of any type of forest for the implementation of a national priority plan with the assurance that it does not adversely affect the environment significantly.

3.3.6 Forest Rule, 1995

The Forest Rules 1995 (amendment, 1999) further elaborate legal measures for the conservation of forests and wildlife. Based on forest legislation, thirteen plant species are included in the level protection list. Of them, GoN has banned the felling, transportation and export of Champ (*Michelia champacta*), Khayer (*Acacia catechu*) and Sal (*Shorea robusta*). The Rule also stipulates that the entire expenses for cutting and transporting the forest products in a forest area to be used by the approved project shall be borne by the proponents of the project.

3.3.7 Forest Produce Collection and Sales Distribution Guidelines, 2001

Clause 3 to 10 of the Guideline have specified various procedure and formats for getting approvals for vegetation clearance, delineation of lands for vegetation clearance, evaluation of the wood volume etc. and government offices and officials responsible for the approval, delineation and evaluation.

3.3.8 The Aquatic Animal Protection Act, 1961

This Act indicates an early recognition of the value of wetlands and aquatic animals, Section 3 renders punishable to any party introducing poisonous, noxious or explosive materials into a water source, or destroying any dam, bridge or water system with the intent of catching or killing aquatic life. Under Section 4 of the Act, Government is empowered to prohibit catching, killing and harming of certain kinds of aquatic animals by notification in Nepal Gazette.

3.3.9 The National Wetland Policy, 2003

The National Wetland Policy, 2003 also includes the need for carrying out EIA in accordance with the provision of the existing laws for development projects and actions, which are planned for implementation nearby the wetland¹.

3.3.10 National Parks and Wildlife Conservation Act, 1973 and Rules

The National Parks and Wildlife Conservation Act, 1973 address for conservation of ecologically valuable areas and indigenous wildlife. The Act prohibits any movement of a person without written permission within the parks and the reserves (Article 4). The Act further prohibits wildlife hunting, construction of houses and huts, damage to plants and animals etc., within the reserve, without the written permission of the authorized person (Article 5). The Act has also listed 26 species of mammals, 9 species of birds and 3 species of reptiles as protected wildlife (Sch.1).

3.3.11 Mountain National Park Regulation, 1979

This regulation governs the Langtang National Park, Sagarmatha National Park, and Rara National Park². Article 7 of this regulation prohibits the following activities within Mountain National Parks without a written permission of the warden:

- Build a house, hut or other construction and use such structure
- Encroach any piece of land, and clear, damage or remove any vegetation and cultivate or harvest any crops
- Graze or water any domestic animals or birds
- Cut, prune, remove, or set fire on vegetation, plants or damage any tree, bush, or plants in any other manner
- Stay overnight, camp, or campfire
- Plough or mine or remove stone, sand, mud, minerals or damage the land in any manner
- Block, divert or use hazardous or explosive materials in the rivers flowing within the national parks or in the sources of water, and
- Bring and leave any exotic plants, animals, and birds inside the national parks

3.3.12 The Buffer Zone Management Regulation, 1996

The Buffer Zone Management Regulation, 1996 has mandatory requirement to have permission of Warden to carry out following activities within a buffer zone area:

- Occupying any land without legal ownership or cutting trees, clear forest or cultivate forestland
- Any activity damaging forest resources or setting fire in the forest

¹ Nepal is also a signatory to the RAMSAR Convention.

- Excavating stone, earth, sand or mine or removing minerals, earth or other such materials
- Using any harmful poison or explosive substances into the river, stream or source of water flowing in the buffer zone, and
- Hunting illegally and any act damaging to the wildlife.

This regulation is applicable for the new road construction between Nagma and Gamgadhi which will lead through the buffer zone of Rara Lake National Park.

3.3.13 International Legal Provisions with Likely Relevance for Road Projects

Nepal is signatory to many international conventions, which deal with the protection of environment and have to some extent also bearing on road project designing. For example, the convention on Biological Diversity was signed by Nepal at Rio de Janeiro on June 12, 1992. The convention provides a broad framework on the need for carrying out EIA to minimize adverse impacts of the projects and programs on biodiversity. The Article 14 of this convention provides the provision of impact assessment and minimization of adverse impacts. In broader sense, it calls upon the signatory parties to introduce appropriate procedures for EIA and ensure public participation, exchange information on adverse effects on biodiversity of other states, notify immediately possibly affected other states in case of danger or damage to biodiversity and to initiate action to prevent or minimize such damages.

Other legal obligations relate to the following international conventions and agreements:

- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, 1989
- The Vienna Convention for Protection of Ozone Layer, 1985
- UN Framework Convention on Climate Change, 1992
- The Agreement on the Network of Aquaculture Centres in Asia and the Pacific, 1988
- The Plant Protection Agreement for the South East Asia and the Pacific (as amended), 1956,
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora, (CITES), 1973
- The Ramsar Convention (Convention on Wetlands of International Importance Especially as Water Fowl Habitat), 1971
- The Convention for Protection of the World Cultural and Natural Heritage, 1972
- The UN Convention to Combat Desertification, 1994

3.4 Road Construction and Land Acquisition

3.4.1 Explosive Material Act (2018 BS)

If construction activities require the use of explosive, in accordance with the Explosive Material Act 2018 BS, prior approval of the Chief District Officer (CDO) is needed to purchase explosives. Any development projects intending to use explosives needs to obtain a license in accord with Article 4 of the Act, relating to procurement, storage, application and transportation of explosives.

3.4.2 Public Road Act (2031 BS)

The Public Road Act is the governing legislation for construction and operation of roads in Nepal. The Act prohibits the construction of permanent structures (buildings) in a defined distance from the rural road, i.e., the road agency has the authority over everything within the right of way. The act makes provision for

cases where road projects temporarily require land and/or other properties during construction, rehabilitation and maintenance. A Compensation Fixation Committee CFC³ determines compensation in case of loss of assets, business or production. Provisions are also detailed for compensation for the extraction of construction materials. Article 19 of the Act mandates requirement of permission from the Department of Roads to carry out activities within the limits of the road boundaries. As per Article 29, local governmental offices have to give notice to the DoR prior to the start of activities in the limits of the public roads.

The Act empowers DoR to acquire any land on a temporary basis (for storage facilities, construction camps, etc.) during road construction and upgrading. The temporary acquisition of land containing any buildings (e.g. houses, sheds, temples and schools) is avoided wherever possible. The Act also empowers DoR to “lift earth, stone or sand from any adjoining land” during construction and upgrading works.

The Act does not provide for leasing of land. However, DoR is required to pay compensation for any damages caused to buildings, crops and trees, where the farming activity of the landowner is interrupted, and where the landowner has to incur expenses to restore the land after its return. Compensation is determined between DoR and the titleholder, or through mediation, involving officials from the relevant VDC and District.

The GoN may prohibit, through notification in the *Nepal Rajapatra* (Government Gazette), the construction of any permanent structure (other than walls) within 6 m of the road formation edge.

3.4.3 Land Acquisition Act, 1977

Land Acquisition Act, 1977 (2034 BS) with amendment in 1993 (2049 BS) guides the compulsory acquisition of land in the country. The Land Acquisition Act 1977 and the Land Acquisition Rules 1969 (2026 BS) are the two main legal instruments that specify procedural matters of land acquisition and compensation. Government can acquire land at any place in any quantity by giving compensation pursuant to the Act for the land acquired for any public purposes or for operation of any development project initiated by government institutions (Section 3 and 4). The powers given under these sections are very broad as government is empowered to acquire any land in the name of public works. The Constitution of the Kingdom of Nepal, 1990 (2047 BS) Article 17 (3) provides for compensation to be paid to the individual if the state takes land for development purposes.

With respect to the resettlement policy framework, the following legal provisions outlined in the Land Acquisition act are relevant:

- The acquisition and compensation of privately-owned assets are undertaken according to a formal procedure, consisting of (a) initial procedures, (b) a preliminary investigation process, (c) acquisition notification, (d) compensation notification, and (e) appeal procedures.
- Compensation Determination Committees are established (at district level) to ascertain compensation rates for land and other assets.
- Compensation must be paid (a) for damages caused as a result of investigations during the preliminary investigation process, and (b) for land and assets permanently acquired by the project (including, standing crops, trees and houses).
- Compensation must take depreciation for salvage materials into account.

³ Sometimes also referred as to “Compensation Determining Committee CDC”

- Compensation must be in cash (lump sum), although titleholders who have lost all of their landholdings may be given replacement land, if available.
- Compensation will be made to the person who has the right to claim for the compensation; to be entitled to compensation for land, a person must submit an official land registration certificate at the time of compensation.
- Titleholders are required to submit compensation claims or complaints within a specified period after the land acquisition notice had been issued by the Local Authority (Chief District Officer). Compensation for land is paid after determination of rates and verification of the list of entitled applicants by the CFC.
- Two separate rates of compensation can be paid i) to titleholders who lose all their land, and ii) to titleholders who lose only some part of their land.
- In determining the compensation amount, the committee has to consider relevant periodic guidelines of GoN and the loss suffered by persons due to acquisition of land, shift of residence or place of business to another place.
- If the land has to be acquired the CFC has to consider the following in determining the compensation amount: price of the land prevailing at the time of notification of land acquisition, price of standing crops and structure, and damage incurred by persons being compelled to shift their residence or place of business due to land acquisition.

3.4.4 Guthi Corporation Act, 1976 (2033 BS)

Land acquisition must also comply with the provisions set out in the Guthi Corporation Act, 1976 (2033 BS). Section 42 of this Act states that Guthi (religious trust land) acquired for a development must be replaced with other land (rather than compensated in cash).

3.4.5 Land Acquisition Guidelines 1989

Two sets of guidelines related to land acquisition are significant for DoR Sector Wide use. They are the Land Acquisition Guidelines of 1989 and guidelines pursuant to section 16 and 17 of the Land Acquisition Act 1977 (2034 BS). These guidelines specify two categories of affected families, Project Affected Families (PAF) and Seriously Project Affected Family (SPAF). A PAF consists of the members of a household including elderly dependents and minor children (under 18 years) residing under one roof and operating as a single economic unit, who are adversely affected by the project. SPAF is defined as a family who loses over 25% of its total land holdings or whose land is reduced to an uneconomic holding (less than 5.0 katha) or who is being displaced.

Under these guidelines the concerned officials, with the assistance of the project team, are to carry out assessments of project affected families to identify their standard of living and types of assets. Valuation of land and asset lost were to be based on comparative market values of similar assets in the vicinity. The guidelines also included arrangements for rehabilitation of project-affected families. For PAF's, the compensation package includes cash for assets acquired or damaged by the project and a rehabilitation grant (assistance allowance) to cover any suffering and hardship. For SPAF's, the compensation additionally include employment for one family member and provision of skill training.

The Guidelines specify the establishment of an Acquisition and Rehabilitation Committee (also known as **Compensation Fixation Committee**, "CFC") consisting of the concerned Chief District Officer (Chair), Land Revenue Officer, representative of the District Panchayat (now DDC) and the Project Manager and others as deemed necessary. The Committee is responsible for acquiring land and paying compensation. In 1993, a second set of guidelines reduced the Acquisition and Rehabilitation Committee to a four-member Compensation Fixation and Rehabilitation Management Committee by dropping the Land

Revenue Officer and other governmental appointees. The functions and powers of the committee were clarified, as were methods of payment and means of ensuring fair valuation of land quality.

The legal provisions prescribe 21 steps in the Land Acquisition Process:

Table 3.1: Procedural Steps in the Land Acquisition Process

Step	Action	Responsibility	Time Required	Clause No. in LAA
1	Identify the areas of land to be acquired and requests authorization from the concerned Ministry or Department to proceed with acquisition	Project Manager (PM)	Determined during feasibility/design work	3,4
2	Ministry/Department officially authorizes the PM to initiate preliminary action for land acquisition	Ministry of Dept.	½ month	5
3	Issues notice of preliminary action and affix it in proper places for information.	PM	1 month	6 (1)
4	After 3 days, start land survey and prepare maps, measure dimensions of houses/walls, count of trees to be felled and assess the amount of standing crops to be cut, etc. Estimate compensation for lost houses, trees, crops. Complete preliminary action within 15 days, submit all documents to Chief District Officer (CDO) for further action.	PM	1-2 months	6 (2,3) 7 8 (1)
5	PAPs may complain to the CDO about the amount of compensation for houses, trees, crops, etc.	Land Owner	½ month	7 (3)
6	Review of the PM's documents from preliminary action and decides on complaints of compensation for losses. The CDO's decision is final.	CDO	2 months	9 (1)
7	Issuing of a land acquisition notice, to be publicly displayed at the following places: <ul style="list-style-type: none"> • The local office of the concerned project • District Administration Office • The concerned VDC/Municipality offices • Land Administration or Revenue office • Thoroughfares located around the concerned lands • Other places as the CDO may deem appropriate. The notice should also indicate that the land owners shall submit an application claiming compensation within a minimum time limit of 15 days, with evidence of the land ownership certificate. The time limit will be allowed for the owners to fell trees or cut standing crops, demolish houses or walls to the land owners.	CDO	2-3 months	9 (2)
8	Information to land owners who may not become aware of the notice.	CDO	½ month	9 (3)
9	After receiving the land acquisition notice, suspends any land transaction until the CDO directs it to lift the suspension.	Land Revenue Office	½ month	9 (4)
10	CDO forms a Compensation Fixing Committee (CFC) of the following officers to determine the amount of compensation payable: <ul style="list-style-type: none"> • CDO • Land Administrator or Chief of the Revenue office • PM in the case of a project and officer designated by the CDO for other purposes • A representative of the DDC The CFC will determine the amount of compensation considering: <ul style="list-style-type: none"> • Current price of land • Value of standing crop, houses, walls, sheds, etc. • Loss incurred as a result of shifting residence or place of business 	CFC	2 months	13 (2)
11	The CDO prepares list of persons entitled to compensation and issues notice of the same.	CDO	½ month	18 (1)
12	Any person who is not satisfied with the list may file a complaint to Ministry of Home (MoH) within 15 days.	CDO	1 month	18 (2)
13	PAPs may complain to MoH through the CDO within 7 days giving reason why his land should not be acquired.	Land Owner	½ month	11 (1)
14	Before taking a decision on the complaint filed, the MoH shall consult the officer responsible for preliminary action and, if necessary, the	MoH	3 months	11 (2) 11 (3)

Step	Action	Responsibility	Time Required	Clause No. in LAA
	CDO. MoH shall exercise the powers vested in a district court, such as summoning witnesses recording statements, or procuring document. The MoH will notify the CDO about the final decision of the complaint.			
15	GoN takes possession of the concerned land and hands it over to concerned office for which it is acquired after: <ul style="list-style-type: none"> Finalization of the amount of compensation by the CFC Decision has been made on complaint, or At any time after expiry of the time limit for filing complaints 	CDO	2 months	12 (10)
16	The CDO notifies the amount of compensation payable by the concerned ministry or department.	CDO	½ month	19
17	Authorization to the PM to make compensation payment to the land owners.	Ministry or Dept.	½ month	13 (1)
18	PM makes payment to land owners in presence of Revenue Officer, CDO and DDC officers' representatives.	PM	2 months	13 (2)
19	Landowners must receive compensation amount within a time limit of 3 months after which he will not be entitled to any compensation	Land Owner	3 months	37
20	The CDO takes possession of the land and hands it over to the concerned Ministry or Department and notifies HMG/N.	CDO	2 months	22
21	The PM obtains land ownership certificate and deposits copies with concerned ministry, department and project office(s).	PM	1 month	

Source: Public Works Directives, PWD Management Unit, MoPPW, 2002

3.4.6 Land Reform Act 1964 (2021 BS)

The provisions of the Land Reform Act 1964 pertaining to the maximum permitted size of individual landholdings also apply to land acquisition, since a landowner may not be compensated for more land than he is entitled to under the Land Acquisition regulations.

The Land Reform Act additionally specifies the compensation entitlements of registered tenants on land sold by the owner or acquired for development purposes. The Act amended most recently in 2001 (2058 BS) has established a rule that when the state acquires land under tenancy, the tenant and the landlord will each be entitled to 50 percent of the total compensation amount.

3.4.7 Local Self-Governance Act 1998 and Local Self-Governance Rule 1999

The Local Self-governance Act has been enacted to provide greater political, administrative and financial autonomy to local bodies and facilitate community participation at the local level. In accordance with the Act, local bodies have been formed at three levels: Village of Development Committee (VDC) at village level, Municipality at town level, District Development Committee (DDC) at district level. The Act empowers these local bodies to formulate and implement periodical and annual plans within their own jurisdiction.

3.4.8 Land Revenue Act 1977 (2034 BS)

Land acquisition for the project involves change of ownership of land. Article 8 of this act states that registration, change in ownership, termination of ownership right, and maintenance of land records are done by Local Land Revenue office. Similarly article 16 affirms, if land revenue is not paid by the concerned owner for long period of time, the revenue can be collected through auction of the parcel of land for which revenue has been due. In any case, the details of land acquisition and ownership transfer involved during acquisition and payment of compensation are directly or indirectly guided by this act.

3.4.9 Child-Related Act 1993 (2048 BS) and Child Labour Act 2001 (2056)

The Child-Related Act 1993 and the Child Labour (abolition and regulation) Act, 2001 are the major acts related to child labour in Nepal. The Article 2 (Ka) of these acts refers "Child" to the children below 16 years of age. The Child Labour (Abolition and Regulation) Act is the most recent and revolutionary decision to overcome the child labour problem in Nepal. Article 3 clause 1 of the act states that any child below the age of 14 years prohibited for labour employment. However, clause 2 states that it is prohibited to engage children below 16 years in works in risk-prone sectors such as public transportation and construction related works. In other words, any employment of children below the age of 16 is to be excluded from becoming contracted in any of the SRN sub-projects' construction works. Children between 14 and 16 years of age may become engaged in other light and low-risk jobs such as roadside planting and drainage clearing.

3.5 The GoN Tenth Five Year Plan, 2002-2007

The Tenth Plan 2002-2007 incorporates national priorities, existing problems, and development potentials, agriculture development, sustainable management of natural resources and biodiversity. Those relevant in one way or another for the envisaged SRN projects are briefly discussed hereunder:

The Tenth Plan has also adopted following major policies and policy actions for the sector of environment management:

- Programs for replenishing the deteriorating natural resources, bio-diversity and cultural heritages in the country will be brought forward. Priority will be given to the conservation of specially bio-diversity, geological resources and cultural heritage.
- Considering the interrelationship between poverty and environmental degradation, an emphasis has been laid on social, economic and environmental development in accordance with the principle of sustainable development as adopted by Rio Earth Summit, 1992. While developing infrastructures, using natural resources and utilizing biodiversity for economic growth, special focus has been given to environmental conservation and pollution-control activities. Likewise, various programs shall be launched aiming at environmental health, environmental education, protection, rehabilitation and proper utilization of environmental resources.
- Local institutions will be made capable and responsible for management of local natural resources on the basis of Local Self Governance Act 2000, so as to increase the involvement of local institutions in environmental protection.
- Vision of environment protection and conservation will be brought in the mainstream of socio-economic development programs.
- Procedure for Environmental Impact Assessment of development projects will be made effective. Monitoring and evaluation will be conducted in the projects in which environmental impact assessment has been done. Besides, even small activities will be made alert from the environmental point of view.
- International conventions in environment will be followed while carrying out various projects, irrespective of their size.
- Programs will be implemented by fixing standard of air, water, sound and land pollution, and effective monitoring system will be implemented.

- Necessary policies and programs will be gradually formulated to implement the Agenda 21 at national level, and indicators of sustainable development will be identified and programs will be integrated accordingly.
- In *Chure* hill areas, including other environmentally vulnerable areas, the plan provides for an integrated management approach.
- An emphasis will be given for recording the preservation of traditional behaviour and technique relating to environmental protection. Besides, environmental information and data bank will be established and strengthened.
- While constructing roads in mountainous and high hilly regions, research for appropriate technology will be conducted; environmental impacts and cost aspects will be considered; and programs will be launched accordingly. Likewise, necessary research work will be undertaken to reduce existing high construction costs of other roads as well.
- Environmental aspects will be taken into account while building rural and agricultural roads, and appropriate technology for labour-oriented roads will be adopted in order to enhance employment opportunities.
- The Tenth and Eleventh Plan period is intended as 'agriculture decade' for the successful implementation of the Agriculture Perspective Plan (APP). In the context of existing complementary and strong relationship between agriculture and natural resource management, it has become necessary to integrate natural resources management and biodiversity with agriculture.

3.6 Relevant Sectoral Policies and Guidelines Prepared by the DoR

3.6.1 Environmental Assessment in the Road Sector of Nepal: A Policy Document, GEU/DoR, January, 2000

The purpose of the Policy Document is to explain, basically the DoR Engineers on what environmental assessment procedures involve and to propose a straightforward set of procedures which make it workable and useful. The document lists Screening, IEE, Scoping, EIA and Monitoring as the five main types of environmental assessment activities during different project phases. The document lists the category of environmental adverse impacts, the problems and their general mitigation measures. The document then guides the various steps to be taken while carrying out an EA. There is also an indicative environmental monitoring checklist in the document.

3.6.2 Environmental Management Guidelines, GESU/DoR, July, 1997

The Guideline, prepared by the Geo-Environment & Social Unit (GESU) of DoR, stipulates the integration of environmental mitigation measures in surveying, design, tender document preparation, contract document preparation, construction, maintenance, rehabilitation and operation of road projects. The guideline results from a program undertaken jointly by GoN and the World Bank under the Road Maintenance and Rehabilitation Project (RMDP). The Guideline has been formally approved by Minister level decision on *Kartik* 22, 1997 (2053 BS).

The Guideline is the part of operational practices for all road maintenance, rehabilitation and construction activities under DoR schemes. The environmental mitigation measures are broken down into twelve categories including (i) Quarries; (ii) Borrow Pits; (iii) Spoil and Construction Waste Disposal; (iv) Work Camp Location and Operation; (v) Labour Camp Location and Operation; (vi) Earthwork/Slope Stabilization; (vii) Use of Bitumen; (viii) Stockpiling of Materials; (ix) Explosive, Combustible and Toxic Materials Management; (x) Setting Up and Operation of Stone Crushing Plants; (xi) Water Management; (xii) Air & Noise

Pollution. The Guideline suggests methods for determining how and when the public should be included in the environmental analysis.

Apart from providing a comprehensive list for mitigation measures to be incorporated into DoR projects, it describes the procedures for public participation, and other socio-economic safeguard considerations. It gives advice on assessing socio-economic impacts and strategies for reducing or avoiding potential adverse impacts, and for maximizing the positive ones for the benefit of local residents. The Socio-economic impacts include important issues of land acquisition and compensation and other economic impacts related with markets for agriculture production, agriculture inputs, nutrition, extraction of natural resources beyond replenishment, migration and influx of migrants, land speculation, illegal logging and mining, carrying goods by porters etc. It also includes the handling of impacts on cultural heritage.

3.6.3 Reference Manual for Environmental and Social Aspects of Integrated Road Development, MPPW/DoR, 2003

This Manual is designed to help integrate social and environmental considerations, including public involvement strategies, with technical road construction practices. It suggests stepwise process of addressing E&S issues alongside the technical, financial and others. The Manual is a suggestive, and not exhaustive, and advise and recommends various environmental and social approaches, actions and strategies to assist developers in following mandatory requirements of the law and improving public involvement. The Manual is based on the experiences of Nepal, as well as incorporates the national (EPA, 1996; EPR, 1997/1999) and international 'best practices'. It suggests process of environmental and social assessment process, roles and responsibilities of stakeholders at various stages of the project, advice on impact mitigation action plans, and process for involving the public.

3.6.4 The National Transport Policy, 2001

This policy states, among others, that the entire process of land acquisition and transferring of land ownership to the project shall be established prior to the commencement of road project implementation. Equally, a basis for livelihood shall be established to the fully displaced families by way of rehabilitation or by any other means.

3.6.5 Land Infrastructure Development Policy 2004

Includes the provisions related to the requirement of advance acquisition of land for major transport sector projects, bearing long-term consequences on the development of the nation.

3.6.6 Public Infrastructure Built and Operate Policy, (2000)

States that the GoN may acquire the necessary land and provide it to the concessionaire as per prevailing rules but the cost shall be born by the private sector.

3.7 GoN Policies Supporting Vulnerable Communities

In all regions where roads are to be newly built or upgraded under the SRN Program, there is high incidence of poverty and vulnerable groups. Accordingly, all Project Designs shall give sufficient consideration, based on current policies and good practices, to develop strategies while addressing uplift of livelihoods of these groups. Nepal does not have a standalone policy on Indigenous Peoples, However in the Tenth Plan significant emphasis has been placed on delivering

basic services to the disadvantaged and indigenous people, *Dalits*⁴, women, disabled and other vulnerable groups including the *Adhibasi / Janajati* indigenous people. One of the main thrusts of the Tenth Plan is the implementation of targeted programs for the uplift, employment and basic security of Dalits, indigenous people and disabled class. The policy provision also outlines that the government should pilot strong and separate package of program of basic security for vulnerable sections of society.

The National Dalit Commission (commission for oppressed) was constituted in the Ninth Plan for the protection of their rights and inclusion in the mainstream of development programs. The acts and regulations of the commission are formulated as well as work related to setting up institutional structure has been undertaken.

GoN's Tenth Plan is the guiding policy document for any development project to integrate programs aimed at poverty reduction, especially among the poor. The Targeted Program is one of the four strategic poverty reduction pillars upon which the Tenth Plan is formulated and being implemented. Targeted programs in the context of poverty reduction are meant to enhance the capability of those communities and areas which are lagging behind in the main stream of development. The Plan states that targeted and empowerment programs shall be promoted to enhance the welfare of vulnerable, disadvantaged and exploited groups, the Dalits and indigenous scheduled caste groups.

The objective of the targeted program is to raise productive capabilities of people belong to marginalized, deprived, disadvantaged, remote and isolated areas. The expected results of Targeted Programs are (i) improving livelihood of Dalits, indigenous people, and any other deprived local groups, and (ii) empowerment of these groups for self-help development.

The Tenth Plan also defines that the areas where more than 50 percent of population is poor and the families have no extra income other than their own household production and which is sufficient for less than 9 months are designated as the 'poor areas'. Likewise families whose income is sufficient for less than three months is categorized as 'ultra poor' who need to be supported for their livelihoods. The Tenth Plan makes specific reference and poverty alleviation activities, such as:

- Construction of Local Level Infrastructure and Local Development Program: One of the targeted programs in the Tenth Plan is the construction of local level infrastructure development. Infrastructure like drinking water, minor irrigation, foot/ mule trails, school and health posts are amongst such programs.
- Programs of Increasing Income Generating Opportunities: There is also increased emphasis in implementing different types of income generation supportive programs targeting the poor and vulnerable people. It is also recognized that some dalit groups like *Kami* (blacksmith), *Damai* (tailor), *Sarki* (cobbler) etc. have been losing markets of their traditional occupations. The imported cheaper goods in the market have greatly replaced the demand of local made goods both in urban and rural areas.

⁴ Dalits are traditionally the most poor and vulnerable communities elsewhere in the country leaving a very few exceptions who are educated and economically better off. The customary practice while defining the poor is that all dalits are put in to this category implying the fact that poverty is prevalent widely among the dalits of Nepal.

According to census survey (CBS, 2001), NPC has estimated a total of 3.1 million population as Dalits with more than 20 different ethnic groups. This figure accounts for 13.3 percent of the total population of Nepal. The hill dalits include mainly Damai, Kami Sarki Gaine, Poda Kusle, Kasai etc while the Terai Dalits constitute Teli, Dusadh, Chamar Musahar and others.

Towards solving this problem, it seems necessary to design and implement different types of skill training programs aiming at specified groups.

Strategies: As stated in the Tenth Plan it is necessary to undertake programs of correcting various human development indexes related for the *Dalits* and neglected communities through targeted programs since they are generally isolated from development mainstream. The Plan outlines four major strategies aiming at inclusion and greater representation of *Dalits* and neglected communities as follows.

- By identifying oppressed, exploited, neglected communities the social discrimination against them will be abolished through the economic and social development of this class.
- Through social and economic empowerment their knowledge, skills and intelligence will be mainstreamed in the development process, and their possible contribution in the national level will be identified and encouraged to put into practice.
- The traditional occupations of the downtrodden and oppressed community will be modernized and the goods produced by them will be made competitive. Necessary arrangements for marketing their products will also be undertaken.
- Social dignity promoting programs will be emphasized for *Dalits* and other socially oppressed groups.

In line of the strategies devised in the Tenth Plan aiming at social and economic improvement of *Dalits* and neglected communities programs are to be designed for these groups as presented below in Table 3.2.

Table 3.2: Support Programs for *Dalits* laid out in the Tenth Plan

Sector	Program Details
Social Programs	Programs to discourage religious and social conservatism among non dalits; capacity building and leadership development of <i>Dalits</i> and women.
Educational Programs	Free education up to secondary level to the children of <i>Dalits</i> ; easy access to higher education, mainly technical and vocational; appointment of dalit females in teaching position; types and amount of scholarship for dalits to be raised; development of <i>Dalit</i> student oriented curriculum; special education programs for <i>Dalits</i> .
Health Programs	Awareness raising of <i>Dalits</i> on health food and sanitary condition; increased access to primary health; provision of safe drinking water; basic and primary health care services; programs on reducing infant mortality, child mortality and family planning among dalits; selection of <i>Dalit</i> women for female workers if possible.
Economic Programs	Priority in land distribution for home- and landless <i>Dalits</i> ; preference in foreign employment opportunities (e.g. road construction); modernization of traditional skills and knowledge through training; provide access to loans to run commercial enterprises etc.

B. Donor Agencies

3.8 Relevant Policies and Guidelines of World Bank

With respect to Environmental Strategies the World Bank pursues three interrelated objectives:

- (1) Improving the quality of life
- (2) Improving the prospects for and the quality of growth
- (3) Protecting the quality of the regional and global environmental commons.

Concerning Safeguard Policies, the operations of World Bank are guided by a comprehensive set of policies and procedures, taking into account the Bank's core development objectives and goals, the instrument for pursuing them, and specific requirements for Bank financed operations. The core of this guidance lies in the Operational Policies (OPs) which are short, focused statements that follow from the Bank's Articles of Agreement, its general conditions and from policies specifically approved by the Board. Within the overall set of Operational Policies, Bank has identified ten key policies that are critical to ensuring that potentially adverse environmental and social consequences are identified, minimized and mitigated. These ten policies are known as the "Environmental and Social Safeguard Policies" and receive particular attention during the Project preparation and approval process. These Operational Policies are short and focused statements that follow the Bank's Article of Agreement, the general condition and policies approved by the Board. Safeguard policies are mechanisms for integration of environmental and social issues into decision making. It supports participatory approaches and transparency. They provide a set of specialized tools to support development processes as follows:

3.8.1 Environmental Assessment EA (OP 4.01)

The objectives of EAs are to (i) ensure that the projects proposed for Bank financing are environmentally and socially sound and sustainable; (ii) inform decision makers of the nature of environmental and social risks; and (iii) increase transparency and participation of decision makers in the decision-making process. To satisfy the Bank's Environmental Assessment requirements, there are various instruments suggested including EIA, Environmental Audit, Environmental Management Plan etc. Any World Bank project, which is likely to have potential adverse environmental risks and impacts in its area of influence, requires an Environmental Analysis, indicating the potential risks, mitigation measures and environmental management framework or plan.

For ascertaining which extent and type of environmental assessment is required, the Bank undertakes environmental screening of each proposed project. The Bank classifies the Project in to one of the four categories depending upon the type (project or specific components have inherent environmental risks), location (proximity to environmentally, socially and culturally important areas), sensitivity (potential impacts may be irreversible or environment sensitive to changes, and scale (extent of environmental and social issues) of the project and the nature and magnitude of its potential environmental impacts:

- Category A: if it is likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. This is where EIA is level study is needed.
- Category B: if potential adverse impacts are less adverse than those of Category A projects; these impacts are site specific; few in any of them are irreversible; and in most cases mitigation

measures are readily designed. An IEE level study is needed here.

- Category C: If it is likely to cause minimal or no adverse environmental impacts. Here, no additional environmental assessment is needed beyond environmental screening.
- Category F: if it involves investment of Bank funds through a financial intermediary, in sub-projects that may result in adverse environmental impact. It requires appropriate environmental review for each sub-project.

3.8.2 Natural Habitats (OP 4.04)

Natural habitats are land and water areas where most of the original native plant and animal species are still present. Natural habitats comprise many types of terrestrial, freshwater, coastal, and marine ecosystems. They include areas lightly modified by human activities, but retaining their ecological functions and native species.

The Natural habitats policy is triggered by any project (including any subproject under a sector investment or financial intermediary loan) with the potential to cause significant conversion (loss) or degradation of natural habitats, whether directly (through construction) or indirectly (through human activities induced by the project).

The main objective of this OP is (i) safeguard natural habitats and their biodiversity; (ii) ensure sustainability of services and products which natural habitats provide to human society; (iii) Bank does not finance Projects that convert critical Natural Habitats; (iv) requires inclusion of mitigation measures if significant conversion or degradation of a (non-critical) natural habitat is needed to achieve project's objectives, includes establishing or strengthening an ecologically similar compensatory protected area.

3.8.3 Forestry (OP 4.36)

This policy is triggered by forest sector activities and other Bank sponsored interventions which have the potential to impact significantly upon forested areas. The Bank does not finance commercial logging. Instead, the Bank aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty and encourage economic development. It is the objective of the OP that (i) forests are managed in a sustainable manner; (ii) significant areas of forest are not encroached upon; (iii) the rights of communities to use their traditional forest areas in a sustainable manner are not compromised.

3.8.4 Involuntary Resettlement (OP 4.12)

This policy is the principal social safeguard policies of the World Bank applying for resettlement. The key objectives of the policy on involuntary resettlement includes to (i) avoid or minimize involuntary resettlement and related disruption where feasible; (ii) explore all viable alternatives for project design; (iii) provide transparent compensation procedures for the involuntary acquisition of land; (iv) assist the affected and displaced persons in their efforts to improve their standards of living, income earning capacity, and production level, or at least in restoring them, implemented through a resettlement action plan; (v) encourage community participation in planning and implementing resettlement; (vi) provide assistance to affected people regardless of the legality of land tenure. The policy covers not only physical relocation but any loss of land or other assets resulting in relocation or loss of shelter; loss of assets or access to assets; loss of income sources or means of livelihood whether or not the affected people must move to another location. When the policy is triggered, a Resettlement Action Plan must

be prepared. An abbreviated plan may be prepared when less than 200 people are affected by the project. In situations, where all the precise impacts cannot be assessed during project preparation, provision is made for preparing a Resettlement Policy Framework (RPF). The RAP/RPF must ensure that all the Bank's policy provisions detailed in OP 4.12 are addressed particularly the payment of compensation for affected assets at their replacement cost.

More specific and relevant to the SRN Program, the following provisions are given in this policy:

The implementation of resettlement activities is linked to the implementation of the investment component to ensure that displacement does not occur before necessary measures for resettlement are in place. The measures (i. e. the RP) include provision of compensation and of other assistance required for relocation, prior to displacement, and preparation and provision of resettlement sites with adequate facilities, where required. Land and assets acquisition should take place only after compensation has been paid and, where applicable, resettlement sites and moving allowances have been provided to the DPs. The measures are implemented in accordance with the plan of action as part of the project.

Preference should be given to organize land-based resettlement program for the DPs whose livelihoods are land-based. In such case, the land should have combination of higher comparative advantage or at least equivalent to the land taken. If the land is not the preferred options of the DPs, or equivalent land could not be available, non-land-based options built around opportunities for employment/livelihood should be provided in addition to cash compensation for land and other assets lost. Cash compensation to the DPs should be sufficient to replace the lost land and other assets at full replacement cost in local markets.

DPs and their communities, and any host communities receiving them, are provided timely and relevant information, consulted on resettlement options, and offered opportunities to participate in planning, implementing, and monitoring resettlement. Appropriate and accessible grievance mechanisms should be established for these groups.

Infrastructure and public services are provided as necessary to improve, restore or maintain accessibility and levels of service for the DPs and host communities. Alternative or similar resources are provided to compensate for the loss of access to community resources.

DPs who have formal legal rights to land and those who don't have at the time of census survey but have a claim to such land or assets or become recognized through a process identified in the resettlement plan are provided compensation and other assistance for the land they lose. In the case of DPs who have no recognizable legal right or claim to the land they are occupying are provided resettlement assistance in lieu of compensation for the land they occupy, and other assistance as necessary, if they occupy the project area prior to a cut off date. Any encroachers settling after the cut-off date are not entitled to compensation or other form of resettlement assistance.

3.8.5 Cultural Property (OPN 11.03)

Physical cultural resources are defined as movable or immovable objects, sites, structures, groups of structures, natural features and landscapes that have archaeological, palaeontological, historical, architectural, religious, aesthetic or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above ground, underground or underwater. The Bank seeks to assist countries to manage their physical cultural resources and to avoid or mitigate adverse impact of development projects on these resources. This policy is triggered for any project that requires an EA.

The objective of the OP is to (i) ensure that physical cultural resources are identified and protected in World Bank's projects; (ii) national laws governing the protection of physical cultural property are complied with; (iii) covers archaeological and historical sites, historic urban areas, sacred sites, graveyards and burials.

3.8.6 Indigenous People (OP 4.20)

The key objective of the Indigenous Peoples Policy are to (i) ensure that the indigenous people affected by World Bank funded projects have a voice in project design and implementation; (ii) ensure that the indigenous peoples are afforded respect for their dignity and cultural uniqueness in the development process; (iii) do not suffer adverse effects; (iv) benefit from prior consultation and informed participation; (v) ensure that benefits intended for indigenous peoples are culturally appropriate. An Indigenous Peoples Development Plan / Vulnerable Communities Development Plan is prepared to identify whether there are any adverse impacts on indigenous peoples and how these will be mitigated as well as measures to ensure consultation throughout project preparation and implementation.

3.8.7 Environmental Assessment Sourcebook

The Environmental Assessment Sourcebook of WB is designed to facilitate the environmental assessment process. The Sourcebook is a reference manual which contains the information needed to manage the process of environmental assessment according to the requirements of the World Bank's Operational Directives on EA (OD 4.00). The Environmental Assessment Sourcebook has three volumes, out of which the first two are of relevance for SRN projects:

- Volume I: Policies, Procedures, and Cross-Sectoral Issues
- Volume II: Sectoral Guidelines
- Volume III: Guidelines for Environmental Assessment of Energy and Industry Projects.

Chapter 9 of Volume II of the EA Sourcebook provides the list of potential environmental impacts due to Highways and Roads. It lists 24 numbers of direct and 6 numbers of indirect potential negative impacts due to implementation of highway and road projects and their mitigation measures.

3.8.8 Roads and the Environment: A Hand Book

This Hand Book published by WB in 1994 intends to integrate environmental protection aspects into road planning and management. The handbook provides a description of practical methods which are useful in designing and executing effective environmental assessments from planning to construction to maintenance. The techniques described can be applied to in-depth environmental assessment studies, or to modest action plans for dealing with environmental aspects of small projects. It also provides a detailed discussion of each of the major actions involved in environmental assessment, including impact mitigation of road projects. The list of impacts under each component covers further issues than discussed in the EA Sourcebook of the World Bank.

3.9 ADB and Other Donor Agencies' Policies

3.9.1 ADB Resettlement Policy

Land acquisition, compensation and the resettlement on the proposed project will seek to comply with the ADB's guidelines, Handbook on resettlement: A Guide to Good Practice (1998). The main objectives and principles of the ADB are as follows:

- Involuntary resettlement should be avoided where feasible.
- Where population displacement is unavoidable, it should be minimized by exploring all viable project options.
- People unavoidably displaced should be compensated and assisted, so that their economic and social future would be generally as favourable as it would have been in the absence of the project.
- People affected should be informed fully and consulted on resettlement and compensation options.
- Existing social and cultural institutions of resettlers and their hosts should be supported and used to the greatest extent possible, and resettlers should be integrated economically and socially into host communities.
- The absence of a formal legal title to land by some affected groups should not be a bar to compensation; particular attention should be paid to households headed by women and other vulnerable groups, such as indigenous peoples and ethnic minorities, and appropriate assistance provided to help them improve their status.
- As far as possible, involuntary resettlement should be conceived and executed as a part of the project.
- The full costs of resettlement and compensation should be included in the presentation of project costs and benefits.
- Costs of resettlement and compensation may be considered for inclusion in Bank loan financing for the project.

3.9.2 ADB Policy on Indigenous People

This policy was formulated in consultation with its developing member countries (DMCs) and their Indigenous Peoples communities in 1998. The policy was incorporated into the ADB Operations Manual in 2004 to ensure that IP benefit from ADB's development activities. The policy ensures that all ADB interventions affecting IP are:

- consistent with their needs and aspirations
- compatible in substance and structure with their culture and social and economic institutions
- conceived, planned, and implemented with their informed participation
- equitable in terms of development efforts and impact, and
- not imposing the negative effects of development without appropriate and acceptable compensation.

3.9.3 ADB Environment Policy

This policy is grounded in ADB's Poverty Reduction Strategy that recognizes that environmental sustainability is a prerequisite for pro-poor economic growth and efforts to reduce poverty. The Policy addresses five main challenges:

- the need for environmental interventions to reduce poverty
- the need to mainstream environmental considerations into economic growth and development planning
- the need to maintain regional and global life support systems

- the need to work in partnership with others
- the need to further strengthen the processes and procedures for addressing environmental concerns in ADB's own operations

The policy is supported by ADB's Environmental Assessment Guidelines (2003). These Guidelines describe how to fulfil the requirements outlined in ADB's Environment Policy and the Operations Manual on Environmental considerations in ADS Operations. Information on ADB's policies and procedures for conducting and reporting on the environmental assessment is also provided for all types of projects. Strategic tools such as country environmental analysis and strategic environmental assessment are also included. The main contents of the guidelines are as follows:

- Country Environmental Analysis
- Environmental Categorization and Rapid Environmental Assessment Checklists
- Environmental Assessment of Project Loans
- Environmental Assessment of Program Loans
- Environmental Assessment of Sector Loans
- Environmental Assessment Reporting Formats
- Environmental Management Plans
- Public Consultation and Information Disclosure

3.9.4 Resolving Outstanding Issues with Regard to a Pre-defined RoW

ADB has recently drafted a document entitled "Technical Guidelines on Compensation for Resettlement in Development Projects" and submitted this proposal to the National Planning Commission NPC. In this draft there is a proposal to adopt a policy that will allow the GoN to acquire for rural road development projects a RoW corridor of 15 m at each side of the centreline. Until now, common practice in rural road construction works required a land acquisition that would enable the project proponent to secure land to carry out construction and upgrading works, normally encompassing a corridor that would represent the width for road formation (commonly 4.5 m, with a leeway of another 0.5 to 1 m as locally required for supplementary or additional structures such as drainage). Any additional land acquisition should be avoided by planners in order to avoid resettlement, social tensions, loss of farm land and, above all, to keep project costs as low as possible.

The new proposal to acquire a RoW corridor of 30 m impinges a number of issues that need to be resolved should they become national policy. At the time of preparing this ESMF there was still lack of clarity on how the GoN will in future deal with the policy proposed by a recent document forwarded by ADB to the NPC. This document needs to be amended to end the confusion of how much RoW needs to be acquired by the government in rural road development projects in addition to the actual road formation width⁵. For example, the DoR has recently purchased a 30 m wide RoW corridor for a 34 km section of the Jumla-Kalikot of the RMDP project. Insofar, such purchase of land has no precedence in the Western Province.

Considering a RoW corridor up to 30 m in the nearby region (e.g. the newly planned road from Nagma to Gamgadhi) creates grand confusion with both planners and the affected population. The remaining issue needs to be clarified

⁵ The current practice is that the Department of Roads determines the Right of Way for feeder and national roads whilst the Department of Local Infrastructure and Agricultural Roads (DoLIDAR) is empowered to fix the RoW for local level roads.

how to subject the affected landowners in this corridor to relocation and/or further use of their properties located in this corridor. It also needs to be appreciated that the proposal of acquiring a 30 m RoW corridor for rural areas where most people live close to existing roads and tracks will substantially increase the overall costs for upgrading or building new roads, apart from the expected magnitude of resettling those people. In other words, rural road upgrading will then become a major financial and social issue for the GoN. Other complications are foreseen in the legal rights of local communities and land owners who wish to continue their customary land use of any land adjacent to the road formation line, be it for agriculture, plantations or other non-structure works and welfare purposes.

Unless the policy directions regarding compulsory land acquisition for rural road development are not resolved and clearly applicable throughout the country for all national highways, this ESMF will adhere to the practical solution, i.e. considering the acquisition of a road formation RoW corridor only, and consider a recommendation to provide policy directions that would subject land owners for not further erecting permanent structures in a pre-defined corridor (e.g. a RoW of 15 to 30 m width) that will individually be adjusted by the project proponent (i.e. DoR and/or MoPPW).

Notwithstanding, policies and legal provisions are needed to determine easement fees and payment for crop damages to land owners and entitled persons to compensate those whose fields may be subject to periodic intrusion into a pre-defined RoW for maintenance and operation purposes. Such provisions are necessary to exclude claims regarded (temporary) restrictions on land use. At the same time, legal provisions need to be created that regulate restrictions in the pre-defined RoW such as constructing new structures which may result in dismantling for maintenance, operation and potential road widening, and penalties for violators as per law.

3.9.5 Policies of other Donor Agencies relating to Involuntary Resettlement

In recent years, a number of multilateral and bilateral agencies have prepared and adopted resettlement policies and guidelines that are similar to those of the World Bank and ADB. The Inter-American Development Bank adopted a set of resettlement guidelines in 1990. In 1991, the Organization for Economic Cooperation and Development (OECD) approved the adoption of uniform resettlement guidelines by their countries' aid agencies. The Overseas Development Administration in the United Kingdom has adopted guidelines that are essentially the same as those of the World Bank. The Overseas Economic Cooperation Fund of Japan issued checklists on involuntary resettlement based on World Bank directives. Japan International Cooperation Agency (JICA) has prepared its own technical guidelines for resettlement with World Bank advice.

Chapter 4

4 Identification of Potential Environmental and Social Impact of Road Projects (including SRN Sub-Projects)

This Chapter identifies the potential environmental and social impacts associated with road development projects at various stages of the project cycle¹. The Chapter is applicable generally to the full range of conditions that occur typically with rural and feeder road development in Nepal. Being explicitly a framework document this ESMF does not provide site-specific details for the on-going improvement projects, as these are subject to specific field surveys and EAs being prepared under the guidance of this ESMF. The overall intent of this document is to provide guidance for environmental and social management of all projects in the roads sector, with specific application to the current SRN sub-projects.

4.1 Potential Environmental and Social Impact of Project Components

Based on the consultations and field surveys conducted, it appears that the SRN sub-projects proposed under the current program will not have any major environmental and social impacts, as most (with the exception of the 88km Nagma-Gamghadi Road, accessing Mugu District) involve only the upgrading or improvement of existing roads.

Minimal adverse impacts can therefore be expected, compared with the loss of land, damage to local infrastructure, loss of vegetation, and slope cutting, that would be associated with the construction of new tracks. With prudent management options incorporated in the planning it is believed that most of these impacts can adequately be mitigated. The ESMF makes provision that all roads considered under this program will have an Environmental Management Plan and a Social Management Plan, including, as required, a Resettlement Action Plan. It is intended to involve to the extent possible the local communities, especially the underprivileged strata, in road construction as well as monitoring activities.

Hill roads often suffer from problems related to slope failure and erosion. The SRN project will improve existing areas with unstable slopes, using protection structures and bio-engineering and it will use labour-based technology which will minimize damage to fragile slopes.

In the Terai, almost all the proposed roads are north-south roads. The potential for flood damage is less in these roads than east-west roads. Furthermore, as some of the north-south roads also function as embankments, the roads will assist in flood control.

The proposed road development project bring both opportunities and risks for both the bio-physical and the social environment as illustrated in table 4.1 for the social sector:

¹ Reference is also made to the World Bank's "Roads and the Environment: Handbook" as well as other sources quoted in the context.

Table 4.1: Opportunities and Risks from Road Construction Activities²

Sector	Opportunities	Risks
Land	Resettlement, rehabilitation and increase in quality of life	Landless, displacement, and decrease in quality of life
Shelter	Reconstruction of project acquired houses, improved housing standards	Homelessness and displacement, destitution
Employment	Job opportunity	Joblessness
Social Change	Social inclusion	Social marginalization, destitution, conflicts
Social Cohesion	Network and community linkage	Social dysfunction and conflicts
Health	Improved health care	Increased morbidity and endemic diseases, spread of STDs, drugs, people trafficking
Nutrition	Adequate nutrition	Food insecurity
Common Resources	Restoration of community resource assets and services	Loss of access to common property resources, environmental hazards (irreversible, long-term)
Education	New or improved school opportunities for all	Children's education restricted to wealthy people
Infrastructure	Rebuilding or strengthening	Infrastructure failure
Cultural Heritage	Saving or re-siting cultural artefacts	Heritage degradation or loss, cultural conflicts

4.2 Beneficial Impacts

Road Projects are generally intended to improve the economic and social welfare of people. The development efforts of the SRN Program, particularly the development of a strategic transportation network will have multifold beneficial impacts. The majority of the communities receiving new and/or improved roads believes that improved accessibility resulting from the project will improve their standard of living, give access to nearby markets and resources, education and health facilities. Unanimously the consulted communities are willing to provide assistance and to provide/donate voluntarily land for the RoW.

The immediate beneficial impacts from road development become apparent in the construction phase. Depending on the demographic and socio-economic setting in a given location there will be various employment opportunities for the local population.

During operation stage, an improved road access will bring in most if not all localities an improvement of food security situation, and will result in an overall economic and social stability. Increased road capacity and improved pavements are expected to reduce travel times and lower the costs of vehicle use. At the same time, good and reliable road links will increase access to markets, jobs, education, and health services and reducing transport costs for both freight and passengers. In the long term, the road will provide safe and fast transport of goods and services from rural areas to urban centres and vice versa. This will bring about increase in productivity in rural areas and eventually improve the overall socio-economic condition of people living in or nearby road corridors. At a more detailed level, the single benefit aspects are discussed hereunder and expected to be detailed in the specific assessments in the forthcoming SRN sub-projects.

² See also Reference Manual for Environmental and Social Aspects of Integrated Road Development, Road Maintenance and Development Project, Department of Roads / World Bank, 2003

4.2.1 Generation of Employment

One of the major direct beneficial impacts is the creation of employment. The sub-projects would require a large number of skilled and unskilled manpower. For example, for Mirchaiya-Katari-Sunkoshi Road, assuming 18 months of the construction period, about 100 skilled, 850 unskilled labours will be required every day which gives the ample opportunity for the local people to work.. The socio-economic information indicates that about 70 percent of the local people are economically active and most of them out-migrate during the agriculture off-season.

As the road upgrading works require labourers, it is likely that they will prefer to work in these projects to stay close to their families. The project shall provide adequate training for masonry works and carpentering to increase the skills of local work candidates. Among the key requirements for employment of local labourers are:

- No gender disparity in terms of number of unskilled workers and wages for equal type of work,
- Preference to disadvantaged and vulnerable local groups,
- Strict avoidance of children (up to age 16) work, and
- Scheduling the construction works as much as feasible during the agricultural off-season to enable local people to become engaged, and to bridge the lean/income-low season to secure food sufficiency.

4.2.2 Opportunities of New Income Generating Activities (IGAs)

The construction activities will not only increase the income sources of the local people, but will open opportunities for additional business opportunities such as the establishment of local tea stalls and 'dal bhat' shops. As a result, a significant amount of cash from the project works will be channelled into the local economy and will generally foster the development of other micro-enterprises.

Once an all-year road access is available, local farmers may be encouraged to start additional or other small scale agro-industries, cold storage, juice and candy, ketchup, bakery etc. When completed, improved road connectivity will bring about opportunities for the promotion of trade and business. All weather road facilities will enhance the trade and business because of round the year access and reduced transportation cost. The flow of goods from and to the project influence area will be continuous. Local products could be transported outside markets at low cost, thereby benefiting the producers.

The local agricultural and horticulture products (citrus, apple, tropical fruits) that use to go rotten and waste previously can be processed and transported. Thus an improved road linkage with other markets opens potential opportunities for the production of off-season vegetables.

In this context, however, care must be taken to channel IGAs to ensure that benefits are equally distributed among the local communities. In Nepal, quite often migrants or outsiders tend to overtake the locals in terms of realizing benefits from the new development much faster and at costs of the local/disadvantaged communities. Therefore it is recommended to install effective social mobilization from NGOs to encourage local people to tap the new opportunities, which includes also the creation of credit facilities, support from government agencies, extension services as well as support from the road program itself.

4.2.3 Increase in Land Values

Road construction leads to appreciation of land values in many places, particularly along the road corridor, which directly contributes to increased property value of the households. The value of land increases sharply as soon as the road link is developed ensuring reliable transportation. Road also contributes to rapid commercialization of agriculture which is also a major factor to raise the land value as a result of which many villagers are in a position to initiate modern farming and diversify their production. Increased land values also enhance farmers' capability for borrowing loans on collaterals. High value lands are easily acceptable to banks and micro-finance institutions to provide loans. Local farm families in particular are benefited due to increased value of land after the construction of road and this will have significant ramifications in addressing poverty of many poor families living along the road corridor.

In the context of increasing land values it needs to be considered that this will also have negative aspects for some groups. This refers to a common trend that poor locals are pressurized to sell their lands to the wealthy and influential people, often outsiders, and would eventually be displaced from their home area.

4.2.4 Enhancement in Technical Skills and Know-How

The underlying policy of the DoR to propose maximum use of local people for construction works lies in the unique chances for the transfer of skills and technical know-how in construction and related technical sectors. Considerable number employed work forces will convert themselves into fully skilled labourers in works such as masonry, gabion wires weaving, construction of dry and foundation walls, slope cutting and stabilization, rock cutting, bio-engineering works etc. These skills will not only benefit the locals by providing long-term employment opportunity but also contribute to local human resource development in regions that otherwise have restricted opportunities.

4.2.5 Easement of Former Environmental Problems

One of the major problems of the gravel and earthen road is dust which directly affects the health of the people living in the vicinity. As applicable and incorporated in the project design, sealed gravel standard or bituminous surface road will substantially reduce the dust nuisance. It will also make easy for vehicle movement thereby reducing amounts of unborn carbon, oxides of sulphur and nitrogen. This impact has beneficial implications on human health. School children, health posts, market areas along the road pedestrians etc. will be relieved from dust nuisance.

One of the major activities of the road works in the envisaged program is to stabilize slopes through proper drainage management, retaining structures and bio-engineering. The project will treat rill and sheet erosion. Similarly, slope failures and landslides will be stabilized. This is a direct and identified beneficial impact as potential landslide and erosion areas will be stabilized and protected by construction and maintenance of road.

4.2.6 Improved Access to Services and Decrease in Transportation Cost

Roads, especially paved roads will provide all weather transportation service to the local people and others. Quick access to, for example health posts may be crucial in everyday life. In addition, the overall vehicle operating cost will be reduced and thereby transportation cost will be decreased. The journey will be comfortable and travel time will be saved. Similarly, the wear and tear of the vehicles will be less; and fuel consumption of the vehicles will also be less resulting into saving in the hard currency for the import of these commodities.

Access to inputs and services is severely constrained without suitable road transportation facilities. In most of Nepal's remote areas, porters and mules are the only means of transporting any input or output in the area. As a result of difficult and expensive access, the use of inputs and services is far below the potential in all sub sectors of the economy such as agriculture, horticulture and livestock and, to lesser extent, handicraft products.

Once the road comes into operation, people will have improved access to many inputs such as seeds, chemical fertilizer, irrigation and technology leading to increased agricultural production and diversification. Crop investment and operation costs are expected to become considerably reduced. Same would be the case for marketing the local products, which have experienced difficult access to get into the bigger markets. This will enhance economic activities within the area through the increase of employment opportunities and income level. The service sector will equally benefit from improved road access. This will include setting up new educational facilities in private and public sector, and implementation of health, hygiene and drinking water programs by government and NGOs. The operation of road will also contribute to raise quality services in social sector as more competent agencies and people will enter into the area to provide the services. Road transportation will also encourage students to enrol in higher grades at campus level, which will become possible after the operation of regular vehicles along the road. Students can attend classes even in distant areas after efficient transportation service. Qualified doctors and other service providers will be encouraged to stay in the area.

4.2.7 Gender-Specific Benefits

Road transportation will benefit local women by providing improved access to market facilities. Mobility will considerably increase while more efficient road transportation systems will be in place. Women, in specific, may therefore get into a better position to attend various service agencies such as hospitals, health clinics, training institutes, women development programs etc. More frequent visit to such organizations will increase women's knowledge and awareness level. Girl students will be encouraged to go to schools that will become easier accessible. In Nepal, road development in rural areas will thus contribute to women's empowerment and facilitate their struggle in escaping widespread discrimination and economic disadvantages.

4.2.8 Exploitation of Untapped Potential

Improved road connectivity will provide access to sites insofar recognized for their cultural scientific, historic, scenic and social values but practically secluded from prospering from these values. This holds particularly true for the potential to develop tourism that will both geared towards environmental education and to bring economic opportunities to the local area.

4.2.9 Poverty Alleviation

Case studies analyzed in the ADB special evaluation (IES: REG 2003-15) The Impact of Rural Roads on Poverty Reduction October 2002 showed that road access significantly alleviated poverty by improving economic opportunities and access to services. However, benefits varied depending on the geographical context, such as the regional economy, agricultural potential, proximity to transport networks, world market prices, availability of services, as well as social structure and concentration of assets.

On the basis of these consultations and field surveys, it appears that the SRN projects will have no major environmental and social impacts, for the following reasons:

Almost all sub-projects (with the exception of the 87 km Nagma-Gamghadi Road in Mugu District, consist of upgrading or improving existing roads. Therefore, minimal adverse impacts are to be expected, such as loss of land, damage to local infrastructure, loss of vegetation, and slope cutting, that are related to opening up of new tracks. With prudent management options incorporated in the planning it is believed that most of these impacts can adequately be mitigated. The ESMF makes provision that all roads considered under this program will have an Environmental Management Plan and an Social Management Plan, including, as required, an Resettlement Action Plan. It is intended to involve to the extent possible the local communities, especially the underprivileged strata, in road construction as well as monitoring activities.

Hill roads often suffer from problems related to slope failure and erosion. The SRN project will improve existing areas with unstable slopes, using protection structures and bio-engineering and it will use labour-based technology which will minimize damage to fragile slopes.

In the Terai, almost all the proposed roads are north-south roads. The potential for flood damage is less in these roads than east-west roads. Furthermore, as some of the north-south roads also function as embankments, the roads will assist in flood control.

4.3 Adverse Impacts

There appears a broad consensus among the local people consulted during the ongoing surveys for the SRN Program that there will be very little, if any, adverse environmental and social impacts and many expect the project to improve environmental conditions caused by existing roads. These mainly include poor drainage conditions in the Terai and unstable slopes in some areas in the hills, and subsequently some adverse effects on local forest and agricultural lands. Few people fear that the newly rehabilitated or constructed roads will result in damages on wildlife and aquatic resources.

Depending on the environmental setting, some construction practices are more sensitive in terms of environmental hazards than others. For example, in mountain terrain gradual widening, of a narrow track of typically 2 m width bears much more risks than doing the same in flat terrain. In the first case intensive slope stabilisation measures or blasting might be required, all of which may include significant residual risks of failure and cumulative impacts. In contrast, the second setting may require much more consideration of preventing losses of farmlands and suitable sites for habitation. Similarly, the use of labour and hand tools instead of heavy machinery will result in completely different environmental impacts in certain conditions. Conservation/protection of soils, water resources, fauna and flora need equally be seen in the local context, including other external impacts like rainfall, seismicity, over-use of certain natural resources, law / order situation etc.

The following sub-section gives an overview of potential adverse environmental and social impacts that are likely to occur during the different stages of the road projects proposed under the SRN Program.

4.3.1 Impacts on the Physical Environment and Land

a. Public Anxiety in Connection with Land Acquisition and with Loss of Private Properties in the RoW

The narrow and linear character of roads makes the impact of lost land seem minimal, but when width of RoW is multiplied with its length, total area of land removed from production becomes much significant. According to the newly proposed policy the standard RoW of feeder roads in Nepal is 15 meter on either side from the centre line and that for highways is 25m. It needs to be noted, however, that the immediate zone of impacts, i.e. the actual formation width of the road, is only 4.5 m. Any enforcement and land acquisition beyond this corridor, e.g. in adhering to the 15 m RoW, will invariably incur in a substantial increase in land that has to be acquired and protected from further encroachment. It also remains subject to governmental decisions on whether the private houses and structures are subject to acquisition, demolishing homes and structures, relocation and compensation. Unless well informed on who will be affected by such land acquisition, and to what extent and time schedule will the RoW be enforced, local communities will be left in a stage of uncertainty and insecurity. This will also trigger a number of undesired spin-offs such as land speculation and additional/fraudulent establishment of new structures. Another undesired side effect would be the incited displacement and out-migration of poor residents. More detailed discussions on a recent proposal made by ADB to the NPC with respect to the land acquisition of a broader (up to 30 m) RoW corridor are presented in Chapter 3.9.4 of this document.

b. Change in Land Use and Loss of Productive Soil

Changes of land use due to the construction of road are mainly conversion of agricultural land, forest land, grazing land, public spaces and other forms of land use into built up area may result in numerous social and ecological consequences (see case examples, Box. 1).

In this context, major impacts them include reduction of fertile and cultivated land, leading to loss of crops, loss of productive area, increase in food deficiency, increase in malnutrition, loss of habitat of wildlife etc. In addition, change of land use due to road construction also results into relocation of private houses and properties, losses of public places, grazing land and social conflicts.

Box 1

Case Examples demonstrating Land-use Changes following Road Development in Nepal

Road crossing the extensive forest areas of the Churia and Mahabharat ranges appear to have had little impact on forest quality. The harsh terrain and lack of surface water have been major hindrances to forest exploitation and settlement. The advent of roads has not changed this, except in a few valleys such as Chinchu (Surkhet) where deep tubewells can now be sunk. In recent years there have been significant changes where agriculture has encroached on to steep forest land in a number of locations, such as in the lower Trishuli Valley.

Road development has seen an intensification of agricultural land-uses, mainly in the greater production of vegetables as cash crops. Examples are at Palung (Tribhuvan Rajpath), Ranipauwa (Kathmandu-Trishuli Road) and around Dhading district roads. This is normally seen as a beneficial change, since it implies an improvement in the agricultural economy.

In the 1980s, new roads appeared at times to lead to forest exploitation in parts of the middle mountains. There were certainly cases of this on the Dharan-Dhankuta road. However, widespread success of community forestry in the middle mountains during the 1990s has seen a reversal of this trend and an improvement in forest quality along a number of roads, such as the Lamosangu-Jiri and Dharan-Dhankuta

roads. There are other examples of apparently sustainable forest management along some mountain roads, particularly the extraction of Pine resin on the far western roads as far north as Darchula, and the numerous forest products (firewood, poles, bamboo, and cardamom) produced along the Mechi highway.

One of the most common changes of land-use found on new roads is the development of bazaars (market centres) in specific areas. These tend to occur on relatively stable sites, and thereby frequently occupy agriculture land. This often gives rise to localized land price boom and allow development of centre of local economic importance. Due to this, small areas of good agriculture land are irreversibly lost.

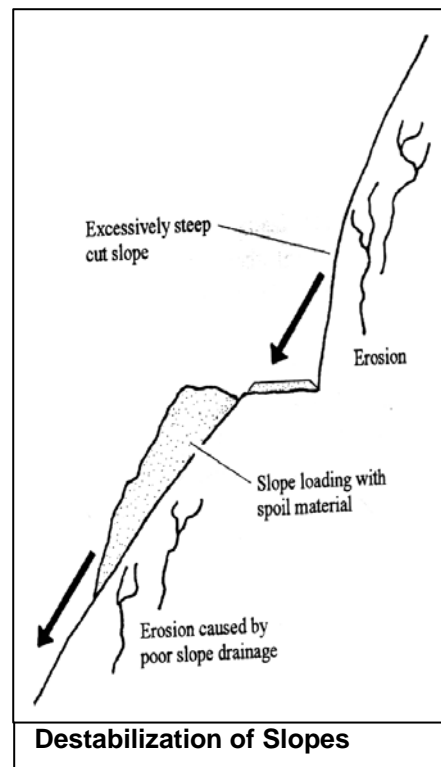
[Source: Briefing Paper on Environmental Issues and Environmental Assessment in Road Sector, RAP, 1999]

c. Landslides, Slope Destabilization and Soil Erosion

Soil is an important component of the natural environment, and is primary medium for many biological and human activities, including agriculture. Instable soils, landslides and severe erosion and, to lesser extent, earthquakes and flush floods, are the major environmental drawbacks associated with most road construction in Nepal. Consequences of landslides and soil erosion not only affect the safety and serviceability condition of roads but also have chain effects on the farmers (loss of crops or farmland), land (degradation due to silt/debris deposition), water (degradation of quality), river and streams (change in regime), vegetation (loss and impact) and on other infrastructures like reservoirs (silting).

Fisher folk may lose the basis of their livelihood because of sedimentation and oxygen depletion in rivers and lakes, road users being exposed to hazardous terrain and delayed when road embankments or structures collapse.

Slope stability can be upset by creation of road cuts or embankments. Excessive steepness of cut slopes, deficiency of drainage, altered and concentrated water flows, and excessive slope loading from spoil disposal can result in landslides. Consequences of landslides and soil erosion not only affect the safety and serviceability condition of roads but also have chain effects on the farmers (loss of crops or farmland), land (degradation due to silt/debris deposition), water (degradation of quality), river and streams (change in regime), vegetation (loss and impact) and on other infrastructures like reservoirs (silting). The degree of slope instability increases during the road construction and offer regular sliding during later operational phase as well. Further, it creates a number of partly significant risks for the down hill and/or downstream settlements.



Disturbance during construction (vibration, spoil disposal, borrow and quarry areas operation, slope cutting and exposed surface, construction carried out in rainy season without proper water control and drainage facilities etc.) can upset the often delicate balance between stabilizing factors, such as vegetation and others which seek to destabilize, such as running water. Sometimes, cumulative result of all these may have impacts far beyond the road itself, affecting slopes,

streams, rivers, and dams at some distance from the initial impact. Fresh cuts are often vulnerable to wind and rain, instigating erosion. Similarly, haphazard disposal of construction spoils, unsuitable locations of quarry sites and borrow pits, fresh quarrying and borrowing activities, construction carried out in rainy season without proper water control and drainage facilities; and improper construction methods which leave soils exposed unnecessarily, etc. are also reason for erosion and possible consecutive landslides. The consequences of landslides and soil erosion not only affect the safety and serviceability condition of roads but also have chain effects on the farmers (loss of crops or farmland), land (degradation due to silt/debris deposition), water (degradation of quality), river and streams (change in regime), vegetation (loss and impact) and on other infrastructures like reservoirs (silting). The costs of correcting these problems are often many times greater than the costs of simple preventive measures.

The problem of road-associated landslides generally results from interaction between water flow and soil, both of which are disturbed by road construction. The situation gets worse if vegetation is also cleared. Improperly disposed construction spoil may worsen this situation. Fresh cut slopes and embankments are relatively more vulnerable to landslides and soil erosion, particularly due to improper water management in the vicinity. During the construction period, instability, landslides and soil erosion problems may result because of:

- steeper cut and fill (embankment) slopes and their construction qualities
- environmentally hazardous disposal of construction spoils (e.g. near water bodies or drinking water sources, wetlands, karstic landscapes, sensitive habitats);
- unsuitable locations of quarry sites and borrow pits (eventually leading to uncontrolled, unaesthetic and hazardous dump sites and mosquito breeding grounds)
- rash quarrying and borrowing activities
- construction carried out in rainy season without proper water control and drainage facilities; and
- improper construction methods which leave soils exposed unnecessarily, etc.

During the operational phase the instability, landslides and soil erosion result not only from the road and its structures but also from heavy rainfall, seismic activities and from general vehicle movement on the road. Common problems associated with slope failures are:

- blockage or deficiency drainage structures,
- modification of water paths leading to concentrated flows (may also be caused by blocked ditches),
- high gradient in cut or fill slopes, and
- cleared areas which have been left without re-plantation or other appropriate rehabilitation measures.

d. Hazards due to Spoil Disposal

In hills and mountains, large amounts of spoil can be generated during road construction. Sometimes it is difficult to keep balance between cut and fill, and haulage to disposal site will be expensive. Thus, spoils are often side-tipped, which invites most hazardous environmental and social impacts. Such construction practices overload instable slope areas triggering slides, cause valuable soil erosion, destroy vegetation, cause hazard to settlement at downhill side, disrupt natural drainages and pollute water sources etc.

Frequently, ploughing the RoW for cultivation to the very edge of the road shoulder makes the adjacent land susceptible to erosion and landslides. Similarly, water leaking from the irrigation canals located near the road or from the irrigated land, quarrying of soil (for mud plastering of houses) and stone from road slopes, destruction of vegetation due to animal grazing, impacts from hoofed animals on embankment slopes, fodder collection (mowing), slash and burn cultivation in road corridors and road reserves, etc. may also result in local landslides and soil erosion.

Examples for hazardous spoil disposal and the controversies associated with depositing spoil in rivers are illustrated in the following Box 2.

Box 2

Spoil Disposal in Rivers: A fact in contradiction

Disposal of spoil in water courses and rivers is considered internationally as a practice which is damaging to the environment. This has arisen as a result of greater environmental awareness in countries with smaller rivers and less variation between normal and peak river discharges. In Nepal, the reverse is probably the case. The mountains of Nepal are so unstable, and the natural rates of degradation so high, that it is unlikely that man can add significantly to this. The large rivers carry enormous sediment loads: (Brunsden *et al.*, 1981) quote the following rates per unit area of the river catchments:

Rivers of Nepal	Sediment yield (m ³ /km ² /yr.	Basin denudation rate (mm/yr.)
Arun (1947)	1,830	1.8
Arun (1947 – 1960)	1,889	1.9
Sun Koshi	2,480	2.5
Tamur (1948 – 50)	4,730	4.7

Smaller rivers often have steep bed gradients and in floods show significant aggradation or sedimentation, depending on the nature of the storm and the landslide activity in the upper catchment. For example, in a flood in 1997, the bed of the Leoti Khola beside the Dharan-Dhankuta road rose by an average of about 5 m. Seasonal rivers in Churia and Mahabharat ranges often have bed gradients of about 15° and in floods can take on the characteristics of a debris flow rather than a river.

Against this background, the disposal of debris into rivers, if possible, seems a better course of action than trying to retain it on slopes which are already at a marginal factor of safety. Problems occurred with spoil disposal along Naubise-Mugling and Mugling-Marsyangdi road sections because spoil was left hanging on the steep slopes rather than being pushed right down into river. Between 1992 - 1995, millions of cubic meters of limestone and shale debris were removed each year by the Trishuli from the Jogimara landslide site alone, with no appreciable downstream effects. It therefore seems clear that disposal of almost any quantity of spoil into river, seasonal or perennial, with a bed gradient of less than 20°, is an acceptable solution. Gullies with steeper bed gradients may become re-activated as a result of scour generated by disposed spoil, and so this limit should not be exceeded.

Source: Briefing Paper on Environmental Issues and Environmental Assessment in Road Sector, RAP, 1999

e. **Water Flow Diversion**

Roads that intersect drainage basins generally modify the natural flow of surface water by concentrating flows at certain points and, in many cases, increase the speed of flow. Diversion or disruption of natural surface water flow and drainage is often inevitable in road projects.

Blockage of natural drainage path during construction or maintenance – for example by environmentally hazardous disposal of spoil material - may generate water depletion, water logging, a concentration of water flow as well as increase the speed of flow, which will be erosive in nature. Diversion as well as overloading existing drains results in water flowing where it normally would not,

e.g. on vulnerable soils where frequent effects are scouring, gullying, bank cutting and soil erosion. The dramatic final effect of these incremental impacts usually cumulates in massive landslides, which in turn can cause slope instability and landslides. In absence of proper water management a concentrated flow can lead to scouring, gullying and soil erosion at downstream land, which in turn can cause slope instability and trigger landslides. The effects of disruption can extend well beyond the immediate vicinity of a road or point sources of any immediate impact (e.g. spoil deposit, see example, Box 3).

Box 3

Case Examples demonstrating Water Flow Disruption and unsafe Spoil Deposit following Road Development in Nepal

Widening of the Naubise-Mugling road gave rise to large quantities of spoil, which were left hanging on the steep slopes below the road in many sections. Heavy rain in 1991 and 1993 triggered a number of mass slump failures, where the slope collapsed on a plane below the original ground, taking part of the road with it. This could have been easily avoided if the debris had been simply pushed down the slopes into the river below. Similar problems have occurred on the sites on the Pokhara-Baglung, Bhalubang-Pyuthan and Syauli-Silgadi roads.

Gullying in fresh, tipped debris is generally common in recently constructed roads, where spoil is side-tipped without proper spoil management. The Kamphek-Rajarani and Baitadi-Darchula roads, both of which have alignment sections near the top of very long steep slopes, are probably the worst examples. Other examples of roads having similar problems are Mugling-Marsyangdi, Butwal-Tansen, Pokhara-Baglung, Sahajpur-Dadeldhura, Silghadi-Sanfe Bagar, Khodpe-Bajhang, and Baitadi-Darchula roads.

Side tipping on the steep Mahabharat slopes crossed by the Surkhet – Dailekh road led to disruption to the Surkhet Water Supply, which has been a well known example of problem of spoil disposal.

In Terai, road embankment often acts like a low height dam across agriculture fields. In the absence of adequate cross drainage structures, water ponding, water logging and flooding on upstream command area occurs, often damaging road itself as well as land and property.

Source: Briefing Paper on Environmental Issues and Environmental Assessment in Road Sector, RAP, 1999

Roads can act as low height dams and cause disruption of natural drainage, water logging, water pounding, flooding. In the Terai plains, for example, the concentration of water from an impermeable road surface, via side drains to a concentrated flow in a gully is an acute hazard. In the Silgadhi-Sanfebagar, Surkhet-Dailekh, Baitadi-Darchula, Pokhara-Baglung and Basantpur-Terhathum roads, inadequate drainage provision around hairpin stacks has led to extensive gullying which has led to widespread damage both to the road itself and to adjacent lands.

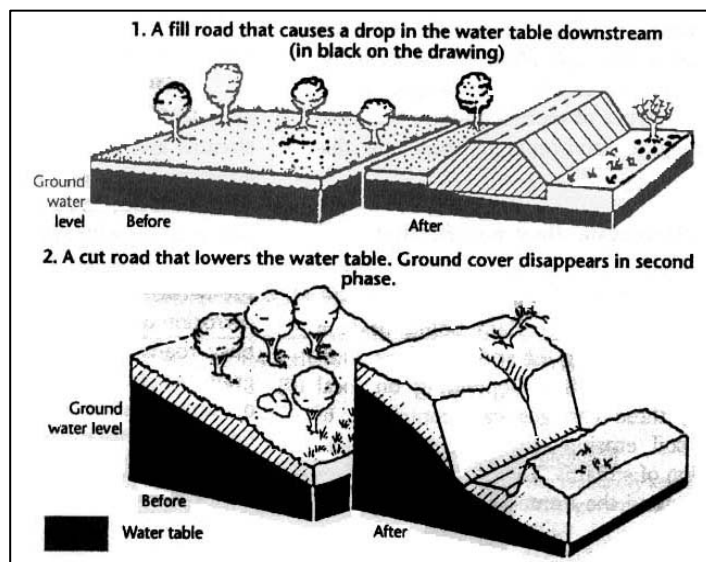
Stagnant pools of water or water-logged depressions as well as abandoned borrow pits may become a vector breeding area thereby causing incremental impacts on public health, e.g. spread of malaria and dengue fever.

Common problems likely to be encountered in Nepal's rural roads are termination of road drains on agricultural land which gets damaged by silt and gravel deposits, creation of new water bodies in the borrow pits, and flooding of farms and settlements because of inadequate number of culverts and their improper placing (particularly in Terai and in the upstream side of the embankments).

f. Groundwater Flow Modification

Subsequent impacts of water flow diversion or blocking by embankment structures are often dramatic changes in local groundwater level that will result in changing vegetation pattern or even destroy vegetation and crops, and may lead either to water logging, increase in waterborne diseases, or to severe water depletion and to local desertification. In many cases such activities will also cause subsequent impacts with far-reaching and long-term implications for aquatic life, habitat changes for fish and reduction in the local and regional fisheries production.

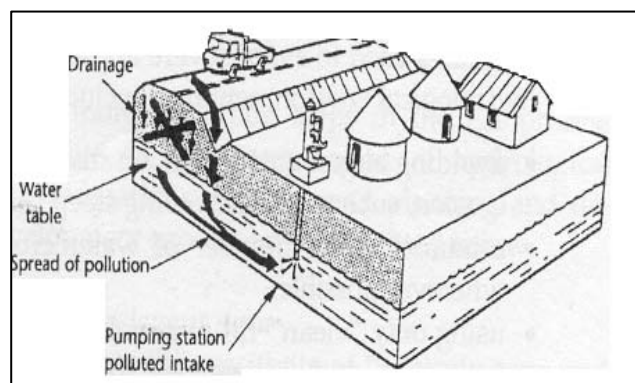
Similarly, excavation activities can lower the water table in surrounding areas. Some common problems likely to be encountered in Nepal's rural roads are termination of road drains on agricultural land which gets damaged by silt and gravel deposits, creation of new water bodies in the borrow pits, and flooding of farms and settlements because of inadequate number of culverts and their improper placing (particularly in the Terai).



Modifications in water table as a result of Road Construction

g. Pollution of Water Resources

Construction activities such as cutting and filling, disposal of construction waste and spoil, erosion and soil movement due to quarrying and borrowing, etc. cause increase in turbidity of streams, rivers and lakes. Improper sanitation of workers or local inhabitants, (e.g. lack of appropriate sanitary facilities, defecation in open field) disposal of wastewater from labor camps, unauthorized washing of vehicles and unauthorized/unsuitable garbage dump sites, may also pollute water, particularly the drinking water sources.



Ground water contamination from roads

Accidents of tankers carrying oil and other environmentally hazardous chemicals can also cause pollution due to their spillage in large quantity. The typical primary and secondary effects of water pollution include health hazards to the downstream water users and impact on local fisheries. Increased silt content could cause unnecessary sediment deposition in downstream areas which causes the rising of river beds resulting flood in downstream areas. Polluted water may become unfit for bathing, drinking, animal consumption, irrigation, etc. and affect fish and other aquatic life.

h. Contamination of Soil

Soil contamination can arise from inappropriate construction practice, as well as from accidents during both construction and operation stage. Pollution risks originate from transportation of hazardous materials during road construction and subsequent traffic operations. Metals such as chromium, lead, and zinc remain and continue to be an environmental hazard in the soil for hundreds of years. Pollutants settling in roadside soil can impair the growth of vegetation and the growth of soil organisms, thus increasing the likelihood of soil depletion and erosion. These impacts tend to be localized, affecting only a narrow zone on either side of the road.

In colder climatic zones in mountainous area, salting of roads can lead to soil contamination, and subsequent decrease in soil fertility and losses of organisms vital for good soil quality.

i. Quarrying of Construction Materials

The construction of road, particularly the structures such as retaining walls, culverts, bridges, road surface works etc. require large quantity of boulders, gravels, sand, and other types of construction materials. Good road building materials are hard to find. Poor quality of material will often lead to premature failures of the road pavement. As a result, it is normally necessary to extract materials from wherever a good enough source is available, mostly locally. Such materials are normally mined in nearby locations on local streams and places near the road alignment with a view to save the transportation cost.

Uncontrolled quarrying by contractors from non-approved sources is a damaging activity which must be controlled. However, sometimes such activities are beyond the control of the road constructing engineers (see Box 4).

Box 4

Case Examples demonstrating Local Impacts from External Quarry Activities

The Jogimara, on Naubise-Pokhara road is a most significant negative example of how quarrying operations, that have no context to road works, result in massive environmental hazards.. During the 1980s and early 1990s, an outcrop of limestone was quarried just above the road to supply a number of cement factories. The quarrying was not properly supervised and contributed to a catastrophic scale of instability.

River beds are common source of materials for roads and other constructions. If extracted in relatively small quantities, this appears to have no damaging effect. However, in a number of places the extraction of stones from river beds has become excessive. The worst example is the Naubise Khola and its tributaries, which supply a constant stream of stone, crushed aggregates, gravel and sand to the construction activities in the Kathmandu Valley. The result is that the river beds have been stripped entirely of the larger debris which helps to regulate flood velocities. It may be that the flood of July, 1993 which caused so much damage to the Naubise-Mugling road would have been slower and less damaging if it was carrying a heavier sediment load.

Source: Briefing Paper on Environmental Issues and Environmental Assessment in Road Sector, RAP, 1999

The extraction of materials from inappropriate places or in excessive amount can seriously damage the local environment. For example, quarrying from a high slope and fragile terrain can result slope instability; extraction of sand and gravel in excessive amount from river can cause river bank cutting and erosion and changes in river regime. This will eventually affect the local environment in terms of erosion, flooding of cultivated land, damage to community infrastructures, affect road itself, and eventually affect the entire livelihood of local people.

Disruption of natural land contours and vegetation resulting in accelerated erosion, landslides, disturbance in natural drainage patterns, siltation of surface waters, ponding and water logging, and water pollution are the potential adverse impacts of quarry and borrow pits operation. General scouring of river beds resulting in endangerment of bridges and continuous degradation of the river regime are also potential impacts of quarry operation.

j. Stone Crushing Plants

Stone crushing plants are temporary work sites, occurring during construction and rehabilitation of roads. They are normally established in quarries and river beds from where the stones are derived. In addition, stones are often broken for rural roads by hands in these locations by labour force. The operation of crushing plants and stone breaking by labour causes inconvenience to nearby settlements in terms of air and noise pollution. Siltation and pollution of surface water resulting from uncontrolled runoff from storage piles, and damage to the local crops and surface water are also potential impacts. Excessive noise and dust from the plant will create disturbance to nearby settlements, school, health posts etc. Crushing plant site is also a high risk area for accidents and injuries. Also, there will be continuous flow of heavy vehicles for carrying the materials to construction sites. If their path is along school and busy market area, there will always be potential risk of serious accidents.

k. Stockpiling of Materials and Disposal of Spoil Material

Construction materials are usually stockpiled for relatively short period without covering. It is often done on river beds or river banks, forest area, open spaces, and cultivated land. This situation may lead to environmental degradation in terms of air pollution, land pollution, pollution of surface water and permanent changes of land use if not rehabilitated after the completion of construction works. Standing crop or future cultivation on land is disrupted. If not appropriately stockpiled with drainage facility, rain water can carry the sediment into water bodies affecting their quality as well as aquatic life.

Surplus construction material, cut material, drainage cleaning debris, and landslide mass (spoil) can cause significant environmental hazards, mainly on the adjacent hydrology and habitats if they are side-tipped downhill without appropriate spoil management. This impact occurs both during construction and maintenance operations. Among the common negative consequences are overloads instable areas causing slope instability and slides, smothering and removal of trees, vegetation and topsoil, causes or promote erosion, kill vegetation, destruction of private property, crops and irrigation systems at foothills, disrupt natural drainages and surface water sources, and pollute water.

l. Air Pollution

Air pollution due to vehicle emission (particulate matter, nitrogen oxides, hydrocarbons, carbon monoxide, sulfur dioxide, lead, aldehydes) and dust raised by plying of construction vehicles and operation of machineries, crushing plant etc. may cause nuisance to roadside walkers and nearby residents (Table 4.2). Dust layer accumulates on the leaves of roadside vegetation limiting their growth and assimilation capacities, and affects the roadside settlements. Many of the air polluting agents re known to cause respiratory and eye disease to people exposed for long duration. Roadside tea shops and cafeterias usually keep food in open, over which dust layer naturally settles. This is directly consumed by people. Although the evidence of concrete health hazards is often not known, it is definitely not hygienic, and may cause stomach ailments. Dust may considerably affect school going children, school and health posts besides the road. Low quality of fuel, age and poor quality of vehicles, lead from petrol engines are the

other causes of pollution. Also driver's behaviour may dramatically contribute or diminish local air pollution: Engines produce higher emissions while decelerating, accelerating, and climbing grades, so any road features which encourage these actions also encourage higher emissions.

Table 4.2: Vehicle emission components and their principal environmental effects

Pollutant	Health Effect on Humans	Effect on Fauna and Flora	Effect on Built Infrastructure
Carbon monoxide (CO)	Reduces the ability of the blood to carry oxygen. Symptoms of exposure include: headaches, dizziness, impaired mental functions, aggravated cardiovascular problems, impaired fetal development, and fatal asphyxiation.	It is anticipated, however, that most traffic-generated air pollution effects identified in humans are likely to occur in animals. Flying animals (bird, insects) may particularly suffer from air pollution as this will impair many physiological functions. Acidification of aquatic ecosystems has definite implications on aquatic organisms.	n.a.
Oxides of Nitrogen (NOx)	Aggravate and induce respiratory and cardiovascular problems such as asthma, emphysema, tuberculosis and bronchitis.	Plants: Acidification of surface water from combination with SO ₂ can interfere with nutrient uptake by roots and affect growth. NOx cause localized death of leaf tissue (leaf necrosis). Animals: Physiological impairment, much of which is similar to those in human physiology	Possible reaction (degradation) with constructions made in sandstone.
Hydrocarbons (HC)	Contribute to eye, nose and throat irritation. Benzene is a known carcinogen.	Ethylene has detrimental hormonal influence on plant growth. In reaction with NOx it stimulates ozone which cause localized death of leaf tissue (leaf necrosis).	Objects in use by humans are vulnerable to air pollution on two fronts: staining and corrosion. Particulate are responsible for dirtifying all manner of structures, including modern buildings, monuments and cultural heritage sites. Acid deposition associated with NOx and SO ₂ is especially destructive of limestone, marble, or lime mortar structures. Acidity originating from vehicular emission is also blamed for deterioration of paints and accelerated corrosion of metals.
Aldehydes	Eye, throat, and lung irritation. In some cases. Allergic reactions.	Same pollution effects identified in humans are likely to occur in animals	
Particulate Matter	Eye and respiratory irritation, aggravation of asthma. Some are suspected carcinogens.	Dust settles on leaves and can interfere with pollination and photosynthetic function. Animals: Respiratory problems	
Lead (Pb)	Nervous disorders, impaired mental function, and behavior problems, especially in children. Also anemia, possibly brain damage.	Plants can absorb toxic pollutants such as lead from the air, making the consumption of these plants hazardous.	
Sulphur dioxide (SO ₂)	Aggravates respiratory ailments such as asthma, bronchitis, emphysema.	SO ₂ cause localized death of leaf tissue (leaf necrosis).	

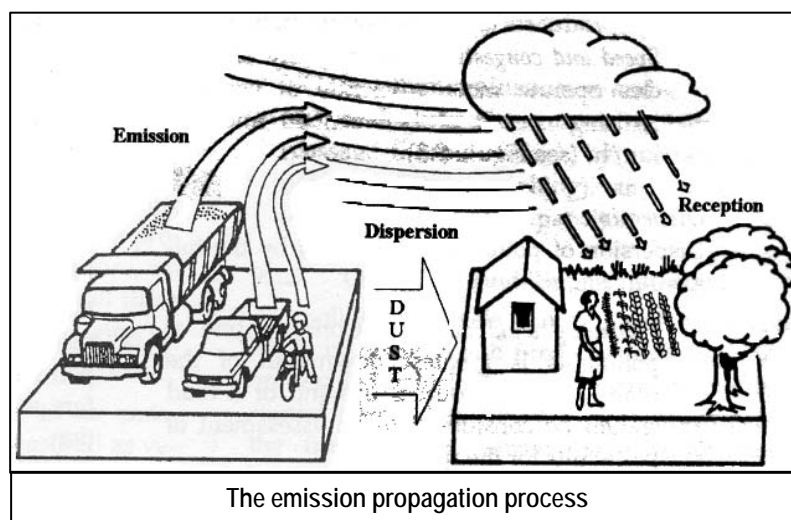
[Source: after Lee, 1985].

Dust and emissions from asphalt mixing plants is a significant pollution problem, although more of localized and temporary nature (over a period of months). A current example of this is the plant situated near Naubise for the rehabilitation of the Thankot-Naubise road, which affected a relatively wide area of the valley. In places it seems that the local community tolerated this kind of intrusion on account of the large number of jobs created during its operation. Elsewhere cash compensation is demanded.. During the reconstruction of Malekhu-Mugling road, the project had to contribute for extension of a school building at Charaundi in return for access to a nearby river bank site to locate there an asphalt plant.

Air pollution is intercepted by local buildings, monuments and cultural heritage sites, which are generally stained, corroded and dirtied as a result. They are inhaled directly from air or ingested when human eat food crops grown near busy roads and which have had particulates settled on

them. They are ingested when

humans touch surfaces in their environment and then make contact with their mouths while eating or playing. Lead commonly finds its way into children's bodies in this way. Pollutants are washed out of the air by falling raindrops and fall as acid precipitation.



m. Noise Pollution

Road construction and maintenance generally require the use of heavy machinery and crusher plants. Noise associated with road development has four main sources: (i) vehicles (engines, transmission, exhaust and suspension); (ii) friction between tire of vehicles and road surface; (iii) driver behaviour (excessive honking, loud music, shouting at each other, causing tire to squeal by sudden breaking or acceleration); and (v) construction and maintenance activity. Although the construction activities are intermittent and localized, they nevertheless contribute to significant amounts of sustained noise during equipment operation. Chronic noise exposure can be a source of nuisance, creating communication problems and leading to elevated stress levels as well as associated behavioural and health effects. It can cause auditory fatigue, temporary and permanent lessening of hearing ability, sleep disorders, and can contribute to learning problems in children.

Noise may prevent many animal species from approaching or crossing road corridors because they are afraid. As a result, road corridor becomes a barrier to regular wildlife migration routes, and effectively rendering roadside habitat areas inaccessible to some species. Such disturbance reduces the success of these species and contributes to ecological alteration. Livestock and wildlife may experience breeding problems and other forms of behavioural disturbances.

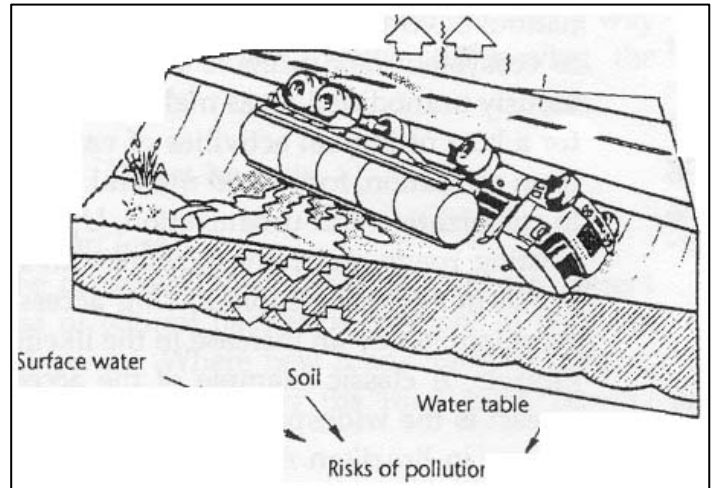
The vibration induced by the resonance of traffic noise can have a detrimental effect on structures standing near the road. This is of particular concern in the case of cultural heritage sites.

n. Hazards caused by Explosive, Combustible and Toxic Materials

During road construction activities, explosive materials are needed to blast hard rocks to open road track. The use of explosives, if not done carefully, can lead to extensive environmental damages in terms of causing slope instability, excessive rock fracturing, damage to nearby property due to vibration as well as rock splinters, injury, disturbance to wildlife, air pollution etc.

The safeguarding of explosive from theft is also a major concern. The regulations of the Government of Nepal for transporting both the gelatin and detonators are well laid out and are carefully adhered to. A police guard and a responsible officer have to accompany each shipment. Problems more usually occur with theft from stores in remote areas. In the past, explosives are thought to have been stolen for fishing or other criminal activities. Recently it has become a serious security concern.

Contractors may store fuel, oil and lubricants, diesel and petrol, bitumen, solvents and other toxic chemicals for use in construction work. Inappropriate storage of such materials or accidents of tankers may cause spillage or leakage, polluting surface and groundwater, contaminate soil, cause fire and explosion hazards and nuisance to human health.



Combustible materials mostly comprise fuels and lubricants, bitumen, and jute netting. The most common risk involved is bitumen distributors catching fire. Cement, a widely used material but can cause minor chemical burns and skin problems to the users. Protective clothing is rarely provided or used. In hot weather, it may be uncomfortable and therefore its use difficult to enforce.

Explosives need particular handling and precautionary measures, both in terms of safety and in affecting the environment. Rock blasting may, for instance, trigger slope instability. Excessive rock fracturing is common feature in Kamphek-Rajarani and Chhinchu – Jajarkot roads. Minor widening of the Mugling – Marsyangdi section of Prithivi Highway led to a massive rock fall in November 1994. This was cleared, but large falls continued at intervals in the same place. The slope was relatively stable before the widening was carried out, but it appears that the contractor's use of explosives gave rise to a severe stability problem.

o. Potential impacts caused by Bitumen

The use of bitumen is one of the most hazardous materials used for road construction and maintenance activities. Bitumen storage is a frequent environmental problem that can only be met by special precautionary measures. Bitumen drums often get damaged during transit, leading to a leakage in storage places which often are not or not adequately cleaned up afterwards: Negative examples are plenty in Nepal, e. g. former storage area of Kurintar, where pools of split bitumen can still be found in cattle grazing areas, many years after the rehabilitation of the road was completed.

During application, workers are often (for various but unacceptable reasons) not adequately protected. Bitumen is applied at a high temperature, leading to a

considerable risk of burns. However, it is most often applied in hot weather, making protective clothing uncomfortable, and enforcement of its use difficult.

A problem frequently associated with layering of bitumen in Nepal is the exploitation of local forest timber as firewood for heating bitumen. Release of bitumen into the environment through runoff into surface water is another environmental hazard, with secondary effects discussed above in section (g).

4.3.2 Impacts on Biological Resources

a. Clearing of Forest and Habitat Disturbance or Loss

A road that passes through forest converts forest area into built up area. Tree vegetation has to be cleared, resulting in loss of habitat of wildlife and loss of timber and forest species. Where new roads intersect defined habitats, the area occupied by the road itself, borrow pits, and quarries is subtracted from the total habitat area available to flora and fauna.

With road connection, forests become easily accessible and render animal grazing, collection of firewood and NTFPs, and hunting. Roads may also considerably contribute and/or accelerate logging activities and timber exports.

A road transgressing forest areas is likely to disturb irreversibly wildlife activities. A road may contribute to increased hunting and poaching of wildlife. The underlying cause is the improved accessibility by road to former difficult or remote lands such as forests, national parks, wildlife reserve areas, community forests, religious forests, private forests. Additional (illicit) activities of the work-force may also create pressure on the forest and forest resources include firewood collection and hunting birds/animals. This can lead to increased timber cutting (legal or illegal) in pristine or vulnerable forests and illegal collection and export of medicinal plants. Development stimulated by the road may promote activities such as use of firewood to meet the demand of both locals and tourists who consume forest resources and increase pressure on it. All these factors may cause significant deforestation and degradation of local forests or other valuable/vulnerable biotopes.

b. Habitat Fragmentation and Barrier to Wildlife Movement Corridor

When a road cuts through an ecosystem, the sum of the two parts created by the cut is less than the value of the initial whole, even when the habitat loss is ignored. Ecosystems are characterized by complex, interdependent relations between component species and their physical environment, and the integrity of the ecosystem relies on the maintenance of those interactions. By slicing through habitat, roads affect an ecosystem's stability and health. Without careful planning, roads tend to fragment an area into weaker ecological sub-units, thus making the whole more vulnerable to invasions and degradation.

A road with wider width and higher vertical alignment may cause a physical and psychological barrier for wildlife, and act as a barrier across their movement corridor. When a road intersects or blocks a wildlife corridor, the result is either cessation of use of the corridor because animals are reluctant to cross the road, and increase of mortality due to collisions with vehicles, or a delay in migration which may result in the weakening or disappearance of an entire generation of the population. Unfortunately, some animals are attracted to roads for various reasons, including protection from predators, good food supplies, better travel conditions, and so forth. This often leads to accidental death and poaching. On busy roads, the death rate for the local amphibian, reptiles or other slow-moving animal populations can be as high as one in ten.

c. Disturbance of Biodiversity and Wildlife

Roads frequently pose a number of threats to local wildlife that can, in worst cases, lead to reduction of biodiversity. Due to clearance of forest and loss of habitat, but also due to increased vehicular movement and disturbance by people, rare floral and faunal species may become adversely affected or might even disappear at all from those areas. It may happen that entire ecosystems may get disturbed and destroyed due to excessive intrusion of human activities (hunting, forest fires), due to filling (e.g. swamplands) or intensive extraction of resources.

Development of road-side settlement, often in the form of undesirable ribbon development of squatters, commonly results in increased pressure on forest resources for caused by firewood and cattle fodder collection, and due to intensive grazing by cattle. Otherwise, forest fire (incidental or intended) occur far more frequent in such settlement conditions which will further enhance environmental degradation.

Roads are effective vectors for the spread of diseases, which can have marked impacts on populations of plant and animal species and thereby pose considerable direct and cumulative impacts on the native biodiversity. Invasive species and pests, carried by road vectors, bring about diseases to which the local flora and fauna may not have developed adequate defence mechanisms against such intruders.

Transportation of livestock, exotic fish (e.g. *Tilapia*) and plant products, such as firewood, animal feed and fruit may also aid in spreading disease among the local animal and plant species. Such impacts will, particularly with respect to the aquatic fauna, result in significant disappearance of endemic species and adverse effects on local fisheries.

Flow of nutrient and materials is a major determinant in ecosystem structure and function. Road construction can easily disrupt this vital flow through alteration of surface water and groundwater, removal of vegetation cover, and relocation of topsoil. Also, increased human activity can be a major source of change in nutrient supply to local water resources (sewage, animal dung, eroded topsoil) which can raise turbidity and BOD of water to a point where certain species, particularly micro-organisms cannot survive while others will react with explosive population growth that will subsequently damage the balance of the aquatic systems.

Construction activities in roads that pass through forest areas may also disturb wildlife. Road construction activities may contribute to increased hunting and poaching of wildlife by the labours and other construction crew. Construction activities and noise may offend wildlife and may restrict their movements and breeding and alter/destroy their habitat. Activities of the work-force that create pressure on the forest and forest resources include firewood collection and hunting birds/animals, destructive fishing etc.

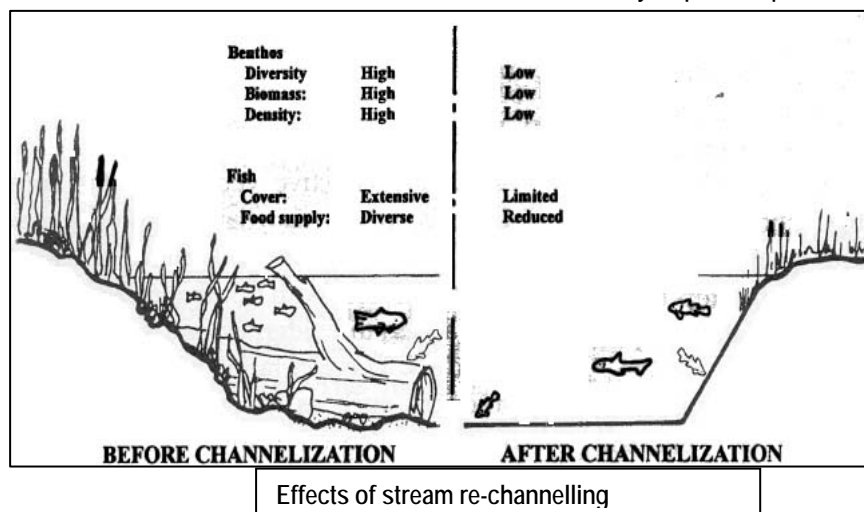
Activity of construction labours may lead to forest and other bush fires, which will have sudden, severe and wide-ranging impacts on all kind of living organisms. Similarly, fire hazards are common at construction sites, workshops where activities related with fire (such as welding etc) is carried out.

d. Damage of Aquatic Habitats

Road development has perhaps its most serious effects on aquatic ecosystems though it is not seen directly. Erosion from poorly constructed and rehabilitated sites can lead to downstream siltation, ruining spawning beds for fish. Constrictions of flows at water crossing can make the current too fast for some species. Alteration of flood cycles, tidal flows, and water levels can upset trophic

dynamics by affecting the life cycle of plankton, and have corresponding effects on the rest of the food chain.

Re-channelling of waterways is often undertaken as part of road construction to avoid flooding and make crossing structures simpler. In the process, natural streambeds are dug up and useful obstructions, including large boulders, are removed. The same applies to shade trees on the banks. Frequently, the result is a straight, featureless channel, which may be an efficient evacuator of water, but has little in the way of the eddies, shaded areas, sheltering ledges, and turbulence essential to the health and existence of so many aquatic species.



Roads may serve as barrier to movement of migratory aquatic species, especially where culverts are used. Often migratory fish species are intensively fished/over-fished at sites where culverts and bridges tend to block the natural migratory pathways.

4.3.3 Impacts on Socio-Economic Environs

a. Loss of Productive Land

The most immediate effect of road development on soil is the elimination of the productive capacity of the soil covered by roads. Unfortunately, the best sites for road development (flat and stable) are also ideal for agriculture. The narrow and linear character of road makes the impact of lost land seem minimal, but when the width of RoW is multiplied by its length, total area of land removed from production becomes much more significant. It impacts on local economy, food sufficiency of the area and have socio-economic implications, leakage of oil and lubricants and other chemicals on cultivable soil and communal water resources. Soil productivity can also be reduced significantly as a result of compaction with heavy machinery during construction leakage of oil and lubricants and other chemicals on soil etc.

b. Land and Property Acquisition, Compensation, Resettlement and Rehabilitation

Road development often requires the procurement of privately owned land. This land has to be acquired by the government from its current owners. While it is sometimes possible to negotiate a price for voluntary sale of a property, governments often have to use their rights to compulsory acquisition of properties for public projects. By its nature, expropriation may cause economic losses and social and psychological disruption for the affected individuals and their families.

An increase in commercial activities like general shops, lodges, hotels, liquor shops, as a consequence of opening new road links may lead to the increase (or in some cases decrease) in land values (adjoining and others). Operation of roads may bring about changes in the agricultural practices, productivity, crop-variety, etc. and land-uses (increase in built-up areas, decrease in agricultural areas, forest areas, etc.), farmers' livelihood and may also encourage tourism. The induced changes are not necessarily limited to the immediate vicinity of the road route. Both positive and negative social and environmental consequences are possible from such changes. After construction of road and better access, a situation may develop in which the value of land in a particular area is increased (as discussed above, Ch. 4.2.3), leading to higher rental value, a turnover in occupancy, and a replacement of lower income tenants and residents by those who can afford the higher rents (often migrants and/or outsiders). This process, known as gentrification, is mainly a distributional issue, recognizing that a road development project can harm the weaker segments of the community while favouring the wealthier ones.

The government's right to expropriate carries with it a responsibility to ensure that those affected do not bear an unfair share of the costs of a project which will bring benefits to others. In the simplest terms, this responsibility should be to ensure that the standard of living of all affected persons is restored to the level enjoyed before the commencement of the road project. Depending on how well the resettlement is planned, it may go a long way in compensating for the loss and disruption, or it may exacerbate the suffering. More details on resettlement, compensation and eligibility are presented in Chapter 7 of this document. In cases where local settlements are affected in road upgrading projects, the specific IEEs/EIAs under the forthcoming SRN Program make due reference on how to solve locally the problems of relocating and compensating private structures and business (particularly in locations where the upgrading works happen in rural market areas, like in sections of the studied roads in Satbanj-Jhulaghat, Khodpe-Jhota and Chinchu-Chegegad).

The economic impacts of expropriation may include the loss of houses or businesses, or the loss of business income, either temporary or permanent. The social and psychological impacts and associated costs are more complex, and they are often much more devastating. Business people may find their established clientele cut off from their shops or experience changes in business practices they neither anticipate nor like. These kinds of social and economic changes often find personal expression in a variety of physical or psychological disorders.

The existence or new establishments of squatters on the right-of-way pose particular challenges for road and land-use manager. There are many reasons why the poor, the homeless, those pursuing informal economic activities, and small-scale farmers encroach upon the publicly owned right-of-way and, in many cases, the existing road surface. More often than not, road projects tend to displace these persons whose very presence signifies their need for special attention. Legally, projects often recognize only formal registered titles. The result is commonly impacting the road structure, and impedes proper maintenance operations. Among the most frequent encroachment observable in rural settings of Nepal are:

- Selling of goods, whether from individual kiosks or more expansive markets;
- Small business such as cafes and vehicle repair shops;
- Uncontrolled stops by buses, taxis, and informal public transport;
- Unregulated parking, often related associated with business activities;
- Production of bricks on the road surface; and
- Growing of crops and drying of farm produce within the road reserve.

Various forms of informal or unregistered title, including usufruct rights (permanent or temporary use), seasonal use rights, rights of access to commons, and others that adds to the complex nature of resolving land-use conflicts. However, lack of legal tenure of land or assets should not be regarded as a criterion for withholding financial compensation or assistance in relocation. Instead, it is important to distinguish those who were living in the project area prior to project approval from those who have invaded the area simply to benefit from the relocation.

New road generally stimulate ribbon settlement along the alignment, often resulting in incremental adverse environmental and socio-economic problems if not properly managed. Some of the undesirable activities of people living or moving near roads are over-grazing of terrains otherwise needed for embankment stabilization, unauthorized and inappropriate collection of firewood/fodder/mowing from road reserve and vicinity, cultivation without terracing in the immediate vicinity of road, cultivation to the very edge of terraces or cut slopes, uncontrolled quarrying of stone and clay from the road cut slopes, poor construction and maintenance of irrigation canals causing water to seep into road slopes and slash and burn cultivation in road vicinity.

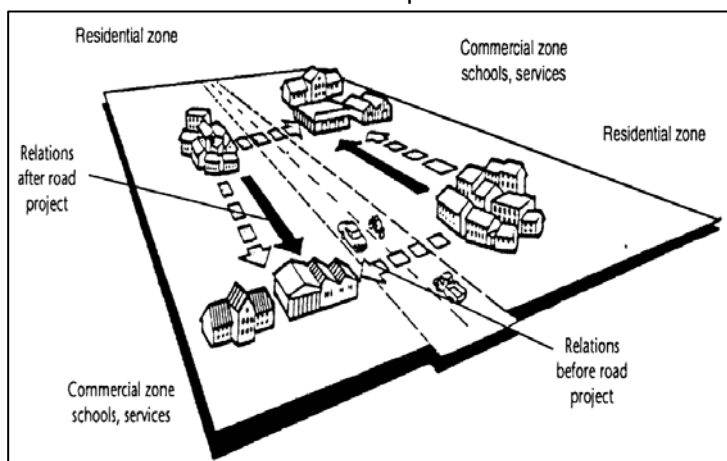
It is strongly emphasized to control and restrict ribbon development after new or upgraded road projects come into operation. Good land-use planning must be developed to reverse the direction of such undesired development. In specific, markets areas need to be planned for further expansion to avoid increased congestions, accident risks and impediments for large transport vehicles and delivery of goods. As applicable, road bypass solutions need to be considered as principal mitigation and future planning measure.

c. Disruption of Community Structure and Livelihood

Rural communities owe much of their vitality to economic and social interactions. Ironically, while roads are central to continuing interaction, new or widening of roads can cause disruption to local interactions which outweigh benefit. Thus, both new road and significant widening has the potential to split a community. Neighbourhoods can be disrupted and, in the worst instances, broken up completely by large construction projects. People who meet on a daily basis and who constantly do each other small but important favours may be left deprived when separated by physical barriers or long travel distances. The split effect of roads crossing through settlement poses specific risks when school children have to cross that road repetitively during school days.

Introduction of faster traffic, access controls, and median barriers generally cuts traditional lines communication. Alternative routes for local movements provided after new construction can be sometimes substantially longer, directly affecting businesses, pedestrians, and users of non-motorized transport. The burden of accommodating to changes is generally greater for the poor. In rural areas, the normal links between villagers and their farmlands may be cut by a new road or increased traffic.

By-pass roads can also create social conflicts between road use and community interests. On the positive side, by-pass



roads reduce the immediate impacts of traffic on the community, and local commercial activities sometimes flourish as a result.

On the negative side, communities may fear a loss of business from the diversion of traffic, and some community activities may “migrate” to the new route, potentially changing existing land use patterns and possibly undermining the objective of greater control of access on the new route. By-passes, like other road projects, can also cause changes in vehicle flow on the secondary network, possibly creating nuisances if traffic should increase at some locations.

d. Conflicts in or with nearby Host Communities

While most resettlement planning concentrates on those people who need to be resettled, the community or communities that receive and absorb the resettlers must also be taken into consideration. In regions where arable land is scarce, or whether other basic resources such as fuel wood and water are in short supply, the impacts on the host community from the influx of a new group of "users" can be severe and highly controversial, leading at times to frictions and even physical clashes.

The host areas' ability to sustain a resettled population without serious resource depletion should also be assessed. Important factors to consider include:

- Availability of clean water (in all seasons)
- Amount of productivity of agricultural land
- Utilities
- Health services
- Education facilities
- Sewage disposal and water delivery systems
- Road network

Great care must be taken to avoid resettling people in areas where they will be viewed as trespassers taking up resources in short supply, or in areas which are totally foreign to them. In the former case, the resettlement can become a major source of tension within the community and may end up being the basis for enduring conflict. In the later case, people who are resettled in unfamiliar environments may have considerable difficulty adjusting, e.g. having to learn new agricultural methods to apply on different soils. Resettlement may drive these people into long-lasting poverty or destituteness.

e. Impacts on Vulnerable Indigenous People and *Dalits*

Indigenous people and *Dalits* are commonly among the poorest segments of a population, especially in the remote areas of Nepal. *Dalits* have the lowest status in all sense, i.e. lacking land resources, livestock, education, sufficient income, access to all services and facilities (including cultural and religious). In many rural areas it is the tradition that *Dalits* depend on Adhibasi/Janajatis (indigenous people) and so-called higher castes for livelihood whereas the indigenous groups depend partly on higher castes for supporting their livelihoods. Indigenous people engage in economic activities that range from shifting agriculture in or near forests to wage labour or even small-scale market-oriented activities.

The cultural, social, political and economic integrity that characterizes indigenous peoples renders their lives vulnerable to disruptions from outside. Whether a road is being planned to cross an area inhabited by indigenous peoples or to open up that same area, it will have a marked effect on their lives. A ‘Cultural Shock Effect’ is not uncommon when isolated communities are exposed relatively rapidly to increased communication with the outside world.

The general principle that should be followed throughout the SRN Program is to apply to the maximum extent a strategy that specifically adopts the good opportunities for vulnerable groups and women. The sub-projects shall therefore explore processes to engage local (experienced) NGOs/CBOs who will mobilize local groups to become engaged as unskilled labourers in the planned work construction activities. The NGOs/CBOs will coordinate the contracting process and ensure that the Contractors will pay fair, timely and gender-equal salaries to same category of works. The NGOs/CBOs may also explore possibilities to arrange for funds where part of the salaries will be added. These funds then may be used for establishing cooperatives for developing other income-generating options, and avoid that newly gained incomes will not be lost.

The foreseen construction works must also take into due account that the new access situation to formerly remote and backward regions will invariably affect social cohesion, produce physiological effects on the individual. Road planners, working closely with indigenous community representatives and sociologists, must attempt to enable indigenous people to adapt at a pace and in ways that they can manage and control, and explore all means to avoid social tensions and conflicts between outside staff (mainly technicians, suppliers) and local people.

Impacts on indigenous people from poorly planned road projects can be:

- **Loss of Traditional Sense of Identity:** For many traditional groups, the land is an inextricable part of themselves, their lifestyle, and their livelihood. Flora and fauna are typically considered beings that are integral part of their cosmos. Thus, the very definition of self is bound up with the land, and its flora and fauna, in a manner often alien to outsiders. Roads can too easily disrupt this sense of identity and may lead to an ecological imbalance when the local population loses the responsibility for their proper environment.
- **Loss of Livelihoods and Violation of Traditionally-exercised Land Rights:** New and improved roads bring increased contact with outside people, who either occupy the land for farming or exploit other resources such as minerals, forests, or wildlife. The increased competition for existing resources can put the indigenous people at a disadvantage, especially when the settlers introduce ecologically inappropriate and unsustainable production systems. Often indigenous people have no recognized land ownership, and they are not compensated for the land that is taken from them. Rather than fight for their rights in an alien national legal system, they may withdraw from the new population centres, thus increasing the population pressures on another, already traditionally occupied land. In extreme cases, physical conflicts can break out between settlers and the host communities when the latter try to reclaim their heritage and traditional rights.
- **Health and Social Problems:** The new arrivals of migrants, as well as the road construction crews, often bring with them serious health and social problems, including endemic diseases, sexually transmitted diseases, violence, crime, alcohol abuse and other conflicts that destabilize traditional lifestyles and can take a heavy toll among relatively isolated indigenous people.

f. Damages of Community Infrastructures

Experience has shown that road construction activities often disrupt community infrastructures such as irrigation canal, drinking water supply systems, electric poles, telephone lines, water ponds, schools, foot trails and cattle trails. Disruption is caused by siltation or burial of irrigation canals, exposure and damages of water supply pipes. Such situation may lead to inconvenience to rural population in terms of carrying out their routine lifestyle due to disruption of facilities. This can potentially cause social conflicts and will affect smooth progress of works.

g. Potential Impacts and Conflicts associated with Road Construction Work Forces

- Occupational Health and Safety (OHS) of workers is an important issue during construction. The occupational health and safety concern arise from the operation of stone crushing, bitumen use, operation of earth moving equipment, use of blasting materials, and all other construction activities. Accidents may occur during the construction and operation of roads causing injuries or loss of property and life. Some common reasons for accidents in rural road works include unsafe excavation, collapse of trenches, injuries from unsafe tools/equipment, lack of protective clothing, debris falling from hill slopes, inappropriate disposal of construction and campsite wastes, electric failures, etc. OHS can only be maintained by stringent awareness training through the contractor, and by providing adequate medical arrangements ready in case of emergency, including provisions for fatal accidents and invalidity. Similarly, OHS issue also covers the quality of living space, facility of clean drinking water, sanitary practices with toilets and solid waste management system etc. within the labour camps. Dust raised by construction activities and blown by air may pose health risks to the workers and inhabitants near the road alignment. Construction practice should employ dust control practices/measures and construction activities should be scheduled taking this into account.
- Vector Diseases is another common problem associated with the sudden influx of work personnel. Gathering and contacting local people may lead to transmission of infectious/communicable diseases. Disease transmission is facilitated by the migration of people, particularly among migrant labourers. If proper sanitary conditions are not maintained in the camps, it may create pool of waters and pile of waste which will attract vermins and vector diseases. Such vectors and new diseases may spread to local population, who are not immune to such diseases. Stagnant water bodies created due to road construction such as borrow-pits and quarries may become breeding sites for disease vectors. This may contribute to increase in number and type of disease vectors and incidence of water-related infectious diseases. Increased movements of people (from or to outside) may introduce new diseases to the area (particularly, communicable diseases like Tuberculosis, cholera)
- HIV/AIDS and other STDs are of particular concern in border regions with India. Spread of these communicable diseases is one of the prime concerns associated with large construction camps. Effective countermeasures and highest level of attention are mandatory in road development projects planned in areas with highly affected HIV prevalence. Effective measures are frequent awareness campaigns, involving both the labour forces and the local communities, and regular health check-ups among both to detect and control transmission of such diseases. Such activities are to be carried out by both specifically engaged NGOs in junction with the contractors who must be obliged for such actions in specific contract clauses.
- Competition for local water supply and water contamination are other potential sources of conflicts between the work forces and local communities. Extraction of large amount of domestic use waters and surface or groundwater contamination often occurs when an influx of people associated with the road project overloads the local sanitation infrastructure, and encourages the spread of water-borne diseases. Accidents involving spillage of fuel and chemicals may pollute water source and contaminate water supply.
- Cultural and social conflicts may arise when outside workers get in contact with locals of different cultural background. Often conflicts may be associated with increased consume and availability and consumption of alcohol and

drugs. Adequate efforts should be made to maintain social harmony and co-operation among the workers and local residents. Other social issues during construction are payment to the workers/labours (in time and adequately); protection, improvement and integration of approach trails and tracks, chautaras, etc. to the road as special features; road-side new income generation activities (tea-stalls, dal-bhat shops, PCO/telephone booth, milk booth etc.); traditional activities (cultivation, porter goods).

h. Road Safety Impacts

Road safety issues naturally increase when the upgraded/new roads go into operation. Inherently, roads bear accident risks that may cause adverse effects to the individuals afflicted, and may lead to a variety of direct and indirect environmental damages. Traffic accidents because of negligent crossing or walking, undefined crossing sites, narrow road, low quality shoulder surface, poor visibility, careless driving in high speed, rushing in the roadway, lack of non-motorized lanes, inadequate traffic signs, inappropriate road standards and designs, and by natural disasters.

There are many features of a road and its associated structures which influence the risk or the severity of a road. Pertaining parameters include:

- pavement and shoulder condition, roughness and surface grip;
- presence of roadside poles, trees, ditches, steep slopes, and barriers;
- signage, markings, intersection layout;
- roadside access, parking, and bus stop arrangements;
- provision of pedestrian, cyclist and other non-motorized road users.
- traffic control and enforcement of traffic rules
- drivers behaviour and license system
- public safety awareness and educational standards
- vehicle maintenance
- road maintenance;

i. Impact on Cultural and Historical Assets

Cultural heritage is sites, structures, and remains of archaeological, historical, religious, cultural, and aesthetic value³. Cultural heritage is a particular form of expression of human values which serves to record past achievements and discoveries. It is important to assess site to understand the significance of a site, according to its aesthetic, historic, scientific, and social value, in addition to its amenity value.

Cultural and historic sites may be threatened by road construction and associated works such as excavation, filling, quarrying and spoil disposal, and unregulated/increased access to cultural heritage sites. It can destroy the sites or alter their character. Aesthetic impacts on cultural monuments and archaeological sites can occur. Road may result in illegal occupation or encroachment of the culturally and historically important areas (temples, shrines, *dharamsala*, *sattal/pati*, religious sites, *mela*, *jatra*, caves, graveyards, forts, palaces) or the land belonging to these sectors. On the other hand, the increased accessibility may attract visitors to these areas which encourage better use, care and conservation of the same.

³ Baitadi District in the far west is particularly rich in terms of religious monuments, temples and shrines. Road planners must therefore make careful assessment of such sites to avoid undesired and irreversible impacts on such heritage.

j. Impact on Landscape Aesthetics

Negative aesthetic impact can commonly result from poor design, faulty identification of likely impacts during the process of EA, and lack of commitment from responsible agencies and stakeholders. Badly designed road structures and affiliated structures. Landscape sores relates particularly to ill-designed or monitored activities resulting from borrow pit and quarrying operations, from landslides that could have been avoided, and from indiscriminate dumping of spoil material. Deteriorating aquatic systems are equally sources of reduced landscape values, especially when signs and secondary effects of pollutants become evident.

A road can be visually attractive or unsightly depending on its physical layout within the surrounding landscape and how far the attention is given to detailed designs, road-side planting and maintenance. In contrast, road design may lack aesthetical considerations when a landscape is distorted by repellent cuts, repulsive borrow pits, unused quarries, and landslides, all leading to depreciation and loss of scenic values of the site. Road induced activities may lead to the generation and mismanagement of wastes (solid and liquid) in the roadsides and create scars on the landscape. Construction of road may cause loss of or encroachment to unique geological and geographical sites (e.g. caves, karstlands, wetlands, sensitive ecological terrains), natural beauty spots and scenic sites that attract both domestic and international tourists, and sites of scientific interests.

Last but not least the right choice of alignment, taking into account the aesthetic qualities of both natural architectural and cultural sites will help to increase the attractiveness of new road development projects.

Chapter 5

5 Public Consultation Framework

5.1 Social and Economic Development and Participation Issues in SRN Sub-Projects

Development interventions in any road construction project, including those envisaged under the SRN Program, are expected to achieve positive social development outcomes such as increased social equity and social cohesion, empowerment, promotion of accountable and transparent governance, avoid gender discrimination as well as the mitigation of adverse impacts arising out of the project. Project designs are obliged to aim for sustainable environmental development and for provisions of precautionary measures for protecting the natural resources and the ecological functioning in the zones of project influence. As a whole the construction operation has to create positive social and environmental benefits in the area. In case of adverse social impacts they should not fall disproportionately on the poor and vulnerable groups which worse off their condition than they would have been without the project.

Participation mechanisms facilitate the consultative process and include information sharing, consultation with APs and other stakeholders, and active involvement of APs in project tasks, committees, and decision-making. This refers to collection of opinions from people with vested interest in the project, be it for safeguarding and improving the living standards for local communities, be it for ensuring best protection for the bio-physical and cultural environment. To achieve these goals, sharing of information on all aspects appealing to a proposed project is the foremost principle of participation. In turn, the Project Management must share with the stakeholders all aspects of the envisaged project (policies, planning, design, alternative options), and possible/anticipated impacts of the project) at the project identification as well as during planning and implementation stages. To maintain social balance and confidence with the local people, all information needs to be disclosed to the public on the project's likely positive and negative impacts, the established compensation and payment schedules, Environmental Management Action Plan (EMAP), RAP, VCDP, implementing institutions and timetable and grievances procedures.

Public participation, consultation and information dissemination in a project must be an integral part in all environmental and social impact assessment activities during the initial phases of project preparation. Concerned stakeholders will be regularly provided with information on the project prior to and during the process of IEE or EIA, respectively while the Consultants prepare the EMAP, RAP and VCDP documents as applicable.

Established mechanisms of public participation include:

- Contact representatives of line agencies responsible or social, economic, environmental, agriculture, forestry, land-use planning) in the project area;
- Consult experienced and well-established NGOs working locally in the above sectors;
- Consult researchers working in the said areas;

- Formation of committees and/or groups comprising of stakeholders at various stages of the project,
- Information campaign through media and other means
- Interviews with PAPs¹ to identify issues for resettlement, compensation and grievance redress mechanisms
- Focus group discussions, seminars and workshops
- Socioeconomic baseline survey as well provides an opportunity for consultation with the concerned public.

Specific public participation and consultation activities that should take in the project cycle with respect to PAPs are summarized in the following table:

Table 5.1: Project Stage and Nature of Participation of PAPs in the Process

Project Stage	Participation of Project Affected Persons and target beneficiaries
Project Identification	Identification/prioritization of community problems Participate in public meetings Identify alternatives to minimize resettlement Assist in developing and choosing alternative options for relocation and income restoration
Feasibility Study and Resettlement Planning	Help to choose resettlement site Facilitate/ participate in survey Participate in meetings with host population Provide suggestions to entitlement provisions Provide inputs in RP preparation Suggest mechanism for grievance redress and conflict resolution
Project Implementation	Participate in implementation process Join local decision making committees like in CDC Decide on management of common property Use established mechanisms for grievance redress Provide inputs to LCF Participation in road construction
Monitoring & Evaluation	Ensure quality of the project and activities Participate in the monitoring team
Maintenance	Participation in maintenance as employee/caretaker

5.2 Identification of Project Stakeholders and Integration of their Perspectives in the Planning and Management Process

Earlier (Chapter 1) the ESMF has already provided information (see Table 1.1) on the targeted institutions and governmental agencies who have a vested interests and also different responsibilities with regard to the proposed road development program.

On the non-governmental level, Individuals, families, social groups, environmental conservationists and research institutions with interest in the road development program are the principal stakeholders of the project. The primary stakeholders of the project are those directly affected by the road construction sub-project either as beneficiaries or as those affected by loss of property or loss of livelihood. Secondary stakeholders are intermediaries in relation to the project and not directly affected but show their concern in one way or the other in the project as a whole such as donor, implementing agency, government, NGOs,

¹ The EA teams shall ensure that a fair mix of representatives of various stakeholder groups as well as vulnerable communities will be included in the consultation process.

environmental protection agencies, civil society and private sector organizations involved in monitoring and advocacy.

The project aims to promote social development and participation of all the stakeholders during the project cycle. However, experience shows that local elites and political parties dominate in the consultation processes and their proceedings. Low caste and minority groups are largely excluded from participation by attitudes towards their status, education and wealth. The situation of women, low caste groups, the poor and vulnerable people can be particularly difficult, resulting in their exclusion from decision-making at this most basic level. To avoid this situation, the proposed sub-projects will work towards improving this situation by holding separate meetings with disadvantaged and excluded groups during both the Environmental and the Social Impact Assessment. It is anticipated that taking part in separate, NGO led, project related meetings and successful outcome of the sub-projects, will encourage these groups to take greater part in project related meetings and hence the planning process. The inputs, perspectives and recommendations of the stakeholders received during public consultation will be incorporated in the planning and management documents.

The formation of local consultative forums (LCF) is one mechanism to ensure PAP's participation in the decision making process of the RAP implementation. This group approach is a convenient way of expressing their individual and community concerns and bringing to the notice of the project management. The LCF meetings will be held as and when necessary at the local level in order to ensure the participation of affected households. Representation from PAPs and the VDC to the Compensation Determination Committee (CDC) is expected to promote ownership and reduce disputes related to compensation fixation and payment.

Local labour especially from the vulnerable and PAPs will receive priority to work during road construction and maintenance. People willing to participate in the construction work from the PAPs and vulnerable communities will be organized in RBGs. At least 30 % of employment will be reserved for women. The NGO will be responsible for monitoring local labour employment. It will also ensure that women are adequately participating and fairly paid for similar type of work like men, and that child labour is being avoided.

5.3 Screening Framework involving Participatory Approach

To assess the precise nature and magnitude of social impacts, environmental and social screening involving local stakeholders to the degree possible will be carried out as part of the feasibility studies for each sub-project. To ensure consistency in the application of screening criteria, standard formats will be used for both aspects. As for the screening format for environmental impacts, reference is made to previous Chapter 2 of this ESMF.

The standard social screening is based on current Department of Roads (DoR) screening guidelines for environmental and social impacts. Social screening will identify the potential for loss of land, assets/structures, livelihoods, and other significant social impacts. Social screening will also enable the categorization of sub-projects based on their level of social impacts. Where the extent of adverse social impacts is minor and no displacement or loss of assets or livelihoods is expected, no further action is required. However, where the social screening indicates that land acquisition and/or loss of assets is unavoidable, and there is adverse impact on PAPs including vulnerable communities, then appropriate resettlement action plans as well as vulnerable communities development plan will be prepared in accordance with the provisions of the framework for resettlement and for vulnerable groups development. During the social screening

process, information will be shared on preliminary project design and resettlement related impacts. Furthermore, alternatives will be explored through consultations to minimize resettlement and adverse social impacts on PAPs and vulnerable groups.

5.4 Public Disclosure of Information

Most often a development project, including its socio-economic and environmental setting, fails due to lack of information or misinformation. For the success of a given program the management must share all information obtained about the proposed activities and their expected results with the affected and/or interested public. Information dissemination in a project begins with environment and social impact assessment activities during the initial phases of project preparation. Through respective local authorities and NGOs, APs should be regularly provided with information on the project and the resettlement process prior to and during the RAP and VCDP preparation and implementation stage. Agencies working for nature conservation or other ecological aspects should also be informed at both local and national level about the ongoing and planned activities, to identify jointly appropriate protective or corrective measures.

For the forthcoming SRN program, it is recommended to adopt the following methodological approach for disseminating project-relevant information to the public general:

Distribution of the project documents: A series of project related information materials in Nepali version will be distributed prior to each construction work in the proposed road projects to local officials, LCFs, PAP and other concerned. Such information includes entitlement frameworks various periodic information sheets on compensation entitlements, project time frames etc.

Workshops: A series of scheduled RAP and VCDAP workshops will be held in the sub-project sites for information sharing with the target beneficiaries and stakeholders concerned.

Mass media: Local media Project related information will be also broadcasted through local radio/FM, TV and newspapers

An information centre will be established during the implementation stage to disseminate all the documents related to the project and its activities. The centre will be accessible to any person interested/concerned to the project.

The project proponent, together with the donor agency's own policy on public information disclosure, will develop and update a website and put the findings of the EIA, IEE, SIA, RAP, VCDAP and other relevant information in the Internet.

5.5 Establishing a Collaborative Partnership Mechanisms between Communities, Local Authorities and the Project Management

To reach the local communities and to ensure maximum employment among local population, as well as ensuring the inclusion of vulnerable groups and women in the income-generating process associated with the road construction works, each sub-project will establish mechanisms and structures to involve all project-affected people and stakeholders.

At first stage before contractors will move into the area, the Social Assessment Teams preparing the SIA need to conduct a local labour availability survey, producing a list of wo/men from the each ward/road section willing to work in road construction. The survey shall also assess the level of skill available among the local communities. Skilled labour will be given priority in employment. If the labour required for the work will be insufficient in the local area, outside labourers will be

allowed to meet the shortfall only. It is proposed from the past practices that at least 70 % of the labour should be reserved for the PAFs in particular and local population in general. Public meetings will be held that explain this strategy and demonstrate the job opportunities to the local population. This arrangement will promote local economy and help PAFs and local community to gain skill related to road construction and maintenance. This will also increase feeling of ownership over the road and will ensure maintenance assistance in the future.

The Project Proponent will then engage qualified NGOs or CBOs who will be responsible, throughout the construction period, for community mobilization and facilitation of employment. The mobilization and facilitation activities will include a number of awareness and skill training programs that will put the potential work candidates in a better understanding of the works requires, and the risks and opportunities associated with such work. Specific awareness aspects will relate to environment protection, agriculture, health, STDs and social conflict avoidance.

Specific attention will be paid to the following principles while generating income opportunities for local people:

a. Empowerment

Empowerment is the process of transforming existing power relations and of gaining greater control over the sources of power. Empowerment builds people's capacity to gain understanding and control over personal, social, economic and political forces to act individually as well as collectively to make informed choices about the way they want to be and do things in their best interest to improve their life situations. Empowerment can occur in economic, socio-cultural, political, legal, inter-personal and psychological dimensions. Empowerment of the LCF, PAFs and the vulnerable families will lead to increased self-confidence and broaden their social capabilities, including quality of life as education, skills, health, access to safe water and sanitation, information and communication.

b. Avoidance of Gender Discrimination

There are ample opportunities and practical means to address gender issues during the public consultation process for the planned sub-projects. Women will be fully informed of the process and procedures of resettlement, as well of the chances and rights they may want to enjoy from forthcoming job opportunities. Contractors need to be made liable to observe gender quota in awarding jobs to unskilled labour. Earning income will raise women's status in the home and in the community, and encouraging savings will enable women to retain control over a small proportion of their income and resources. Unfortunately, gender discrimination against women is deeply rooted in Nepalese society. Existing social norms and values have discriminated Nepali women of all background. At each level of the caste system and within all ethnic groups, women are more disadvantaged than men. Stereotyped roles, limited access to education and skills/vocational training, discriminatory wage rates, legal discrimination, and deprivation of the rights to property are some factors that negatively affect women's participation in the development activities.

Gender norms and practices vary among different cultural groups in Nepal. *Janajati* women are generally known to have greater freedom and decision-making at the household level than the 'high caste' Hindu women. But in terms of accessing state resources like education and employment, *Janajati* women lag behind 'high caste' women. The literacy and health status of *Dalit* women is by far the worst. Hence, resettlement policies and programs should take account of the diversity in status of women within Nepal and consider different positions and conditions of women based on income level, marital status, caste, ethnicity, culture and geographical location.

The SRN program shall therefore make efforts to gradually mainstream the gender equity issue at all stages of project cycle (need assessment, project planning/design, implementation, monitoring and evaluation). This strategy will involve the assessment of existing roles and responsibility of men, women, boys, girls, elderly, disabled and widows, single mothers etc and increasing their participation and ownership in all stages of project cycle.

More specific, the strategy will target primarily disadvantaged women, such as single woman, widows, or women in polygamy marital relationships within and outside a household. Women-headed households would be given special priority in resettlement packages. Appropriate capacity building programs² would be introduced to increase participation and receive valued inputs from women themselves.

c. Education on Worker's Rights and Grievance Resolving Processes

The work candidates will also receive appropriate information on their rights with respect to health care, remuneration and payment conditions. A specific grievance and complain mechanism will be established to ensure the addressing of claims brought forward by the engaged workers.

Poor, lower caste women and those from indigenous and tribal communities will receive preference in selecting wage labourers. Observing (caste-wise) gender quota (suggested is a minimum of 33% in the overall employment of unskilled labour) will help these women to participate and benefit from the project and to alleviate their status of poverty. Such reservation is proposed to keep at least 33 percent for women. A locally contracted NGO will be responsible for monitoring local labour employment to ensure that female participation in construction work are maintained and that child labour is avoided.

The consultation process shall provide full information and explanation that not only equal access to employment opportunities are maintained, but that equal wages will be paid for similar work for both men and women. Contractors shall also be obliged to make payment in frequent and agreed intervals, equally to both men and women employed. Payments schedules and amounts need to be continually monitored by NGOs and CBOs to ensure that both men and women receive the payments they are entitled to, and at schedules specified in their contract.

5.6 Public Consultation throughout Project Cycle to Secure Support

Consultation helps identify impacts, sources of vulnerabilities, the households and groups likely to be affected and appropriate measures to address appropriately. Similarly, because the APs know their economic, social, and bio-physical surroundings best, consultation is useful in formulating environmental mitigation measures or resettlement options that balance the APs needs and capabilities with the technical requirements of the options. In carrying out public consultation, a number of advantages for smooth project implementation will be secured which are briefly discussed hereunder:

The project-affected communities should be continually consulted by the Project Management (including supervision and monitoring personnel) to identify upcoming needs, constraints and priorities and discuss success/mobility needs as well as the levels and kinds of services needed, or what kind of environmental corrective measures need to be pursued during the different phases of the road

² Similarly, emphasis is given to include women representatives in the Committees for Land Acquisition and Compensation (CDC), who can rightfully assess and calculate resettlement effects on women and children.

development activities. As such consultation becomes a two way transfer of information or joint discussion between project staff and the project affected population (APs). Consultation provides some of the detail that planners cannot or may not foresee. For example, land acquisition and displacement often generate a wide spectrum of impacts, even within the same project. Similarly, gender discrimination may easily be overlooked if not explicitly embedded both in the public consultation and the monitoring process of a given project.

Public consultation is also a viable instrument to addressing AP's anxieties and to secure their support. Communities of the proposed project may be anxious that they will lose their property or livelihoods due to the land acquisition or activities that may hamper their production (e.g. fisher folk may lose income as catches will diminish due to increased sedimentation rates in the fishing grounds, resulting from ill-managed spoil disposal). Participation in planning and managing the project activities might help to reduce such fears and will give the consulted persons equally the opportunity to participate in key decisions. Thus they will both understand and support better the proposed measures, particularly when viable income alternatives can be offered. In other word, a frequent Public Consultation that will give due account to the concerns and perceptions of the affected persons will be the best way in creating a feeling of ownership among the people, particularly when they gain the confidence that their concerns and suggestions forwarded are taken into consideration in the design and the construction. Only then the local communities will collaborate and support the beneficial aspects and measures of the project(s).

In addition, local people must receive adequate feedback for imposed corrective measures: One of the effective mechanisms of continued consultation with the project communities also could be public audit to conduct at a regular interval during implementation and operation so that project beneficiaries are informed timely on the project activities, and are invited to provide feedback for further improvement.

In contrast, project activities implemented without (adequate) public consultation may lead to undesired counter-actions (e.g. opposition or blockage of works, theft, delays, cost increases, penalties), social disturbance and eventual crime. With proper and timely consultation, initial opposition to a project may be transferred into constructive participation. In addition, providing continual information on the project and, at the same time, asking the public for constructive suggestions will eventually make the local communities ready to feel the ownership and support the beneficial aspects of the project.

Chapter 6

6 Environmental and Social Impact Mitigation Measures

6.1 Introduction

This Chapter presents a set of technical aspects to guide planners and contractors to cope with typical environmental and social impacts as they are likely to occur in the forthcoming SRN road development program. The Chapter is organized to provide the framework for the planners and practitioners of the EAs while considering typical mitigation measures as they occur in the chronological sequence of road development projects in Nepal.

It is also attempted to give guidance in elaborating credible, feasible and cost-effective actions to implement the proposed mitigation measures, and how to ensure that these actions will later be implemented in the desired manner. While doing so, this framework presents practical and proven methods to maximize the beneficial impacts, and at the same time to avoid or minimize adverse impacts. The mitigation measures basically follow common-sense approach that aims to viable, practical, and cost effective solutions, which in turn would supplement its environmental and social sustainability. As such, four approaches are pursued: preventive measures, seeking alternatives, undertake corrective measures, and arrange for compensation where particular impacts are unavoidable.

More detailed technical discussion on environmental principles for corrective and preventive measures in road construction works are provided in ANNEX 2 (Environmental Code of Practice).

6.2 Phase-wise Mitigation Measures for Environmental and Social Safeguards

6.2.1 During Road Design Stage

The mitigation measures adopted during design or pre-construction phases are of preventive in nature with two basic objectives: (1) avoiding costly mitigation, and (2) awareness among the stakeholders for environment protection while constructing and operating infrastructure services.

a. Route Selection

Proper selection of appropriate route for the road alignment can be one of the major preventive environmental mitigation measures. The appropriate route selection avoids or minimizes the environmental degradation primarily in terms of loss of flora and fauna, minimum or no slope instability or soil erosion, disruption of water bodies, minimum loss of fertile cultivated land, no loss of valuable personal properties etc.

Adequate measures should be taken while surveying to avoid forests, sensitive habitats, cultivable lands and settlements while carrying out alignment section or designing geometrical improvements or widening of road.

b. Detailed Survey and Design

At this stage, the survey consultants shall conduct a census survey and assess the potential impacts and losses on properties and lands, and establish the baseline data for compensation. The detailed survey and design shall include all possible preventive measures to avoid or minimize slope instability, disruption of water systems, minimize disturbance to settlements, minimize forest loss, and affecting cultural assets and the aesthetic value of the landscape.

The design shall adopt the labour-intensive approach, minimising/avoiding blasting and use of mechanized method, as far as practical. Bio-engineering can be used for slope stabilization in an environment friendly manner, and plan for using local resources and manpower. More details, see ANNEX 2.

c. Inclusion of EMAP requirements in BOQ

To become effective and verifiable, all provisions mentioned in the EMAP should be reflected in the Bill of Quantity (BOQ) explicitly while issuing Tender Document for the Contractors. The contractors must clearly quote these activities in BOQ rate, and provide beforehand any comments in case of opposing these clauses.

6.2.2 During Construction Stage

(i) *Benefit Augmentation Measures*

a. Increased Income and Employment Opportunities

The road construction work will use large numbers of man-days of unskilled local labourers. All sub-projects under this SRN Program will follow prescribed principles as outlined in Chapter 5. This will increase the individual live standard of the selected beneficiaries and enhance the local economy. The coordination for local employment arrangements will be facilitated by NGO/CBO as well as through local authorities as applicable. Supplementary activities and programs might be considered that will equally be facilitated through contracted NGOs, e.g. access to micro finance, cooperatives, cottage industries and diversification of crop and non-farm products.

b. Enhancement of Technical Skills

During the road upgrading works, the local labourers will be given training in road, soft engineering structures construction and bio-engineering works. This can help them to find job as skilled workers in future projects as an alternative occupation in addition to agriculture.

c. Enhancement of the Local Economy

During construction, there will be large number of people and construction crew working in the area. Consequently, there will be large demand for consumable goods and local products such as vegetables, poultry and dairy products, cereals, and fish. Small food shops and tea stalls will be in demand. The proposed enhancement measure is to facilitate the process where local people may be willing to obtain micro-credits to start some enterprises.

(ii) *Adverse Impacts Mitigation Measures*

(1) Impact Mitigation relating to the Physical Environment

a. Addressing Changes in Land-use and Loss of Land

Many problems associated with the loss of valuable land may be avoided by choosing the right alignment and reducing the area of ground clearance. In cases

where loss of land is unavoidable, appropriate mitigation measures shall aim at increasing the production of the remaining land

- Applying specific/additional protective measures that the remaining land will not be lost due to erosion and other detrimental effects (caused or not caused by the road development)
- Improving agricultural extension service
- Improving/widening forestry extension services to increase productivity and NTFP diversification in Community Forests
- Increase nature and wildlife protection measures
- Give due consideration in spoil deposits to avoid secondary impacts on soils and aquatic systems
- Choose good sites for compensatory plantation in response to the vegetation cleared due to construction works.

b. Coping with Slope Failure and Erosion

Good practices and prevention measures to cope with erosion and associated problems are :

- Minimizing the area of ground clearance
- Avoiding sensitive alignments, such as those which include steep hillside, erosion prone areas
- Balancing filling and cutting requirements through route choice, so as to avoid the production of excess spoil material and reduce the need for borrow pits
- Choose the best work period to limit risks of erosion- avoid rainy season
- Avoiding previously contaminated sites
- Avoiding the creation of cut spots and embankments which are of an angle greater than the natural angle of repose for the local soil type,
- Protecting trees and vegetation in the road alignment vicinity and re-vegetation of cut slopes as soon as possible.
- Maximum destruction to the vegetation in the right of way.
- Replanting disturbed areas immediately after disturbance has stopped, not after construction has been completed, and their maintenance, and
- Drainage improvement to control location, volume and speed of water flows in water courses in the vicinity of exposed soils and slopes.

Bio-engineering methods should be employed to the maximum extent possible to protect slopes¹. Replanting cleared areas and slopes is the most effective action to be taken in reducing erosion and stability problems. It should be undertaken as early as possible in construction process, as soon as the soil becomes stabilized and before erosion becomes too advanced. The benefits of such bio-engineering solutions are:

- Catch and retain material moving over the surface;
- Armour the surface against erosion and abrasion by intercepting raindrops (leaves);
- Reinforce the soil profile by increasing its shear resistance (roots);
- Drain the soil profile by drawing water out through the roots and releasing it to the air by transpiration; and
- Facilitate infiltration of water through the soil profile, thereby reducing the proportion of water flowing over the soil surface (roots).

¹ For detailed application of bio-engineering solutions, reference shall be made to the following guidebooks:

- (1) Roadside Bio-engineering Site Manual and Handbook, 1999, ODA
- (2) "Vegetation Structures for Stabilizing Highway Slopes - A Manual for Nepal", DoR
- (3) Maintenance of Roadside Vegetation, 1999, MoPPW/ DoR;
- (4) Use of Bio-engineering in Road Sector, 1997, MoPPW/ DoR

Re-plantation in slope locations should be carried out promptly and their routine maintenance, controlling speed and volume of water flows, and with appropriate awareness campaigns. The latter refers both to contractors, work forces, public, local extension services and livestock holders. As for the designers and planners, construction practices that are sensitive to and incorporate soil conservation aspects are to be duly incorporated in the road design. Good practice should also encourage protection of trees and vegetation in the road vicinity and re-vegetation of cut slopes as soon as possible. There should be minimum destruction to the vegetation in the RoW. The quality of 'cut and fill' mode of construction and the drainage structures is equally important.

In many cases, vegetation alone may not be enough to prevent erosive damage to slopes, and various engineering measures may be needed to complement or replace it. The use of slope retaining techniques may be necessary when slopes are unstable because they are too high and steep; climatic conditions are such that establishment of vegetation is slow or impossible; there is risk of internal erosion or localized rupture because of drainage difficulties. Well-established engineering measures for slope protection include followings:

- Intercepting ditches at the tops and bottoms of slopes.
- Gutters and spillways are used to control the flow of water down a slope;
- Terraced or stepped slopes to reduce the steepness of a slope;
- Riprap or rock material embedded in a slope face, sometimes combined with planting;
- Use of retaining structures such as gabion, cribs etc. with battered back against the slope;
- Gravity stonewall or RCC wall.

In addition there are a variety of mitigation measures at choice, such as jute netting, bamboo terracing, turfing, construction of Hessian-bag walls, dry-stone retaining walls, gabion walls, drainage ditches/works, etc. that may be used for slope protection. Change of road alignment may also become necessary at some instances. The sophisticated techniques like the use of traditional retaining walls should only be adopted in the most difficult cases when there is no other viable solution. Other precautionary measures include undertaking cut and fill activities during dry season, construction of drains and ditches to avoid the damages by water flow and the regular maintenance of the slope protection measures.

Compensatory measures to cope with erosion and associated problems are:

Topsoil (15 to 25 cm top layer) is an important natural resource that needs to be preserved to the extent possible. It takes a long time to form a layer of topsoil, and is therefore high priority is accorded to the conservation of the soil during road construction. Topsoil must be carefully stripped separately from subsoil and collected from area of excavation and stored at a designated safe place for later use. It should be stored with protective measures, including covering, making bund and drainage around the stockpile etc. It should be reused to reclaim land, form a cover layer on spoil disposal and landscaped areas, reclaimed land, slope of embankments prior to turfing or replanting or developing as farmland. This way, the productive area lost can be compensated to some extent. Other measures may include remediation of soils whose productive capacity has been reduced during the construction phase, for example by using a subsoiler to break up hardpan produced by compaction with heavy equipment.

c. Addressing Destabilisation of Slopes

Due to the complex interaction between water, soil, fragile geology, seismic events and topography, common features particularly in hilly regions of Nepal are slope failures, landslides, and mass wasting. These factors can easily be further aggravated by road construction activities such as earth excavation, namely in unstable zones, drainage works, quarrying and spoil disposal. Practical mitigation measures are at hand such as:

- First, design the road with optimum balance in cut and fill with good positioning of road and good construction supervision;
- Second, do not undertake road construction during peak rainy season.

In mountainous terrain, gradual widening, i.e. construction of narrow track of typically 2 m width in the first year and widening later, provides opportunity to natural stabilization of the slopes and growth of vegetation during rainy season. This helps to control slope failure and soil loss in the hills and mountains;

The high geometric standard of highways and feeder roads of DoR/GoN is difficult to achieve in many areas with irregular terrain. Although the main slopes are often massive, there is very often a micro-topography of spurs and re-entrants which make it difficult to achieve the geometric standard without a considerable amount of slope cutting. Older roads such as the Tribhuvan-Rajpath and the Kathmandu – Trishuli road, built to a lower geometric standard demonstrates how this can be avoided at the expense of travel speed and comfort.

e. Precaution Measures during Slope Cutting Activities

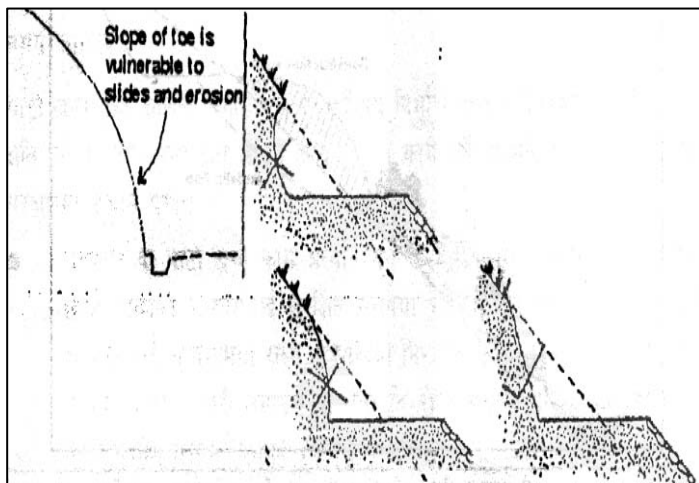
Slope cutting should be done based on the natural type of material, and natural slope should be maintained. Following Table 5.1 presents the general angle of slope cutting in different types of geological characteristics.

6.1 General Guideline for Slope Cutting Table

Type of Material and Natural Condition	Angle of Cutting (vertical : horizontal)
Loose clay and vulnerable geology	2:1
Compacted soil with slope towards road	4:1
Soft rock	6:1
Hard rock	8:1

It is mainly the slope of toe that is vulnerable to slides and erosion. Thus, appropriate measure must be adopted while cutting the slope, as pictorially presented below.

In cut areas, the exposed slope should be protected using conventional civil engineering structures in conjunction with bio-engineering techniques. It is also advised to do minimum damage to vegetation during construction. Exposed slopes should be planted with suitable vegetation as soon as possible using previously stockpiled top-soil.



All areas susceptible to erosion, such as cut and fill areas, shall be protected by either temporary or permanent drainage works. Measures should be taken to prevent ponding of surface water and scouring of slopes. Newly eroded channels should be backfilled and restored to natural contours. Where crossing unstable terrain is unavoidable, minimize the road width for the section affected to reduce disruption to the slope. Pay special attention to drainage and leave a temporary road surface until a stable condition is achieved.

e. Avoiding Hazards due to Unsafe Spoil Disposal

Construction work implies that extensive excavations will be carried out to prepare for the RoW. Spoil should be well managed with appropriate terracing at appropriate locations. Spoil should be managed adopting the following principles and methodologies:

▪ Preventive Measures:

Careful selection of the road centre line by adjustment up or down the slope should aim to achieve balance between cut and fill within a reasonable haulage length. Alignments on ridges are considered to be best alignment avoiding excessive excavation. Other suitable options include to balance cut and fill for minimizing spoil generation, and to use phased construction techniques.

▪ Mitigative Measures:

- Wherever possible, use surplus spoil to fill eroded gullies and depressed areas.
- If feasible, spoil material may be disposed in abandoned quarries and borrow pits as means to help restore original contours.
- It is advised to use the excavated materials for reclaiming the degraded land in near vicinity in consultation with local communities on their preferences.
- Never dispose spoil on fragile slopes, flood ways, wetland, farmland, forest areas, natural drainage path, religious and culturally sensitive sites, wetlands, canals and other infrastructures.
- Acidic and saline spoil shall not be spread onto agriculture land.
- Never dispose spoils on areas that will create inconvenience to the local community or it will deprive the livelihood of people.
- Spoil material may be discharged to a landfill that is constructed using a series of small spoil benches to prevent slope overloading;
- During disposal, place the spoil in layers of about 15 cm and compact each layer at optimum moisture content,
- After the disposal, the site should be landscaped, provided with proper drainage, plant with vegetation, and provide adequate protection against erosion and scouring.
- Spoil should not be disposed in rivers, lakes and water bodies;
- Exposed areas should be planted with suitable vegetation at the earliest opportunity following the GESU/DoR Manual on 'Vegetation Structures for Stabilizing Highway Slopes- A Manual for Nepal'.

▪ Compensatory Measures:

- Provide adequate compensation to land and property damaged by spoil storage and disposal;
- Use well-covered spoil to build community facilities like playground or park by reclaiming land in public area;
- Use spoil in local road net and embankment construction works.

f. Avoiding Hazards due to Water Flow Diversion

As discussed in Ch. 4, construction work for roads often implies water flow diversion, with a number of induced sequential secondary impacts on both the bio-physical and socio-economic environment (e.g. fisheries). Adequate mitigation measures are therefore of paramount importance to ensure environmental soundness of such projects.

- Preventive Measures:

- Avoid alignments which are highly unstable fragile zones susceptible to erosion, and landslides;
- Avoid alignments in the close vicinity of wetlands and sensitive water bodies;
- Wherever possible, drainage structures should be designed and constructed to have minimum interference with and impact on the natural drainage patterns in the area;
- Avoid surface water discharge onto farmlands or risky locations. Always consult local communities regarding location of drainage outfalls. Provide adequate protection measures like apron and walls at the disposal points to prevent scour and undercutting.
- Do not divert water away from a natural watercourse unless it is absolutely necessary or otherwise environmentally desirable;
- Avoid blockage or diversion of natural channels due to construction of road embankment and disposal of spoils

- Mitigative Measures:

- Provide suitable water management and gully protection works, e.g. check-dam and bank protection, in the affected areas. In the hills and mountains, it is often necessary to extend these measures well outside the right of way, typically up to 500 m.
- Flow speed control: Protect, conserve and promote ground vegetation including use of grasses (turfing) or replantation of trees which absorbs surface run-off, reduces overland water flow speed and provides protection against erosion. Structures like riprap and other devices in water channels and dispersal structures in main drains reduces water speed and can substantially reduce potential impacts at their discharge points;
- Paving: section of gravel roads prone to erosion and likely to be a source of sediment can be paved to reduce amount of sediment produced. This is especially relevant near water crossings.

g. Avoiding Hazards originating from Quarry and Borrow Activities

Collection of construction material may have long-term and sometimes irreversible effects, for example road-side borrow pits may pose increased accident risks, or if left unmanaged, may become filled with garbage and stagnant water being both an eyesore and source of breeding ground for mosquitoes and other disease vectors.

- Preventive Measures:

- Always select sites which will not result in slope instability, erosion, disruption to natural drainage patterns, river bank cutting, destruction to forest/vegetation, damage to farmlands or other social economic cultural resources.
- Borrow sites should be located away from cultivable lands and settlements, drinking water intakes;
- Quarry and borrow pit should be located in structurally stable area, even if some distance from construction site. In long run, unsound quarries and borrow pits can promote slides and further aggravate maintenance and traffic flow resulting in higher overall costs.

- Quarry and borrow pit location shown in design documents are provided only as a guide. It is the Contractor's responsibility to verify the suitability of all material sources, and to obtain the approval of the Engineer. If possible, seek borrow pit locations not immediately adjacent to the road shoulder.
- The sustainable rate and total amount of extraction from the sites should be assessed.
For both quarries and borrow pits, locations should be selected in consultation with local residents and water users and ensure that irrigation intakes, water intakes, bunds and local fishing areas and activities are not adversely affected.
- Educate local communities not to use abandoned quarries and borrow pits as garbage dump sites, and alert them on the inherent health risks when doing so.
 - Mitigative Measures:
 - Extraction of sand and stone from seasonal rivers should be avoided due to the impact on complex flood hydrology, which can result in much more serious storm floods.
 - Extraction of stone and sand should be spread over the longest length possible so that no section of river bed is excessively disturbed;
 - Clearing of trees and other desirable vegetation should be discouraged. Only those trees which are absolutely necessary to operate the sites should be cleared;
 - If clearing of trees is needed, then the cost of replanting and maintenance for a 12-month period should be included in the Bill of Quantities. As an alternative, the contract for replanting and maintaining the trees can be awarded to local communities, people or NGO;
 - Stripped material shall be stored so as to not disrupt natural drainage and shall be protected to prevent erosion and migration of soil particles into surface water.
 - Temporary ditches and / or settling basins should be dug to collect runoff water and to prevent erosion and contamination of surface water;
 - The undesirable ponding of water shall be prevented through temporary drains discharging to natural drainage channels;
 - In case ponding takes place, at the time of decommissioning the site, insecticide spraying may be considered to combat water-borne disease vectors.
 - Extraction locations should not be near bridge and river training structures;
 - Location of extraction should be selected where there is little fine material to be carried downstream;
 - The site should be restored after completion of construction activities, and left in stable condition without steep slopes;
 - If possible the sites should be filled, final surface should be graded to provide surface water drainage, stripped material should be spread to stable contours in order to promote percolation and re-growth of natural vegetation, and also planted with vegetation to provide protection against instability, erosion and scouring;
 - The restored site should be drained, and no standing water shall remain. Stagnant waters become disease vectors breeding site and pose threat to public health;
 - The sites must always be closed and restored in a planned and appropriate manner to suit local conditions and in consultation with the concerned owners and/or community. It should be done before spreading equipment is allowed to leave the site;
 - Apply proper fencing so nobody can deposit garbage and other waste material in the decommissioned sites.

- Land utilized for river bed extraction and quarry site access roads should also be restored, as applicable;
- Exposed areas should be planted with suitable vegetation at the earliest opportunity, and the contractor shall follow the recommendations specified by the staff of GESU/DoR.
- **Compensatory Measures:**
 - Provide adequate compensation to the landowner for providing his area for quarry and borrow pit operation;
 - Provide adequate compensation to land and property damaged by the quarry and borrow pit operation;

h. Address Risks associated with Stone Crushing Plants

Crushers commonly cause problems associated with air and noise pollution. Much of such impacts can be controlled by sensible technical solutions (filters, canvas) and proper site selection criteria.

- **Preventive Measures:**
 - The selected site should avoid being in the main wind direction that would carry emissions to nearby human settlements or sensitive ecological habitats.
 - Sites for Stone Crushing Plant should be located away from settlement, school, health posts/hospitals;
 - Stone Crushing Plant should be located away from drinking water sources and intakes, cultivable land and sensitive ecosystem areas including wildlife habitat;
 - The Contractor must submit a plan indicating the exact plant location, construction schedule and an operation plan to obtain approval of the Engineer before locating and operating stone crushing plants.
 - The plan should clearly mention in the technical specification the technical preventive measures to control dust, erosion protection, water pollution prevention and safety measures. These measures are compulsory to be adopted by the Contractor;
 - The Contractor must exert all efforts to supervise this work site, especially to prevent children from approaching the plant.
- **Mitigative Measures:**
 - Stone Crushing equipment should be fitted with approved dust control devices and operated in accordance with manufacturer's specifications;
 - Stone Crushing Plant should be operated only during daytime. If necessary and if requested by locals based on rational reasons, timing of operation should be planned in consultation with local communities so as not to disturb local schools, health posts, markets, settlement areas etc.
- **Compensatory Measures:**
 - Compensation for land and crops damaged due to operation of crushing plant should be given by the Contractor to the affected landowners;
 - The site should be cleaned and brought to original condition after closure and dismantling of the crusher.

i. Addressing Issues associated with Stockpiling of Materials

- **Preventive Measures:**
 - Sites for stockpiling of material should be located away from cultivable lands and settlements, drinking water intakes, public places, near school and health centres;
 - Sites for stockpiling of material should be located away from forest area, sensitive ecosystem, fragile and landslide prone slope or terraces etc.

- The Contractor must submit and obtain approval for a plan on location and mention the erosion protection, water pollution prevention and protection from dust nuisance to be adopted by the Contractor;
- The Contractor must submit and obtain approval for a plan on access to stockpile location, which must bypass school, health centres, market and other community canters to avoid risk of potential accident.
- Mitigative Measures:
 - Stockpiling of earth fill shall in most cases not be permitted during the rainy season unless covered by a suitable material;
 - Stripped material should not be stored where natural drainage will be disrupted;
 - Stockpiled material should be protected from erosion prior to rainy season, including construction of drainage, trenches and ponds around the heap;
 - As necessary, seal the area so surface water pollution does not occur;
 - Storage of material on private property will be allowed only if written permission is obtained from the owner or authorized lessee.
- Compensatory Measures:
 - Compensation for land and crops damaged due to stockpiling of materials should be given by the Contractor to the affected landowners;
 - The site should be cleaned and brought to original condition after closure and removal of the stockpile.

j. Avoiding Water Pollution

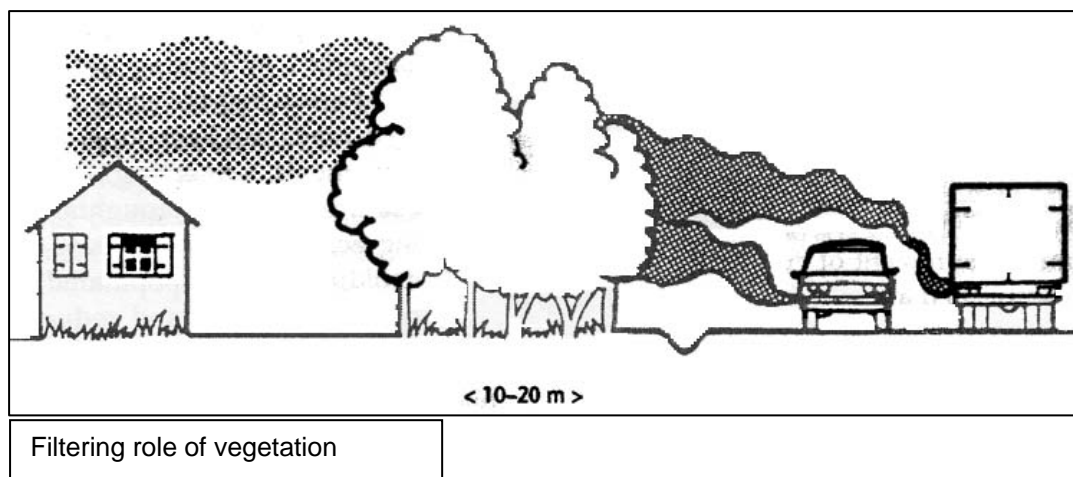
- Preventive Measures:
 - Avoid alignments which are susceptible to erosion, such as those crossing steep slopes;
 - Minimize the number of water crossings by the road, wherever possible;
 - Use only “clean” fill materials around watercourses, such as quarried rock containing no fine soil;
 - Leave buffer zones of undisturbed vegetation (width increased in proportion to slope) between road sites and bodies of water;
 - Do not dispose spoils, other hazardous substances near water sources or water bodies; and
 - Do not wash vehicle, or dispose cement slurry etc. in water bodies;
 - Enforce law and penalties to violators.
- Mitigative Measures:
 - Flow speed control: water speed reduction measures, including use of grasses (turfing), riprap, and other devices in water channels and dispersal structures in main drains can substantially reduce potential impacts.
 - Settling basins: settling basins are sometimes used to remove silt, pollutants, and debris from road runoff water before it is discharged to adjacent streams or rivers.
 - Paving: section of gravel roads prone to erosion and likely to be a source of sediment can be paved to reduce amount of sediment produced. This is especially relevant near water crossings.
 - Infiltration ditches: infiltration ditches can be used to reduce overland flow by encouraging the movement of runoff down through the soil profile. The volume of flow in downstream drainage structures is reduced, the flow of pollutants is localized, and groundwater is recharged.
 - Oxidizing macrophytes such as cattails in temperate climates can be used to remove some pollutants naturally from settling basins. Such solutions, however, shall only be pursued if there are proven records that

these species will not bloom or present competition to other aquatic organisms (such is the case of water hyacinths which rapidly become an invasive nuisance).

- Water collection, control and treatment: This is relatively expensive option for polluted runoff from pavements and slopes, but may be called for in particularly sensitive areas.
- Compensatory Measures:
 - Compensatory measure should be considered if they prove more cost-effective than mitigation or if mitigation proves impossible.
 - Moving a bore hole away from an adversely affected site, provided the local ground water distribution permits this;
 - Drilling wells for local residents who previously relied on surface water for drinking;
 - Creating a replacement habitat for wildlife;
 - Consider aquaculture development programs to compensate for losses in catch fisheries, and
 - Incorporating environmental enhancements in the projects.

k. Avoid Air Pollution

- Preventive Measures:
 - Route alignment of road away from populated areas. As a general rule, avoiding densely populated sites means fewer potential impacts and reduced need for traffic management measures;
 - Take measures to reduce traffic congestion (e.g. control encroachment on RoW);
 - By-pass can keep traffic out of settlements;
 - Pre-identify the status of air cleanliness or pollution by measuring at selected sites (near proposed alignment) by measuring pre-defined parameters (e.g. CO, hydrocarbons, NOx, dust and particulate matter);
 - ensure proper driver licensing system
 - ensure proper training of drivers
 - Ensure proper maintenance status of vehicles with respect to emissions.
- Mitigative Measures:
 - Selecting road alignments which avoid passing close to housing, school, and work places;
 - Avoid placement of busy intersections, tunnel vents and openings near housing, school and workplaces;
 - All heavy equipment and machinery shall be fitted with air pollution control devices that are operating correctly;
 - Stockpiled sand and soil shall be slightly wetted before loading, particularly in windy condition;
 - Vehicles transporting sand and soil shall be covered with a tarpaulin;
 - Dirt and gravel roads through residential areas shall either be black-topped or surfaced with bamboo-reinforced concrete;
 - Sprinkle water on sites with ongoing construction activities. On associated gravel or dirt roads thrice a day to protect road users from dust nuisance;
 - Take account of prevailing wind direction when siting roads and road features, including re-fuelling stations, near population centres;
 - Avoid steep grades and sharp curves which would promote deceleration, acceleration and shifting wherever possible;
 - Seal high-use dirt roads, where they pass through populated areas, to control dust;
 - Plant tall, leafy and dense vegetation between roads and human settlements to filter pollutants (see figure below);



■ Compensatory Measures:

- Provision of farmland improvements or more economic space for farmers whose crop options have been restricted, or whole soil has been contaminated due to movement of heavy vehicles during construction;
- Provide adequate fund to be used in additional cleaning and maintenance of important buildings and monuments;
- Improvement of local health care facilities which will aid in treatment of pollution-related ailments;
- Promote community development programs that aim at reducing indoor pollution by introduction of more efficient and less smoke-producing cooking techniques.

I. Control of Noise Pollutions

■ Preventive Measures:

- Select route alignment of road away from populated areas, school, health posts, temples and other sensitive areas;
- Take measures to reduce traffic congestion by preventing encroachment;
- By-pass can keep traffic out of settlements, near school and health centres;
- Carry out road checks to identify faulty vehicles.
- The Contractor must use good condition vehicles with appropriately maintenance and having proper silencer;
- Avoid placement of quarry and borrow pit access, stockpile access, construction sites near settlements residential areas, school and workplaces;

■ Mitigative Measures:

- All heavy equipment and machinery shall be fitted with noise pollution control devices that are operating correctly;
- Application of bituminous layer produce less noise than over worn concrete surface or open-graded asphalt or avoiding surface dressings in sensitive areas;
- Avoid steep grades and sharp bends to reduce noise during design and construction;
- Provide ear mufflers to construction crew working at high noise exposure areas;
- Use noise barriers. They are most effective if they break the line of sight between the noise source and the receptors being protected, and if they are thick enough to absorb or reflect the noise received. Various materials and barrier, façade patterns can be used to obtain maximum reflection,

absorption or dispersion of noise without being aesthetically ugly. Noise barriers commonly employed consist of earth mounds or walls of wood, metal, or concrete which form a solid obstacle between the road and roadside communities;

- Consider erection of noise barriers by planting bushes/hedges in the vicinity of sensitive road sections (e.g. in front of schools and health facilities).
- Include education of local drivers in the awareness training provided through the projects.

m. Handling Hazardous Materials

▪ Preventive Measures:

- Oblige the Contractor to present a plan for explosive, combustible and toxic materials. An appropriate and approved management plan for safe handling and storage of hazardous material must be compulsory and approved by the Resident Engineer.
- Oblige the Contractor to include in this management plan an emergency plan in case of major accidents associated with improper handling or spill of hazardous materials.
- The contractor must include fire-fighting training for labourers in his work routine

▪ Mitigative Measures:

- Hazardous materials shall not be stored near surface waters;
- All used lubricants and oil should be collected and recycled or disposed off site in appropriate manner by not causing environmental degradation;
- Hazardous materials should be stored only on impervious (concrete or plastic sheeting as approved by Engineer) floor with drainage and collection sump so as to retain leaks and spills;
- Apply sealing or binding material in case of major spills of (liquid) hazardous materials;
- Soil contamination can be controlled to some extent by using phyto-remediation by incorporating roadside planting strategies to control soil contamination problems. Some plant species render common road-derived contaminants harmless, while other species accumulate them in their tissue, making cutting plants and removing the debris for proper disposal an effective way to get rid of soil contaminants caused by operation of the road.
- Immediately inform the MoEST in case of major hazards involving hazardous material and imminent risks for the adjacent natural resources.
- Contaminated runoff from storage areas shall be captured in ditches or ponds with an oil trap at the outlet;
- Contaminated and worn plastic sheeting shall be packed into drums and disposed off site;
- The use and storage of explosives should be as per GoN regulations;
- The Contractor must install all safety and warning devices before commencing blasting operation;

▪ Compensatory Measures:

- In case where damage occurred to vegetation, due compensation plantation needs to be carried out, as directed by the local Forestry Officers.
- In case water resources get polluted, consider due compensation measures and/or payment to those having experienced losses (e.g. farmers, fisher folk, and livestock cultivators).

n. Avoiding Hazards caused by the use of Bitumen

▪ Mitigative Measures:

- The contractors must use bitumen emulsion where feasible;
- In hilly areas with steep road gradients, cut-back bitumen should be used;
- Use of fuel wood for heating bitumen shall be discouraged;
- Where heating is required, bitumen heaters should be used, fuelled by either kerosene, diesel or gas;
- Bitumen should not be applied during strong winds and rainy periods, or if rain is likely;
- No bituminous materials should be discharged into side drains;
- Nearby trees, vegetation and private property should be protected (with cloth, plastic sheets, straw) during bitumen spraying work;
- Bitumen drums should be stored at designated locations and not scattered along the road.
- Work personnel handling hot bitumen must wear all time protective cloths (appropriate shoes, gloves). Work time with bitumen should be confined to maximum 4 consecutive hrs/day to prevent respiratory hazards.

(2) Impact Mitigation relating to the Biological Environment

a. Clearing of Forest Land and Habitat Damage or Loss

Road development projects have manifold direct and indirect (induced) impacts affecting the ecological conditions in the zone of influence at various time and space extent. This holds particularly true for aquatic systems where project-induced impacts are often noticed at much further distance and time lapse. Road projects also bear the inherent risk of attracting and accelerating illegal timber extraction if not strictly controlled.

▪ Preventive Measures:

- The likelihood of serious environmental impacts on forest land or on aquatic systems as a result of road projects can be reduced by:
- Sensitive natural environment areas should be identified early in the planning process so that alternate routes and designs may be considered. Therefore consult forestry and land-use maps, as well as local/regional development plans;
- Wherever possible, road developments should be located more than one kilometre away from sensitive areas to avoid severe impacts on flora and fauna;
- Establishment of barriers to control entrance to forest areas;
- Strict implementation of environmental work code.
- Preparation of land-use plan that incorporates environmental sensitive locations of at least the environmental corridor and strict adherence to the same can help to preserve the forest and wildlife.
- To protect aquatic resources, provide for designated sites for disposal of oil/grease/chemicals,

▪ Mitigative Measures:

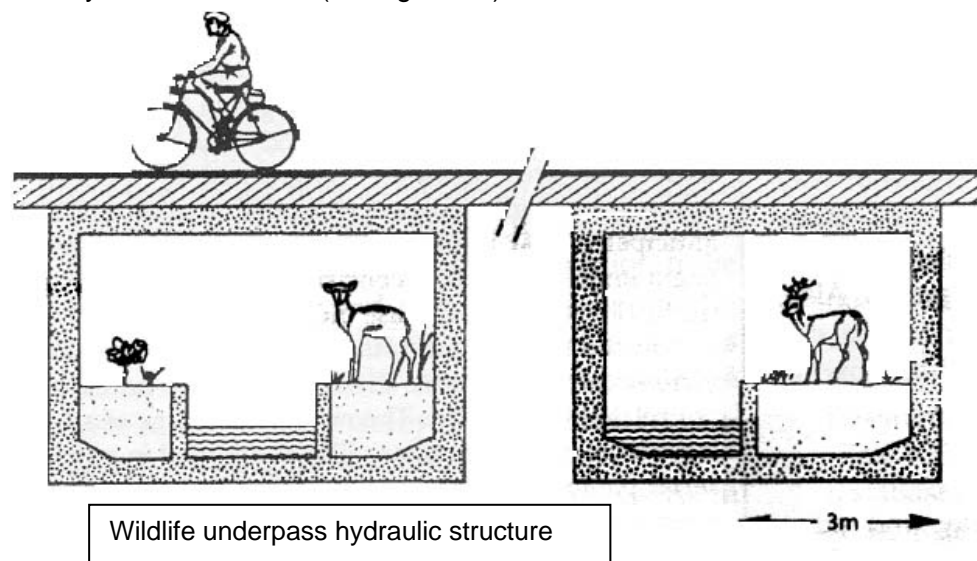
- Clear trees only when absolutely necessary. Trees falling in right-of-way but not on formation width need not be cleared, rather consider new plantation of selected (non-exotic) species;
- Planting in road right of way, adjacent areas and other public areas in consultation with local people can help to support local flora and fauna. In some cases, compensatory planting in locations away from the road impact zone may provide additional habitats and migration routes for local animals, while also guarding against erosion;
- Compensatory plantation should be done in the ratio of 1:25 for each cleared tree, as per decision of the Department of Forest.

- Border plant species need to be chosen for resistance to wind or fire in some areas;
- Planting should be done wherever possible with native species, which are likely to require little maintenance and may prove beneficial in maintaining ecosystem integrity;
- In cases where non-native species of plants are deemed essential, careful monitoring should be planned, to ensure that they do not compete too successfully with native species and spread uncontrollably.
- To protect aquatic resources, provide precautionary mechanisms to avoid accidental spills, controlling of open-field defecation by work staff and restrict access and amount to drinking water sources other than agreed with local communities and entitled users.
- Stream re-channelling should be avoided as much as possible, but where it must be done, efforts should be made to recreate lost channel diversity;
- Careful attention should be paid to erosion control techniques near watercourses;
- Culvert crossings should be designed with the needs of migratory aquatic species in mind;
- Baffles might be installed to slow the flow enough to allow fish and others to swim against the current and culvert bottoms should be set below the level of stream bed;
- Pre-development streambed gradients should be maintained wherever possible;
- Destructive fishing technique by the labour-force and technicians, such as use of dynamite, fish poisoning and application of gill and electro-fishing shall be strictly prohibited during project implementation period.
- Supply meat and fish by contractor to the labour force and construction areas from outside the project area, as possible.
- To prevent the introduction of invasive species (by work personnel, supply trucks and machinery used), the project should make adequate provisions and control mechanisms. Visual control for invasive species (e.g. pests, rodents, spoiled vegetables) and adequate destroy mechanisms shall be put in place.
- Compensatory Measures:
 - Replacing damaged or lost biotopes with others of equal or similar characteristics and ecological significance as compensation for lost ecosystem and biodiversity.
 - Ecologically valuable biotopes damaged by roads can be restored, and nearby biotopes of the same significance can be protected as parks or reserves.
 - Compensation for lost fish diversity and reduced fisheries production can be compensated by stocking nearby or other fishing grounds with artificially hatched/reared fish fries and fingerlings. Thus, impediments of the livelihood of fishermen families could be eased or set off.
 - For compensatory aquaculture measures it must be strictly prevented to consider the introduction of exotic species (such as Nile Perches, *Tilapia*) since these may put the local and indigenous fish fauna and the entire ecosystem balance at hazard. Any compensatory fish stocking must follow a thorough feasibility analysis and assessment by the regional fisheries extension services or experts before adopting this measure.

b. Avoiding Habitat Fragmentation

- Preventive Measures:
 - Water crossing should be minimized, and buffer zones of undisturbed vegetation should be left between roads and watercourses;

- Major roads should not be constructed through national parks or other protected areas.
- Mitigative Measures
- Road cross-section should be appropriately planned so as to reduce impacts on the environment. Using narrow widths, lower vertical alignments, smaller cuts and fills, flatter side slopes and less clearing of existing vegetation should be adopted. Narrower rights-of-way and lower vertical alignment may make crossings easier for animals that find roads a physical and psychological barrier;
- Animal crossings can be used to assist the migration of animals. At important crossing points, animal tunnels or bridges have some times been used to reduce collision rates, especially for protected or endangered species. Tunnels are sometimes combined with culvers or other hydraulic structures (see fig below).



These measures are expensive and should be used only at a few locations where they are both justified (by the importance of the animal and population and the crossing route) and affordable (relative to the cost of the project and the funds available).

In forest areas, particularly tropical forest, reducing the width of vegetation clearance in selected areas may allow trees to touch over the roadway, providing a means of crossing for canopy dwellers.

c. Control of Illegal Harvest of Forest Products and Poaching on Wildlife

The large size of labours will basically depend on forest products for their energy requirement, if not provided alternate fuel for cooking and heating. Without strict control and management, labourers are likely to collect the fuel wood from the nearby forest.

- Preventive Measures:
- The Contractor documents must include provisions to restrict work forces with regard to forest product and wildlife collection and trade.
- The contract documents must include provisions to should instruct or arrange alternate energy such as kerosene, LPG and micro hydropower for labour by making provision in contract document should be minimized, and buffer zones of undisturbed vegetation should be left between roads and watercourses.

- Mitigative Measures:

- The Contractor must prevent illegal cutting of forest wood by labour force should. He is also liable for penalties to violators.
- Equally, collection of non-timber forest products (e.g. bamboo, medicinal plants, mushrooms) by work staff must be prohibited and enforced.
- The project management should instruct the project officials, labour force, contractors, consultants and other stakeholder not to indulge in such activities and abide by the forest act and its regulation.
- The project should closely coordinate with Forest Office and its outlets to control illegal poaching and trapping by the project stakeholders or other outside wildlife poachers, wildlife traders and timber smugglers.

(3) Impact Mitigation relating to the Socio-Economic and Cultural Environment

a. Loss of Properties and Productive Land

- Preventive Measures:

- Make adequate provisions and compensation arrangements in the Resettlement Action Plan and the Land Acquisition Plan to satisfy and compensate all PAPs in a fair and timely manner.
- Align the road such that acquisition of productive and irrigated agricultural land (*khet*) is minimized.

- Mitigative and Compensatory Measures:

- Implement the Resettlement Action Plan, as described in Chapter 7.
- Encourage the involvement of agricultural extension services to increase local crop production and adopt better hill farming techniques;
- Encourage community development programs to increase product diversification and development of alternative livelihood activities.
- Use spoil to reclaim lowland and waste places and cover them by at least one meter of top soil to use it as agriculture field;
- Adopt compensatory plantation for lost trees, fruit orchards etc;
- Arrange/assist in food supply programs for food deficiency areas.

b. Avoid Impacts on Indigenous People

Indigenous people are commonly among the poorest segments of a population. They engage in economic activities that range from shifting agriculture in or near forests to wage labour or even small-scale market-oriented activities. The cultural, social, political and economic integrity that characterizes indigenous peoples renders their lives extremely vulnerable to disruptions from outside. Whether a road is being planned to cross an area inhabited by indigenous peoples or to open up that same area, it will have a marked effect on their lives.

- Preventive Measures:

- Align the road such that need for acquisition of communal land, house and properties of indigenous people are avoided or minimized as far as possible.
- Make adequate provisions and compensation arrangements in the Resettlement Action Plan and the Land Acquisition Plan to satisfy and compensate all indigenous and vulnerable groups in a fair and timely manner.

- Mitigative Measures:

- Engage locally operating and experienced NGOs to assist indigenous people in coping better with the new situation, to ensure social cohesion and maintenance of identity and livelihood. The NGOs shall develop programs that will specifically address the losses of traditional sense of identity, the change in the traditionally adopted land rights and use of natural resources. The programs need to take into consideration that

indigenous people often have no recognized land ownership, and they are not compensated for the land that is taken from them. Rather than fight for their rights in an alien national legal system, they may withdraw from the new population centres, thus increasing the population pressures on other, already traditionally occupied lands. In extreme instances, physical conflict can break out between new settlers and the indigenous peoples, as the latter try to reclaim their heritage.

- Address in the assistance programs specific health and social problems: The proposed assistance program needs to take into account that new arrivals of migrants, as well as the road construction crews, often bring with them serious health and social problems to indigenous groups who normally have weak defence mechanisms, for example against introduced disease, alcohol abuse, violence, sexual abuse, etc.

c. Damages to Community Infrastructure and Social Life Quality

Experience has shown that road construction activities often disrupt community infrastructures such as irrigation canals, drinking water supply systems, water ponds, schools and trails. Disruption is caused by siltation or burial of irrigation canals, exposure and damages of water supply pipes. Such situation may lead to inconvenience to rural population in terms of carrying out their routine lifestyle due to disruption of facilities. Even worse, the effects of such impacts can have serious consequences on public health and cause social conflicts. Equally, such conflicts are likely to affect any smooth progress of works.

▪ Preventive Measures:

- Make adequate provisions and identify compensation arrangements in the project's planning documents, above all in the EMAP.
- Include all identified precautionary measures in the works contracts and tailor the verification indicator in accordance to the respective specification clauses.
- The project as well as the contractors should follow established rules and regulations for work safety and health, especially with respect to those activities that bear on community life and resources (details see below next point).

▪ Mitigative Measures:

- Explore the possibilities to engage a local experienced NGO to assist in community awareness program that depicts all aspects to facilitate smooth progress of the work progress and addresses potential sources of grievances and social conflicts. The program shall also include environmental awareness to promote the people's conscience by acting as stewards for their natural environs.
- CBOs, together with local health workers, shall control and regularly monitor the quality and quantity of the water resources used by both the community and the work forces. Incidents and observations of spills, pollutants or exceptional development of the groundwater table should bring to the immediate attention of the Resident Engineer who shall direct the Contractor for corrective measures, as applicable.
- Both Contractor and representatives from the community and VDC should establish an emergency (contingency) plan in case of major accidents (oil spill, fire) resulting from construction activities.
- The Contractor shall inform the VDC and the community in due time about operations that may represent severance and nuisance, particularly to announce traffic diversions, detour routes, river barrages and blasting.
- Work activities causing air and noise emission in the neighbourhood of settlements should be avoided during night hours (8 p.m. to 5 a.m.).

- Local health workers or organizations working in the health sector shall develop community programs that will specifically address the avoidance and control of vector diseases. Commonly traditional people in remote areas lack adequate sanitary facilities and rarely are aware of hygienic requirements to prevent communicable diseases, including highly infective diseases such as cholera, tuberculosis, intestinal ailments, HIV/AIDS and other STDs. Similarly, people often are unaware of how settling pattern and avoidance of stagnant waters can contribute in the control of waterborne diseases (malaria, dengue, worms, snails). An appropriate awareness program would therefore be of significant value to cope with the potential risk of the above mentioned diseases. The program shall also include representatives of the contractor and the work forces.
- Promotion of health programs that propagate safe sex, use of condom. Local NGO/CBOs shall be responsible for distribution of condom, as well as controlling prostitution alcohol and drug abuse.
- Mobilize CBOs for local landscape improvement programs aiming at filling and draining of stagnant water can avoid or reduce chances of water-borne infectious diseases.
- The Contractors shall make provisions to maximize local employments, observe gender equity payment for similar works, strictly prevent child labour and observance of local rites and festivals. A contractor should accept, following agreement with the community, new income activities along the construction sites, such as small tea-stalls and 'dal-bhat' shops.

d. Observation of Occupational Health and Safety (OHS)

Apart from the basic requirements ensuring work safety, the Contractors shall be obliged to make adequate efforts to maintain social harmony and co-operation among the workers and local residents.

▪ Preventive Measures:

- OHS clauses established by DoR must be included in the works contracts. This refers basically the FIDIC rules for road construction works, encompassing all accident preventing measures which potentially can happen at work sites and in the camps.
- The OHS clauses are identifying adequate living, sanitary, washing and cooking conditions for the work camps.
- An approved site management and waste disposal plan is equally an integral part of the works contract.
- The OHS clauses shall make provision for insurance and indemnities, as well as payments in case of injuries, invalidity and death of workers and affected local persons.
- Both the Contractor and representatives from the community and VDC should establish an emergency (contingency) plan in case of major accidents (oil spill, fire) resulting from construction activities. Necessary planning and safety approach should be made for rescue during emergency. Local health unit and hospitals should be assisted to stay ready for emergency cases.

▪ Mitigative Measures:

- The Contractor shall inform the VDC and the community in due time about operations that bear the risk of nuisance and accidents, especially when blasting operations are under way.
- Provision and wearing of proper safety gear and clothes must be standard in all work operations.
- The contractor is responsible for provision of adequate first aid boxes, medical supply and routine medical service to all work forces. As

- necessary, he is obliged to give immediate and free of charge transport to next/adequate health facility in case of a worker is inflicted in an accident.
- CBOs, together with local health workers, shall control and regularly monitor the quality of living conditions in the workers camps as specified in the contracts. Of special concern is the provision of safe drinking water and hygienic latrines for the workers, as required, separately for men and women.
- The contractor is obliged to keep accurate records of accidents and corrective OHS measures.
- The contractor is responsible (upon advice of the Resident Engineer and Environmental Supervision Expert) for erecting signs and signal on sensitive and unsafe areas, which should be visible from long distance.
- The contractor is responsible to regularly control open defecation and pollution of water bodies by construction crews.
- The contractor is responsible for regularly training of all work forces in OHS requirements and mechanisms. He should make record on these training activities and all OHS observations, subject to supervision by DoR.

e. Avoiding Impacts on Cultural and Historical Properties

Cultural heritage are sites, structures, and remains of archaeological, historical, religious, cultural, and aesthetic value. Cultural heritage is a particular form of expression of human values which serves to record past achievements and discoveries. It is important to assess site to understand the significance of a site and to provide due protection according to its aesthetic, historic, scientific, and social value.

▪ Preventive Measures:

- Specify in the works contracts all required steps, notifications and preservative actions in case new / undiscovered archaeological or other culturally interesting items are encountered during excavation works. The clauses will specify whom to inform and how to proceed with works after the respective approval.
- Align the road such that acquisition of sites known for cultural heritage is avoided at good distance (to prevent possible damage by road-induced emissions like air pollutants, vibrations and noise).

▪ Mitigative Measures:

- The contractor is responsible for strictly instructing workers to stay away from and respect local cultural assets, to avoid any direct harm to those items or to hurt the traditional feelings of local people.
- Avoid any actions that bear the risk to destroy the sites or alter their scientific or aesthetic character.
- In case of accidental damages, the Contractor will be obliged to inform immediately the archaeological department who will then decide further actions.
- In case of accidental damages, the Contractor will be obliged to carry out immediate corrective and repair measures to satisfy the local population and, as applicable, the representative of the archaeological department.

6.2.3 Potentially Induced and Cumulative Environmental and Social Impacts after Completion of the Road Projects

(i) *Benefit Augmentation Measures*

At this stage it is not intended by the ESMF to develop further measures to increase or maximize some of the aspects discussed below. This sub-section shall rather serve as reference for development programs that might be considered for each of the regions where the SRN road development program

becomes operative. Much of the development options that come along with improved road accessibility is under the umbrella of projects that relate to social, agricultural and health aspects, all of which are not the mandate of the Department of Roads. However, which of the sectors briefly discussed hereunder will be directly or indirectly assisted by the MoPPW/DoR is not subject of this ESMF. Among the prominent elements that might be tackled in near future in the respective regions are the following

a. Improved Access to Services and Facilities

The proposed road development project will increase the Government's capacity to further deliver infrastructure to the area, through cooperation with local authorities as well as direct spin offs from forthcoming development programs which invariably require good road access. This will be partly reflected in further development of the regional road connectivity.

Beneficial aspects which are likely to be induced by the SRN roads will promote the development of regional health and education facilities, and improve the regional communication system:

- Major benefits will be felt in the health sector, where patients (e.g. childbirth) will have safer, quicker and more comfortable access to health facilities; accordingly, child mortality and other causes of death due to insufficient and time-consuming access would be significantly be reduced.
- Operation of Public Motor Vehicles and freight and passenger operations ferrying people between various destinations will increase the development of facilities and services;
- Increased access to schools and universities for people who formerly were excluded from those benefits, thus enabling them to find more prosperous income opportunities;
- Improved access to markets and new market outlets (e.g. directed towards tourist sector).
- Improved trade links for products in high demand (e.g. precious stones, salt, off-season vegetables, livestock, forest products, dairy products, betel nut).
- Improved access to commercial centres for banking and technology.
- Increased use of permanent and semi-permanent building materials (providing better and healthier shelter) enabled by road transport.
- Promotion of cross-cultural communication, with good potential to bring about political and economic stability to formerly secluded regions.
- Greater circulation of printed media and dissemination of information.

b. Promotion of Small Scale Businesses

After the completion of the project, the road built under the project will provide access to the local farmers to sell their products to bigger markets at better price. In case of the Western Districts of Nepal, this will encourage local people to establish small-scale industries, cultivate/harvest citrus, apples and vegetables and other cash crops, dairy products and NTFPs, and expand other micro enterprises. All these will increase productivity, and earning of the people. The benefit augmentation measure will thus be to promote cooperative, and provide bank finance for setting-up business enterprises. Examples for likely development of business opportunities would include:

- Fuel stations, vehicle maintenance and repair shops
- Small trade store businesses along the route, opportunities to sell fish, agricultural products, and sawn or processed timber.
- Development of accommodation facilities and potential for eco-tourism.

c. Enhancement of Quality of Life

As a by-product of increase in productivity and subsequent increase in income level, it is also expected that there will be improvement in quality of life of rural people. The improvements can be seen as students can study at night time, people will feel more comfortable with electric light, people can keep television for better media communication and recreation, women can work at night and earn more. All these will subsequently enhance the people's quality of life.

(i) *Addressing Negative Aspects associated with the Improved Roads*

Concerning the time after the sections for the specific SRN sub-projects become completed, the ESMF makes generally reference to typical mitigation measures for those impacts that are associated with safety and maintenance works bearing some similarities to those during the construction works.

a. Slope Instability and Erosion

The consequences of land slide and soil erosion are far wider than repair and maintenance of the road is able to cope with. Potential impacts of slope instability and erosion will be in terms of damage of agricultural land and property, reduction in agricultural production, reduction in forest area etc. High speed of vehicles will increase which may disturb the stability of the slope thereby lead to the slope failure. Depending on the situation, measures to mitigate such impacts may include:

- Correction of the maintenance of the slope protection measures (bio-engineering) and drainage works;
- Rill and gully formations should be regularly monitored and immediately fixed at critical areas;
- Correcting the effects of minor landslides, erosion and mass wasting should be immediately cleared and slope restored with appropriate technology (bio-engineering);
- Promotion/support/assistance to community forestry programs, not only in the right of way, but also beyond in erosion-prone lands;
- Soil amelioration methods in the right of way and beyond should be promoted;
- Community development programs for local communities to stimulate self-help initiatives to carry out minor but instantly needed road maintenance works, such as removal of stones falling down from slopes, fallen trees, correction of minor gully erosion damage, removal of earth and debris from drainage structures after heavy rainfall, etc.

b. Road Safety and Speed Limit Controls

After the operation of road services there are incremental risks for accidents affecting persons, vehicles and goods transported. A number of environmental impacts may result from vehicle accidents such as spill of hazardous liquid and solid materials, soil and water contamination, forest fire, damage to properties, utilities and cultural assets.

In order to mitigate these impacts, the safety measures suggested by this ESMF include the following:

- Provide proper signage regulating permissible speed-limits;
- Incorporate physical barriers in the road design to reduce speed at sensitive sections;
- Ensure regular road police patrolling and enforcement;
- Incorporate environmentally friendly roadside delineators, such as bushes and hedges, as prescribed in the bio-engineering guidebook.
- Conduct, at certain schedules, public meetings to assess the adequacy of road signage and installed safety measures. When upgrading

/maintaining roads because of increasing traffic demand, consider design improvement in the pavement condition and geometry of the road,

- As applicable, provide proper signage on sections with increased accident rates, and at sites with critical slope development. Include appropriate speed-limit measures (road police patrolling and enforcement, speed bumpers).

c. Control Air, Noise and Water Pollution

Increased traffic movements on the road will invariably cause incremental pollution due to vehicular emission and dusts. The movement of vehicles will increase local noise levels. Similarly, disposal of oil and grease of water body surface run-off from road surface may cause water pollution. Depending on the situation, corrective measures to mitigate such impacts may include:

- Community and road user awareness programs should be organized to enhance public understanding on how individuals can contribute to reduce environmental impacts associated with road uses;
- Provide proper signage on accident-prone spots, and include appropriate speed-limit measures (road police patrolling and enforcement, speed bumpers);
- Control and enforce vehicle emission standards, and stipulate vehicle owners to engage in proper and regular vehicle maintenance;
- Ensure proper use and sale of (clean fuel) at local pump stations;
- For control of dust nuisance, sprinkling of water, speed limit of vehicle and vegetative barrier of earthen bounds should be designed.
- In congested settlement and sensitive areas (Schools, health posts, hospitals) consider sealed surface of the road for the stretch it pass through the sensitive area. Include appropriate roadside planting (bushes, hedges, trees) where possible, to enhance absorption of vehicle emissions by the plants.

d. Control of Cross-Drainage Outfall and Gullies

Cross-drainage outfall and gullies will be carrying concentrated water discharge from the respective catchments. They could lead to the downstream erosion if outfall area is not protected or guided properly. This impact is more severe in hill roads. Depending on the situation, measures to mitigate such impacts may include:

- Provide proper signage on spots with (seasonal) drainage problems, and include appropriate speed-limit measures (road police patrolling and enforcement, speed bumpers);
- Road-side and the gullies shall be connected to the natural drains with protected outfall.
- Regular maintenance of the drains shall be carried out and blockages cleared; use local community members contracted for such works.

e. Depletion of Forest Resources

Road development often induces or accelerates the pressure on forest resources. Counteract measures are difficult to realize, but to some extent the following mitigation mechanisms may be successful:

- Provide support to local communities for preserving their forest especially the community forestry;
- Promote homestead activities to cultivate non-timber-forest products (e.g. medicinal plants, ornamental plants, ornamental animal farming, mushroom cultivation, bamboo);

- Promote replacement of firewood by non-forest energy source such as micro hydro, bio-gas and solar energy;
- Introduce or promote energy-saving and improved models for cooking stoves.
- Introduce selected and alternative building material for houses;
- Encourage and support local community for controlling illegal harvesting of forest resources;

f. Collision and Disturbance Afflicting Wildlife

Accidents inflicting wildlife is an almost inevitable risk associated with roads passing through remote and forested areas. Among the proved mitigation measures are:

- Alert drivers of possible wildlife crossing: Provide proper signage where the road transects sensitive habitats and include appropriate speed-limit measures (education signboards, road police patrolling and enforcement, speed bumpers).
- Lower speed limit at sensitive sections during night hours as wildlife is more prone to be inflicted in road accidents when disturbed by vehicle headlights;
- In cases where protection of rare or endangered species is of high importance, impacts may be mitigated through translocation them in homologous habitat of nearby vicinity. Such actions should be based on detailed studies and carried only by experts.
- Local community, forest user groups, school going children should be given awareness training on protection of forest and wildlife. Consequently, the chances of harassing, poaching or trapping of wildlife will be reduced.
- In case certain road sections will cause repeated or incremental risks of wildlife collision, rehabilitation works may be considered to incorporate wildlife under passages.
- Other effective prevention means include the erection of roadside fences that will prevent terrestrial wildlife entering the road corridor. However, the establishment of fences needs to be implemented with caution as this may severely impact migratory species or species travelling to feeding and breeding habitats across the road². Wildlife fence establishment needs therefore an adequate study of possible effects on the local fauna, taking into full account a full season of observation on migratory species.
- Roadside reflectors may be used to scare animals away from the roadway when vehicles approach at night.

g. Control of Ribbon Settlement along the Road and Encroachment in the RoW

Once a road passing through new (remote) lands is completed there are likely chances of growing ribbon settlements and undesired squatter development. Apart from land-use and other social conflicts, this will cause congestions to road users and increased accident risks.

Mitigative measures depend much on the local government ability for good land-use planning and governance to discourage and/or remove such newly upcoming settlements along the road. Effective means include:

² Fencing may also simply shift the points of migratory road crossing to other areas (e.g. settlement) where other types of impacts would then be the consequence. Fencing may also sometimes interfere in predator-prey relationships, allowing predators to gain significant advantage because prey escape routes are restricted.

- Establish public notes that specify the acquisition / property rights of the RoW, and that explain at the same time non-permissive uses of the RoW by non-entitled persons.
- Establish and propagate an effective land-use plan for the region; such land-use plan should clearly incorporate future visions for acquiring land for further road net expansion.
- Prepare good cadastral records that can easily be verified by land-use planners.
- Good demarcation of RoW, incorporating physical barriers and appropriate planting (through community forestry programs) of selected zones adjacent to the road.
- Incorporate physical barriers in zones of potential / prospected encroachment risks, e.g. by roadside plantation schemes;
- Initiate, by engaging local NGOs/CBOs, community awareness and assistance programs to prevent undesired land-take and roadside squatter development.
- Put in place appropriate mechanisms for grievance resolution to settle disputes between new squatterers and local communities.
- Exert all legal and socially acceptable means to evict illegal occupants of the RoW, but take in due consideration the needs and constraints of vulnerable and indigenous groups.
- Consider long-term solutions to avert undesired growth (e.g. expanding markets along road or in different axis) by planning for road bypasses in congested areas.

Chapter 7

7 Resettlement Policy Framework (RPF)

7.1 Introduction

The Government of Nepal (GoN) currently prepares the second ten year Sector Wide Road Program and Priority Investment Plan (SWRP & PIP) for the Department of Roads (DoR) as part of the World Bank funded Road Maintenance and Development Project (RMDP). This study/program includes both the Strategic Road Network (SRN) as well as Rural Accessibility Issues. The scope of the study includes the new construction and upgrading of strategic road networks, district roads as well as the feeder roads of about 815 km of roads in mid and far west of the country. The list of candidate roads has been agreed with DoR to include in the study for which the Resettlement Policy Framework (RPF) has been developed. The RPF is developed to deal with land acquisition as well as resettlement component of project-affected persons (PAPs).

This Resettlement Policy Framework establishes the resettlement and compensation principles, organizational arrangements and design criteria to be applied to meet the needs of the people who may be affected by the project activities resulting due to land acquisition loss of shelter, assets or livelihoods, and/or loss of access to economic resources. The RPF is prepared to the standards of the GoN as specified in relevant legislation and the policy of the World Bank, Operational Policies (OP) 4.12. The RPF will be applicable to all sub-projects under the study project as well as in other projects planned in the road sector where land acquisition and/or resettlement is required as part of the project implementation. All resettlement actions will be approached uniformly in all sub-projects.

The objective of the RPF is to implement the proposed Project smoothly to control or minimize any adverse effect on the people affected by the project. The RPF makes comprehensive reference to the policies and guidelines discussed in Chapter 3 of this ESMF (Legal Framework Analysis) document to guide the process of land acquisition and resettlement on subproject roads, and vulnerable community development initiatives within the zone of impact of the proposed sub-project roads. Specific terms relating to this chapter are summarized in ANNEX 3.

The surveys for the SRN Program indicate that none of the per sub-projects dealing with road rehabilitation will exceed more than 20 households to become fully affected and be subject for complete resettlement. As per GoN requirements, only for one (Nagma-Gamgadhi new road) a Resettlement Action Plan will be required. The survey is yet to be completed, and it will probably result in more than 20 HHs affected. In any case, Resettlement Action Plans (RAP) will be required for all future rural road development projects where major resettlement actions are unavoidable. This is even more the case when new proposals for land acquisition policies will materialize that aim at the acquisition of a 30 m RoW corridor (see discussion Ch. 3.9.4 in this ESMF document). With such policy, the number of even small rural upgrading projects will raise the number of PAFs considerably and will require substantial planning for resettlement.

7.2 Comparison of the GoN's and Donor Agencies Policies on Involuntary Resettlement and Land Acquisition:

Upon request of the Client, this ESMF shall carry out a comparative analysis of the national and donor agencies policies on involuntary resettlement/land acquisition, and presents recommendations to bridge identified gaps.

7.2.1 Common Principles

Generally, both the donors' and the policy of GoN support the following basic principles:

- Involuntary resettlement shall be avoided or minimized to the extent possible, through the incorporation of social consideration into design options and alignment selections.
- Where displacement is unavoidable, i.e. people losing assets, livelihood and other resources shall be assisted in improving or at a minimum regaining their former status of living at no cost to themselves.

There are some areas, however, where additional measures or further specifications for the entitlements under national guidelines and laws are necessary to meet the standards of the World bank (OP 4.12), ADB (Handbook on resettlement: A Guide to Good Practice) and other agencies. These additional measures are essential for ensuring that the principles mentioned above will be achieved. In addition, a well thought out, specific entitlement framework would protect the project from major delays caused by confusion.

7.2.2 Identification of Gaps and Limitations in the National Policies

The main gaps and limitations of the national legal and policy framework are:

- National law makes provision for compensation to the titled landholder only and, by default, omits all other PAP, including non-registered tenant farmers, landless farmers, squatters, agricultural labourers, shopkeepers, artisan groups and *Dalits*. There are also no provisions to protect the interests of vulnerable groups.
- National law does not make any provision for encroachers or squatters regarding to the entitlement for compensation. The reason to them is to assist poor people whose assets and livelihoods may be lost or disrupted by the project.
- Accordingly, there is no provision for rehabilitation assistance for such vulnerable groups.
- When GoN requires assets, national law does not specify about the provision of mandatory replacement cost.
- The Land Acquisition Act, 1977 does not emphasize transparency and stakeholder participation for various decisions that directly affect the long-term wellbeing of PAPs. Also, the CDC does not require participation of either the representatives of PAPs or representatives from the local VDC/municipalities.
- There are no clear directives to look at project design options that avoid or minimize involuntary resettlement.
- Only cash compensation is considered for payment. It is the easiest mode of operation but its long- term impact on families who are not used to large cash flow can be more negative than otherwise.
- There is a provision in the Land Acquisition Act, 2034 for land-for-land compensation such that if a titleholder loses all his/her land and opts for land as compensation, the government may provide land if there is *ailani* (unclaimed land) or other government land available. Past experience, however, indicates that the relevant clauses are too general and do not oblige

implementation. It is not clear if PAPs can exercise this right or it is entirely the decision of the government.

- Lack of consideration of the apparent time gap between notification of acquisition and the payment of compensation is another limitation of the existing legal framework.

The summary of this analysis is presented in tabular form in the Table 71. below.

7.2.3 Recommendations to Bridge the Gaps

The results of this policy review of both the World Bank and GoN are taken into due account in the development of a Resettlement Policy Framework (RPF) including a policy matrix for entitlements to compensate losses from project interventions. In addition, a Vulnerable Communities Development Framework (VCDF) had been prepared (see Chapter 8 of this ESMF) to ensure that provisions of the policies articulated in the GoN Tenth Plan on the support to indigenous, ethnic and vulnerable groups as well as the provisions forwarded by the World Bank's OD 4.20 on Indigenous Peoples are addressed properly by the forthcoming project.

Policy recommendations to close the identified gaps and limitations are:

- A project affected person needs to be defined as a person or household whose livelihood or living standard is adversely affected through loss of land, housing and other assets, income, or access to services as a consequence of the implementation of the project, causing a change in land use.
- Entitlements should be established for each category of loss.
- Special attention should be given to protect the interest of vulnerable groups. With a census date as cut-off date, no fraudulent encroachments after this date should be considered eligible for entitlements of compensation. However, landless farmers/ squatters who have been occupying public land for at least 3 years before the cut-off date, but without legal title, which has not been claimed by others, should be entitled to compensation for the lost land and entitled to be legalized on the remaining unaffected portion, if they do not have title to any other agricultural land. Non-land assets should be compensated at replacement value and their relocation and transportation must be assisted. Support for vulnerable groups should be provided to improve their livelihood.
- Practical provisions must be made for the compensation for all lost assets to be made at replacement cost without depreciation or reductions for salvage materials. Efforts must be made to assess the real replacement costs of land to the extent possible. A procedure should be established for determining compensation rates accurately plus rigorous efforts to assess the replacement costs and market rates for all assets, including labour costs for construction.
- There must be legal provision of PAPs and local representatives of VDC/Municipalities participation in settling the resettlement issues related to compensation, relocation and rehabilitation.

Table 7.1: Comparison of GoN and World Bank Policies on Entitlement for Land Acquisition, Gaps and Recommendations

Type of Impact	Entitlement Unit	GoN Policy	World Bank Policy	Recommendations
A. LAND				
Loss of private Land	Families, households	Cash compensation rates established by a Compensation Fixing Committee (CFC), consisting of: (i) Chief District Officer; (ii) Revenue Board Land Administrator; and, (iii) a DDC representative.	Compensation at full replacement cost. For agriculture land pre-project or pre-displacement, which ever is higher, market value of land of equal productive potential within the same vicinity. For urban land, pre-displacement market value of land of equal size and use, with similar facilities and sources within the same vicinity. Replacement land of equivalent productive potential.	Cash compensation equivalent to the amount as per Land Acquisition Act; and Resettlement allowance in cash equivalent to the difference between compensation as per the Land Acquisition Act and full replacement value as per current values in the same vicinity, plus value of all land transaction fees and charges. Families who become landless will receive allotted land as per provisions of the Land Act.
Loss of untitled land	Non-title holder (squatters and encroachers)		Resettlement assistance in lieu of compensation for land occupied (land, cash, other assets, employment) to at least restore their livelihoods and standards of living to pre-displacement levels.	Resettlement assistance to those most vulnerable to restore pre-displacement level livelihoods. Vulnerable groups may include but not be limited to ethnic minority groups present in the Terai and Hill districts as categorized by GoN, women headed households, the most poor (based on poverty line and the local wealth ratings), the disabled, the elderly and landless/kamaiya families. Encroachers will not be entitled to any compensation for their affected unauthorized/illegal extensions over public land. Vulnerable encroachers with economic losses may be entitled to assistance as a vulnerable group.

B. HOMES/ STRUCTURES				
- ditto -	Families, households, structure owners	Cash compensation determined by Compensation Fixing Committee on the current value of houses and structures, in accordance with the Land Acquisition Act and Land Acquisition Regulations.	Compensation at full replacement cost. For houses and structures the market cost of the materials and labour to build a replacement structure of a similar quality or better than the affected structure.	Cash compensation in accordance to the Land Acquisition Act. To ensure compensation is at replacement cost, additional resettlement assistance in cash equivalent to cover depreciation over and above compensation amounts provided.
C. ECONOMIC ASSETS				
Income losses for affected HH	Families, households		Compensation at full replacement cost.	Compensate and replace lost assets at the their replacement cost. Compensation for perennial crops and trees calculated as annual net product value multiplied by number of years for new crop to start producing. Compensation in cash for lost standing crop.
D. INCOME				
Local HHs	Affected person, families, households		Measure to assist affected people in improving their former living standards, income earning capacity, and production levels, or at least restoring them.	Rehabilitation assistance for lost or severed livelihoods.
Local communities	Affected communities/families		Measures to assist impacted communities to re-establish or re-develop lost community resources.	Compensation for re-establishing or re-constructing lost community resources such as religious and cultural structures.

- Land acquisition and resettlement should be avoided or minimized where feasible, exploring all viable alternative project designs.
- Options for compensation should be kept open; decision should be made only after project detailed analysis, consultation, and acceptance by the project affected families, based on full information being made available to them about the implications of the various options. In rural areas, land-for-land should be the preferred option offered to PAPs, and cash compensation in urban areas.
- Titleholders who are severely affected through loss of their agricultural land should be offered a choice of assistance with the identification and purchase of suitable privately owned cultivation land in the community (if there is no suitable unallocated replacement land), or cash compensation. They should also be entitled to rehabilitation assistance such as skills training for one household member.
- Full compensation for all losses, including land, at current market price shall be paid promptly before evacuation. In the case of residential land, current market price of similar land or replacement land of equivalent size must be provided together with transfer arrangements in the case of displacement, and cash compensation in the case of partial loss without displacement. Tenants renting residential land will be compensated in cash and assisted in finding suitable alternative residence.

7.3 Eligibility, Entitlement and Valuation

7.3.1 Eligibility

The World Bank Policy on Involuntary Resettlement requires compensation for the lost assets at replacement costs to both titled and non-title holders (i.e. squatters, encroachers and tenants) and resettlement assistance for lost income and livelihoods. In the proposed project, the absence of formal titles will not be a bar to resettlement assistance and rehabilitation. Further, the principles adopted herein contain special measures and assistance for any vulnerable affected person (AP). Persons affected by land acquisition, and relocation and/or rehabilitation of structures/assets (businesses, houses, etc.) are entitled to a combination of compensation measures and resettlement assistance, depending on the nature of ownership rights of lost assets and scope of the impact, including social and economic vulnerability of the affected persons. Thus, the affected persons in the project will be entitled to various types of compensation and resettlement assistance that will help in the restoration of their livelihoods, at least, to the pre-project standards.

The cut-off date of eligibility for entitlement is when the census survey is completed and when publicly announced. Persons who has encroached the area after the given cut-off-date are not entitled to compensation or any other form of resettlement assistance.

During planning and design phase of road construction, efforts will made to minimize impacts on land, people and property and access to resources due to expansion, rehabilitation or construction of road facilities. However in case where land acquisition will cause adverse impact on people and property or people's access to land or property, the resettlement and cash compensation payment shall be made in accordance to the World Bank OP 4.12, and GoN's Land Acquisition Act, 2034 (1977) and Road Act 2031 (1975).

For the 21 procedural steps that are described in detail in the GoN Land Acquisition Guidelines, reference is made to Table 3.1 of Chapter 3.

7.3.2 Entitlement Framework

The project will affect property owners and occupants, their dependents and community groups through acquisition of private and community assets. The Entitlement Policy accordingly specifies compensation and/or rehabilitation measures for two units of entitlement; individuals (i.e. affected individuals and their households) and groups. Entitlements for each type of APs are based on the types and levels of losses. Details on the entitlement framework by type of loss and entitlement unit are shown in Table 7.2.

In Nepal, the following types of entitlement practices exist¹:

Those who have formal legal rights to land (including tenancy, customary and traditional rights recognized under the Land Related Act, 2021 (1964) will receive:

- In case of tenancy land, 50 percent of the evaluated amount (value of the affected land) will go to the owner and 50 percent is paid to the tenant.
- Those who do not have formal legal rights to land at the time of the census begins but have a recognizable legal right or claim to such land or assets. They are the persons waiting for the Land Certificate ("*Lal Purja*") to be approved by the District authority but who have documents to prove as such. They are all entitled to full compensation at replacement cost.
- Those who occupy land temporarily or on a leased-basis allocated to them by the individual, community and any private or public organization with the written permission or signed contract. Entitlement will be provided according to the lease arrangement.
- Those who have no recognizable legal rights or claim to the land they are occupying i.e. squatters, ownerships under dispute etc. GoN laws and regulations do not provide any compensation to this category. However, with an assumption that people of this category are poor and vulnerable, the Project will compensate for the loss of crops at market prices and structures at full replacement cost. For poor and vulnerable affected persons who have no other land, the Project will suggest to allocate land and provide temporary or lease land rights to them as well as relocation allowances and rehabilitation measures. Landless PAP will not be displaced until the project provides land or alternatives for the poor and vulnerable.
- *Guthi*, Public or Community Land Area can also be subject to loss of land due to the Project. If the recovered land belongs to the Guthi it will be treated according to the Guthi Corporation Act, 2033 (see Ch.3). . On public and community land, the Project will relocate the land or pay cash compensation on consensus basis.

¹ Currently there is a new Resettlement Policy discussed in the NPC which may cause, when approved, some changes in the presented Entitlement Matrix.

Table 7.2: Entitlement Matrix

Type of Loss	Entitlement Unit	Description of Entitlement /Compensation Policy	Implementation issues/procedures
1. Agricultural, Residential, Commercial, Pasture and Forestry Land			
1.1 Loss of Private Land under any form of tenure	<ul style="list-style-type: none"> Titleholder Encroacher/ Squatter on public land 	<ol style="list-style-type: none"> Provide compensation at full replacement cost, or Provide full title to land of equal area and productivity acceptable to owner in the vicinity. If land is not available elsewhere then provide cash compensation at full replacement cost based on current market rate or Government rate which ever is higher. In case of vulnerable groups preference should be to replace land for land Squatter/encroacher cultivating the effected land for at least three years prior to the cut-off date will be entitled to allocation of land if <i>ailani</i> or other government land is available. However illegal occupants after the cut-off date do not qualify for compensation for land losses. Resettlement assistance in lieu of compensation for land occupied (land, other assets, employment) at least restore their livelihoods and standards of living to pre-displacement levels. In the case of farmland, the AP will be entitled the cultivation disruption allowance equal to one-year production. 	<ul style="list-style-type: none"> A List of available <i>ailani</i> land in each affected VDC is required A list of affected and entitled persons and the area of land loss is required Notice to vacate will be served at least 35 days prior to acquisition date. If any owner having significant impact receives cash compensation for farmland and purchases replacement farmland within 1 year from the date of receiving compensation, all related land registration fees, taxes and duties will be borne by the project. Case-wise compensation will be either by cash or cheque, depending on the owner's preferences. To ensure fair compensation, determination of rates will be established not more than one year prior to property acquisition.
1.2 Loss of Tenancy Land	<ul style="list-style-type: none"> Landlord and Tenant by a written agreement (That is yet in practice and to be processed as per 2058 B.S. amendment in Land Reform Act). Renter/lease holder 	<ol style="list-style-type: none"> Both the landlord & the tenant will be entitled for 50 percent of land compensation amount each (As per 2058 B.S. amendment in Land Reform Act) . Non-registered tenant/renter/lease holder does not qualify for compensation for land losses; however they will be entitled to compensation for crops. 	<ul style="list-style-type: none"> Where a renter/leaseholder has a sharecropping arrangement, the compensation payable should be apportioned according to the arrangement.
1.3 Loss of <i>Guthi</i> (Trust) Land)	Entitled Person/ institutions and tenant in accordance with the <i>Guthi</i> Corporation Act 2033.	As per <i>Guthi</i> Corporation Act, 2033	
1.4Temporary Loss of Private Land	Titleholder Tenants and landlord (As both are the owner of equal (i.e. 50 %) share, hence treated as private land	<ol style="list-style-type: none"> Compensation for crop, land productivity and other property losses for the duration of temporary occupation. Compensation for other disturbances & damages caused to property. Or, Contractor to negotiate a contract agreement on the rental rate with the owner for temporary acquisition of land. 	<ul style="list-style-type: none"> The owner/entitled party will sign a temporary occupation contract specifying: <ul style="list-style-type: none"> ➤ Period of occupancy, ➤ The terms and conditions for calculation of production losses,

Type of Loss	Entitlement Unit	Description of Entitlement /Compensation Policy	Implementation issues/procedures
	holder.	<div><div>4.</div><div>Project and the Contractor to ensure that persons other than the owner affected as a result of temporary acquisition are compensated for the temporary period.</div></div> <div><div>5.</div><div>Land should be returned to the owner at the end of temporary acquisition period, restored to its original condition or improved as agreed with owner.</div></div>	<div><div>➤</div><div>The frequency of compensation payment, and</div></div> <div><div>➤</div><div>Land protection and rehabilitation measures.</div></div> <div>The land will be returned to the owner at the end of temporary acquisition, restored to its original condition.</div>
2. Crops and Trees			
<div>2.1 Loss of Trees & Perennial Crops</div>	<div><div><div>Titleholder</div><div>Lessee/cultivators having agreement with the owner</div></div><div><div>Landless squatter/ encroachers on public land</div></div></div>	<div><div>1.</div><div>Advance notice to harvest crops</div></div> <div><div>2.</div><div>Net value of existing crops where harvesting is not possible.</div></div> <div><div>3.</div><div>The crops, which live, in short time will be paid in accordance with one-year output value. The crops which have lived for several years will be compensated at market value on the basis of loss of future production, based on 5 years annual net production for fruit & fodder trees & 3 years annual net production for timber/ fuel wood trees & other perennial crops.</div></div>	<div><div><div>Inventory of the tree and plant species list</div><div>List of owner, non-perennial crops and the area (if applicable) of cultivation should be prepared</div><div>The APs will get notice 3-6 months in advance regarding crop harvesting. Crops grown after the issue of the notice will not be compensated.</div><div>The work schedule has to be adjusted considering the crop seasons so that for avoiding crop damage.</div><div>Crop/trees/bamboo market values will be determined by the CFCs in consultation with District agriculture and forestry office.</div><div>Where a tenant/renter/lessee & landowner have a sharecropping arrangement, the compensation payable should be apportioned according to the arrangement.</div><div>Materials may be salvaged with no deduction from compensation</div></div></div>
<div>2.2 Loss of Non-perennial crops</div>			
3. Houses, Structures and Other basic facilities			
<div>3.1 Loss of own house & Privately owned other structures</div> <div>3.2 Loss of commercial establishment.</div>	<div><div><div>Full Titleholder</div><div>Tenant/Renter/Lease holder (own accommodation)</div></div><div><div>Landless squatter/ encroachers on public land</div></div></div>	<div><div>1.</div><div>Compensation for full or partial loss of house and other structures at full replacement cost of materials and labor according to house/structure type, with no deduction for depreciation.</div></div> <div><div>2.</div><div>Every displaced household is entitled to a housing displacement allowance, based on the established rates per HH, capita, capita income and/or minimum wage rate.</div></div> <div><div>3.</div><div>Every household will receive transportation allowance on actual cost basis.</div></div> <div><div>4.</div><div>However, loss of structures other than household and commercial establishments does not entail payment of a displacement allowance</div></div> <div><div>5.</div><div>Resettlement assistance to those most vulnerable households to restore pre-displacement livelihoods.</div></div> <div><div>6.</div><div>Every displaced household with business affected will be entitled to receive</div></div>	<div><div><div>Replacement cost at market value of house and structures will be determined by the CDC in consultation with local experts and compensation prices will be finalized with participation of LCF/AP representatives.</div><div>Formal resettlement planning will be undertaken where more than 10 households from one settlement/residential area are displaced, if the households having significant impacts opt for group resettlement site.</div><div>Other structures include: toilet, sheds, walls, fences, water mills, workshop etc.</div><div>Materials may be salvaged with no deduction from compensation</div></div></div>

Type of Loss	Entitlement Unit	Description of Entitlement /Compensation Policy	Implementation issues/procedures
3.3 Loss of rented accommodation	Renter/Lessee holder	<p>one time lump sum grant; minimum one month's income based on the nature of business and type of losses assessed on a case to case basis. Daily minimum wage rate may be used as compensation for business loss as basis for calculation when and as applicable.</p> <p>7. One time cash assistance (displacement allowance) equivalent to one months rent for moving to alternative premises for commercial establishment</p> <p>8. The household will be entitled to a rental stipend for loss of rented accommodation</p> <p>9. Cash compensation for damages to structures resulting from temporary occupation of land at replacement cost.</p>	<ul style="list-style-type: none"> Non-titleholder (squatters, encroachers) will not be entitled to any compensation for their affected unauthorized/illegal extensions over public land. Vulnerable encroachers with economic losses may be entitled to assistance as a vulnerable group, at established rates determined by the CDC. Renter/ lessee holder will not be entitled for compensation of structures. However if the structures are made by them, they will be entitled to compensation or will be according to the lessee agreement
3.4 Other basic household facilities	<ul style="list-style-type: none"> Titleholder Tenant/lessee holder/renter Landless squatter / encroacher on public land. 	<p>1. Payment of installation charge or compensation for relocation of electricity, telephone line, TV cable drinking water and other infrastructure to the installer, if these exists.</p>	<ul style="list-style-type: none"> The concerned authority will be requested to assist the households to reinstall or permit the facilities in their new location if applicable/required.
4. Community and Cultural Assets/ Facilities			
4.1 Loss of community buildings/ structures, cultural assets	Local community/ User's group	<p>1. Cash compensation for restoring affected community and cultural resources.</p> <p>2. Restoration of affected community buildings and structures to at least previous condition, or replacement in areas identified in consultation with affected communities and relevant authorities.</p> <p>3. Restoration before commencement of the project where necessary, or to be determined in consultation with the community.</p>	<ul style="list-style-type: none"> Community resources/facilities include: schools, temples/monastery, religious tree, graveyards, ghats, waiting sheds, including the community hall etc. established by the local community/ CBOs.
4.2 Loss of land	Local community user's group	<p>1. Restoration of access to community resources</p>	<ul style="list-style-type: none"> The land revenue office in the district and concerned VDC/municipality will be requested to assist communities for land replacement identifying the area nearby.
4.3 Loss of community forests and other natural resources due to construction	Forest user's group/Other Groups Concerned	<p>1. Mitigation measures should be initiated to control erosion caused by tree cutting, and to stabilize and rehabilitate the slopes with suitable bioengineering works and vegetation.</p> <p>2. Community forestland lost due to road construction should be replaced and reforested according to DoF regulations including others concerned.</p> <p>3. Advance notice to harvest resources from affected community forest areas.</p> <p>4. Compensation for trees to the FUG</p>	<ul style="list-style-type: none"> List of plant and tree species lost and an assessment for maintaining that kind of vegetation Compensation for trees calculated on the basis of type, age, and productive value of affected trees in consultation of concerned forestry office and FUG. To minimize damage the department of Forestry will be requested for necessary action.

Type of Loss	Entitlement Unit	Description of Entitlement /Compensation Policy	Implementation issues/procedures
5. Displacement Allowances			
5.1 Displacement of households	<ul style="list-style-type: none">TitleholderTenant /Lessee holder, RenterLandless squatter / Encroachers on public land.	1. Every households displaced will be entitled to a housing displacement allowance. 2. Each displaced renter, lessee holder household will be entitled to a rental stipend for loss of rented accommodation. 3. The households affected by partial loss of structures that can be repaired will be entitled to repair allowance for mitigating the loss, not displacement allowance.	<ul style="list-style-type: none">Each displaced household will receive housing <i>displacement allowance equivalent to two months poverty line income (PLI)</i>.Displaced households living on rent will receive 35 days notice or rental stipend equivalent to 0.5 month PLI plus transportation assistance by the project.Allowances will be paid prior to displacement.Partial loss to be calculated as per the cost of replacement material and labour cost.The following cultivation disruption allowances will apply to<ul style="list-style-type: none">households with total landholdings of 0.25 ha and smaller who loose more than 10 % of their landholdings;households with total landholdings above 0.25 ha who loose more than 25 % of their landholdings;households whose production levels are severely affected through participatory assessment with LCFs.The cultivation disruption allowance will be equal to one season's production on the area of land lost, based on published District/VDC production figures, land type and crop market prices for the year of acquisition.
5.2 Displacement of commercial enterprise		4. Every household of displaced businesses will be entitled to a business displacement allowance for loss of commercial establishment.	
5.3Transportation allowance		5. Each displaced household will be entitled to transportation assistance to move their belongings. 6. Cultivation disruption allowance for severe disruption to household cultivation levels.	
5.4 Severe disruption to cultivation			
6. Group Losses, Vulnerability and Rehabilitation Measures			
6.1 Loss of income indirectly due to the project (employment for porters and other laborers)	<ul style="list-style-type: none">Persons in the vicinity of the road who may be adversely affected by the project although they do not lose assets.Female community living near construction section	1. Rehabilitation assistance such as information dissemination regarding project impacts, compensation alternatives and risks. 2. Preferential access to project construction employment opportunities, to the extent possible. 3. Assessment of current economic activities and potential for improvement to these activities, as well as alternative income earning opportunities. 4. Counseling/information dissemination/ skill development training for job upgrading/diversification and other possible support services. 5. Employment opportunity for unskilled labor to female should make compulsory at established rate of at least 33 % female participation.	<ul style="list-style-type: none">List of SPAF with potential impact should be prepared in consultation with LCF & Civil Society and may include:<ul style="list-style-type: none">Porters and other providers of non-vehicular transport.Ethnic, occupational cast peopleHaving aged people as household head and having disabled family members in the householdsWomen headed poor householdsPoorest of the poor landless households & squattersProvide clauses in Work Contracts that will require specific employment quota for local female residents, taking into special account vulnerable groups.

Type of Loss	Entitlement Unit	Description of Entitlement /Compensation Policy	Implementation issues/procedures
6.2 Severe loss of assets directly due to the project, and severe impact indirectly caused by the project.	<ul style="list-style-type: none"> Households/ APs having significant impacts Households of the Vulnerable categories APs family members over 16 years of age 	<ol style="list-style-type: none"> Information dissemination regarding project impacts, compensation alternatives and risks, and resettlement options (where required). Technical support on saving schemes and cash management. Preferential access to road construction employment opportunities, to the extent possible. Assessment of current economic activities and potential for improvement to these activities, as well as alternative income earning opportunities. Assistance with training in life skills that would help in obtaining employment and/or earning livelihood. The project will investigate training programs and institutions. In such a case, Funds will be paid directly to the relevant institutions. Or, project by itself will arrange suitable program for its mitigation. Assistance through the implementation of Vulnerable Community Development Plan. 	<ul style="list-style-type: none"> The rehabilitation measures will be targeted to APs having significant adverse impact and to vulnerable groups in the vicinity of the project area, even though they do not lose assets. Training on road construction and hiring workers will be included in Contractors' contracts. APs having significant impact who opt for training assistance will be entitled to a training subsistence allowance equal to a maximum of one three month's minimum wage as established at the national or local level, whichever amount is higher, for the duration of the training course. The respective Agriculture and forestry related Institutions will be requested to assist in implementing the forestry and agriculture program if required. Any costs required for this will be borne by the project.
7. Damages Caused during Construction			
7.1 any kind of Private and Public Properties	All categories of entitled persons	<ol style="list-style-type: none"> Extreme care should be taken by Contractors to avoid damaging public and private property unnecessarily. Where damages do occur to public or private property as a result of construction works, the affected parties shall be compensated immediately for damages to crops and trees, damaged land, structure and infrastructure shall be restored immediately to their former conditions. 	<ul style="list-style-type: none"> The same entitlement policies will apply as for other land acquisition.
8. Government Property			
8.1 Loss of infrastructure and facilities	Relevant agency	1. Facilities will be repaired or replaced.	<ul style="list-style-type: none"> To be undertaken in consultation with the relevant department or ministry
8.2 Loss of forest areas	Department of Forest	1. Mitigation by means of afforestation.	<ul style="list-style-type: none"> An assessment for maintaining that kind of vegetation To be undertaken in consultation with Department of Forestry

7.4 Carrying Out the Valuation of Affected Assets

All assets that will be affected, as identified by the survey teams, will be properly recorded and verified in the presence of the concerned persons. The detailed survey asset information will be computerized to monitor the reestablishment of PAPs. The valuation of affected assets will be undertaken by the District-level Compensation Fixation Committees (CFCs). It is also recommendable to geo-reference the said assets (land, structures) with the help of a Global Positioning System (GPS) to facilitate monitoring and to be used in case of later claims.

Each asset will be enumerated and inscribed on a register. Values for each types of asset will be pre-printed, shown to the affected person, and set against the type and number of such losses that the individual will sustain. The total compensation for that category of loss will be explained to the AP, and the total of all losses shown as well. The valuers must ensure that the AP will fully understand the compensation calculation, and that the entire process is explained in local dialect, as applicable. The inventory and evaluation sheet will then be signed and a copy given on the spot to the affected person. The form will also state, and the affected person will be notified, that the inventory will not be official until a second signed copy, verified by project supervisory staff, is returned to the affected person. At that time, a copy of the grievance procedure described below (explaining the rights of the AP to forward claims) will also be given to the affected person.

When valuing affected assets, the CFCs will take account of rates in the open local market and information gathered during RAP preparation to ensure that compensation is at replacement value. Compensation rate for all types of losses will be prepared. The established price list for land and other assets will be used for compensation of property acquisition. During the course of project implementation, the rate will be continuously reviewed and updated on an annual basis by the CFC. The respective data will be stored in an updated data bank administered by the Social Division of the Geo-Environment and Social Unit of DoR.

The methods of valuation for verifying the replacement for each type of losses, which will be carried out by the CFC and resettlement committee, are, but not limited to, the following:

Land:

- Recent land use rights transfer on land
- Determine whether the established rates are sufficient or not to purchase the same quality and quantity of land.

Structures:

- Evaluate whether the compensation for the structures will enable APs to rebuild their affected structures by consulting landowners, based in an inventory of
 - (i) types of structures, size, stories, rooms, land area, materials used and the cost of various materials
 - (ii) Who built the structures (AP or Contractor) and whether hired labour will be used or not.
- Obtain cost estimates by consulting at least three local/regional contractors and suppliers in order to:
 - (i) Identify local/typical cost of materials and labour,
 - (ii) Identify cost of different types of houses according to categories,
 - (iii) Compare prices with those prevailing in the District.

Crops and Production Trees:

Information will be collected to establish the average market price for these items. Current market prices will be determined in the same and adjoining districts for different types of crops and plants in consultation with District Agriculture Office and the District Forestry Office.

The final valuation shall be based on the principle that the project-affected families shall be compensated in a way to guarantee that their living standard is at least the same as before, if not better. Accordingly, the assessment of compensation for affected assets will be based on the principle of current market price at replacement value. The prices per square meter for different category of structures will be based on the total affected area of a structure, and not the usable area. As matter of principle, all compensation should be equivalent or higher than the prevailing market price.

7.5 Public Participation, Consultation and Grievance Mechanism

Public participation and consultation are the basic the principles in arranging for proper resettlement and compensation mechanisms in all forthcoming sub-projects. Public consultation includes comprehensive and timely dissemination to the project-affected people, while involving at the same time all agencies who will implement and monitor the process. Care will be taken to maintain transparency of the Project, reduce potential conflicts, minimize the risk of project delays, and enable the Project to design the resettlement and the rehabilitation program as a comprehensive development program to suit the needs and priorities of the APs.

7.5.1 Mechanisms of Consultation and Participation of PAPs

This framework recommends a set of public consultation activities and information dissemination to affected people. Public consultation will include both local governments and civil society where the APs would be regularly provided with information on the project and the resettlement process prior to and during the preparation for resettlement actions. Mechanisms of consultation and participation will include:

- (1) Public meetings in the project area
- (2) Information/ awareness campaigns through engaged NGOs
- (3) Interviews/surveys in project affected households
- (4) Focus group discussions,
- (5) Formation of committees and/or groups including stakeholders at various stages of the project.
- (6) Development of grievance redresses mechanism in the Project premises.

At early stage of initiating the resettlement process a Local Consultative Forum (LCF) will be formed at VDC level to ensure PAP's participation in the decision making process of the RAP implementation. The LCF will play a key role in all public consultation activities.

During the process of preparing RAP, discussions will be held with the directly affected families, institutions and the representatives of the directly affected VDCs. PAP as well as other stakeholders will be requested to participate in meetings of the RAP processes and express their concerns about various aspects of the project.

The information dissemination will be effected through electronic and print media, during public consultation/LCF's meetings, and direct discussion with the affected families and institutions.

PAPs' participation should also be ensured during final assessment of compensation, resettlement and monitoring.

Details of these consultations including dates, names of participants, issues raised and how these have been addressed will be documented in the subproject RAPs.

7.5.2 Establishment of Grievance Redress Mechanisms

For each sub-project a grievance redress mechanism will be established to allow APs to appeal any disagreeable decisions, practices and Activities arising from compensation for land, assets settlements, and technical and general project-related disputes. The APs will be made fully aware of their rights and the procedures for doing so verbally and in writing during consultation, survey, and time of compensation.

For each sub-project, there is the potential for two types of grievances: grievances related to land acquisition and resettlement requirements, and grievances related to compensation or entitlement.

The APs will have access to both locally constructed grievances redress committees specified under existing government mechanism i.e. LCF and formal courts of appeal system. Under the latter system every AP can appeal to the court if they feel that they are not compensated appropriately. They may appeal to appellate court within 35 days of the public notice given to them.

Special project grievance mechanisms such as on site provision of complain hearings allows project affected persons to get fair treatment on time. The LCF will be established in each road affected VDC to handle initial grievances of the project-affected people. The Project will handle issues regarding the compensation damages done during construction. The APs will have unhindered access to the Grievance Office to forward and file their complains without being intimidated or being deterred by excessive bureaucratic hurdles. The provisions of Local Community Liaison Assistant (CLA) in the project implementation are good practices in this regard. CLA can be mobilised in order to help APs to file the complaints and concerns to the concerned agency. APs will be exempt from all administrative fees incurred, pursuant to the grievance redressal procedures except for cases filed in court.

A three-stage procedure for redress of grievances is proposed for the forthcoming sub-projects (see Box 1)

Box 1

Proposed Mechanisms for Grievance Resolution

- Stage 1: Complaints of APs on any aspect of compensation, relocation, or unaddressed losses shall in first instance be settled verbally or in written form in field based project office (PO). The complaint can be discussed in an informal meeting with the AP by the concerned personnel to settle the issues at the VDC level. The community consultation, involvement of social and resettlement experts and NGOs will be helpful in this regard. It will be the responsibility of the LCF and project manager to resolve the issue within 15 days from the date of the complaint received.
- Stage 2: If no understanding or amicable solution reached or no response from the PO, the AP can appeal to the CDC. While lodging the complaint, the AP must produce documents to support his/her claim. The CDC will provide the decision within 15 days of registering the appeal.
- Stage 3: If the AP is not satisfied with the decision of CDC or in the absence of any response of its representatives, within 35 days of the complaint, the AP, in his/her last resort, may submit its case to the District Court.

7.6 Monitoring and Evaluation

The land acquisition and resettlement and vulnerable communities' components will be monitored both internally and externally with the objective of providing feedback to management on implementation and identifying problems and successes as early as possible to facilitate timely adjustment of implementation arrangements.

7.6.1 Monitoring Social Aspects Pertaining to RAP and VCDP in the Sub-Projects

The objectives of the monitoring program are:

- to ensure that the standard of living of APs are restored or improved;
- to monitor whether the time lines for resettlement and compensation are met;
- to assess if compensation, rehabilitation measures and social development support program are sufficient;
- to identify problems or potential social, ethnic or other conflicts; and
- to identify methods of responding immediately to mitigate problems.

The monitoring and evaluation of project-related activities with regard to the social implications will be carried out at two stages: First during the mid-term and a second yet to be determined by the DoR, most likely just before the project completion. The mid-term evaluation will focus more on the process part and will examine if the project is in the right track in implementation in terms of its project design/planning and right processes are being followed. It will also assess the type of adjustments/adaptations being made during the course of implementation as a result of the monitoring.

7.6.2 Types of Monitoring Applied

For sub-projects where resettlement and land acquisition will be required, specific monitoring and evaluation program will be implemented to (i) record and assess project inputs and the number of persons affected and compensated, and (ii) confirm that former subsistence levels and living standards are being re-established. The range of activities and issues that would therefore have to be recorded and checked, include:

- a. land acquisition and transfer procedures;
- b. compensation payments;
- c. construction of replacement houses by displaced households;
- d. re-establishment of displaced households and business enterprises;
- e. reaction of severely affected households, in particular, to resettlement and compensation packages; and
- f. re-establishment of income levels.

Two main monitoring mechanisms will be applied:

(1) *Internal Monitoring*

This type of monitoring studies the ongoing process and the respective outputs, compared against established social indicators. The projects, will be responsible for internal monitoring of RAP implementation. The GESU of DoR will supervise the land acquisition and Vulnerable Community Development Plan (VCDP) components of the RAP. The Social Division of GESU give guidance on the monitoring and prepare quarterly reports on the findings of the monitoring reports received from the sub-projects. The funding agency (World Bank) will receive copies of these monitoring reports.

(2) *External Monitoring*

Thus type of monitoring, carried out by an independent monitoring agency, will assess the extent to which resettlement and rehabilitation objectives have been met. The Project Implementing Units (with approval from World Bank as to ToR and qualifications and experience of monitoring agency) will recruit, for the entire project, an independent external monitoring agency/consultants for independent bi-annual review of RAP and VCDP implementation to determine whether intended goals are being achieved, and if not, what corrective actions are needed. The independent monitoring agency shall carry out a replacement cost survey to verify and update the district compensation rates in each and ensure that the current market rates are applied and are acceptable as replacement values to both APs and DoR. The independent agency will carry out field visits and consultation with the vulnerable and endogenous communities. The findings of the external monitoring reports will be subject to public disclosure through a public consultation a meeting. External monitoring reports will be submitted directly to GESU/DoR with copies to the funding agency (World Bank).

7.6.3 Social Indicators to Monitor the Effectiveness of the Proposed RAPs and VCDPs

The following table presents the basic indicators that are recommended under this framework for monitoring the success/failure of the resettlement activities and the development programs for vulnerable groups.

Table 7.3 Framework for Monitoring Social Issues Related to Resettlement and Vulnerable Groups

Type	Indicator	Variables
Process monitoring indicators	PAP involvement in ongoing project works, Consultation, Participation, and Grievance Resolution	Number of LCFs formed Number of local workers employed through NGO/CBO mobilization and facilitation initiatives Number of persons belong to vulnerable groups being employed Number of women being employed Number of consultation / participation programs involving stakeholders Grievances by type and resolution Number of field visits by DoR/GESU staff Number of CBOs (Users' Committee) and labour groups participating Number of PAPs who know their entitlements Number of PAPs receiving compensation Number of vulnerable people's household supported
	Procedures in Operation	Census and CFC asset verification/quantification procedures in place Effectiveness of compensation delivery system Number of land transfers effected Coordination between Project Implementation Unit and line agencies Number of households/PAPs to be resettled because of displacement. Status of livelihood restoration activities. Number of targeted beneficiaries provided support with employment, micro-credit disbursed, number of income generating activities etc.)
Output Indicator - monitoring indicators	Acquisition of Land	Area of cultivation land acquired by road section Area of other private land acquired Area of communal/government land acquired Compliance of established norms in land acquisition Number of disputes resolved related to land acquisition
	Structures	Number, type and size of private structures acquired Number, type and size of community structures acquired Number, type and size of government structures acquired
	Trees and Crops	Number and type of private crops and trees acquired Number and type of government/community crops and trees acquired Crops destroyed by area, type and number of owners

Type	Indicator	Variables
	Compensation and Rehabilitation	Number of households affected (land, buildings, trees, crops) Number of owners compensated by type of loss Amount compensated by type and owner Number and amount of allowances paid Number of replacement houses constructed by concerned owners Number of replacement businesses constructed by owners Number of owners requesting assistance for purchase of replacement land Number of replacement land purchases effected Number of delivery of entitlements Number of use of entitlements by APs Suitability of entitlements to APs as per RAP objectives Number of poor and vulnerable APs requesting assistance to allocate land and provide lease/temporary rights Number of assistance made related to poor and vulnerable APs
	Restablishment of community resources	Number of community buildings/facilities repaired/ replaced Number of saplings supplied by type Number of trees planted by government agency
Outcome/ Impact Indicator - evaluation indicators	Household Earning Capacity	Employment status of economically active members Landholding area cultivated, production volume by crop Types and value of livestock raised Selling of cultivation land Changes to agricultural income-earning activities – pre- and post disturbance Changes to off-farm income-earning activities – pre- and post disturbance Amount and balance of income and expenditure Numbers of vulnerable groups received livelihood opportunities Number of APs received employment opportunities to restore pre-project income levels and maintain their original living standards.
	Changes to Status of Women	Participation in users' committees, disaggregated by subject Participation in training programs, disaggregated by subject Participation and types of saving/ credit facilities Participation in road construction employment contracts and payment Participation in commercial enterprises Change in ownership over assets Change in status in decision making Change in the mobility and participation in public affairs and user groups (if formed).
	Changes to Status of Children	School attendance rates (male/female) (illegal) participation in road construction Incidences of trafficking
	Settlement and Population	Growth in number and size of settlements, inside and outside RoW Growth in market areas along the road alignment Influx of illegal settlers/encroachers on the road performance Increase in public facilities
	Multiplier effect	Changes in the economic activities, enterprises and functions of the market Changes in the employment status of the population Changes in the economic and social infrastructures Changes in the pattern of consumption and provision of electricity

To assist the field work in the ongoing Project, this ESMF also provides a tabulated guidance (Tab. 7.4) which indicates the likely social parameters to be measured during the different stages of the road development sub-project. The following template is to be understood in this sense. It also indicates the likely schedule and the responsibilities for each monitoring task.

Table 7.4: Phase-wise Social Monitoring & Evaluation Indicators for SRN

Issue	Verification	Schedule	Responsibility
A. Construction Period			
Employment of local labour including women and children and wage rates	Site observation regarding illegal child works; attendance record, interaction with Project & contractors.	Weekly	PM/DoR, Consultant, Contractor, NGO/CBO
Employment of local economically weak section of population (unemployed youths)	Job lists, job opportunities by gender; amount of work awarded. Site observation, attendance record, interaction with Project & contractors.	Weekly	PM/DoR, Consultant, Contractor, NGO/CBO
B. Operation Period			
Encroachment into public land/open space/common property (grazing land, open market, temples, etc)	Visit the identified public land/ open space, interact with local people, photographic documentation, geo-referencing	Half Yearly	PM/DoR, Consultant, Contractor, NGO/CBO, DDC
Development of new or expansion of old settlements/ business establishments / squatter development along roadside	Observation, recording of sites, photographic documentation, geo-referencing objects; status of affected families	Half Yearly	Division or District Road Office/DoR, NGO/CBO, DDC
Migration to the road side/ displacement of local people	Review of land holding records, discussion with local people/groups. Photographs	Annually	Division or District Road Office/DoR, NGO/CBO, DDC
Road accidents	Discuss with local people, Consult hospitals/health posts records.	Annually	Traffic Police District Road Office/DoR, NGO/CBO,
Incidence of communicable diseases e.g. respiratory diseases, HIV/AIDS, TB etc.	Discuss with local people, health workers/ health post/ records.	Annually	District Road Office/DoR, NGO/CBO, Health Unit, DDC
Upgrading of old and establishment of new schools/colleges along the road and vicinity.	Discuss with local people, political leaders and local groups/CBOs.	Annually	Dist. Education Office, DDC, NGO/CBO
Student's enrolment for higher studies in near by towns (girls, boys).	Discuss with local people, school teachers and local groups	Annually	District Road Office/DoR, Dist. Education Office
Changes in the land price, land use, agricultural practices, productivity and crop export	Discuss with farmers and extension workers, agricultural statistics of District Agr. Office, Agric.-Input Corp., District Food Corp. Office, land use maps, photographic documentation	Annually	District Road Office/DoR, District Agriculture Office, Local Authority
State of social harmony and social security (e.g. alcoholism, drug abuse, prostitution, violence)	Police records, discussion with local residents.	Annually	District Road Office/DoR, Local Authority, Police Office
Changes in the living standard of people	Interview with families, VDC records, discussion with local leaders, CBOs.	Periodically	District Road Office/DoR, Local Authority, NGO/CBO
Displacement of traditional employment (porters, traditional mode of transportation, such as mules, carts)	Discuss with local residents, DDC, community	Annually	District Road Office/DoR
Condition of cultural and historical areas and aesthetic qualities.	Visit the area; discuss with people, observation and photographs.	Annually	District Road Office/DoR, NGO/CBO

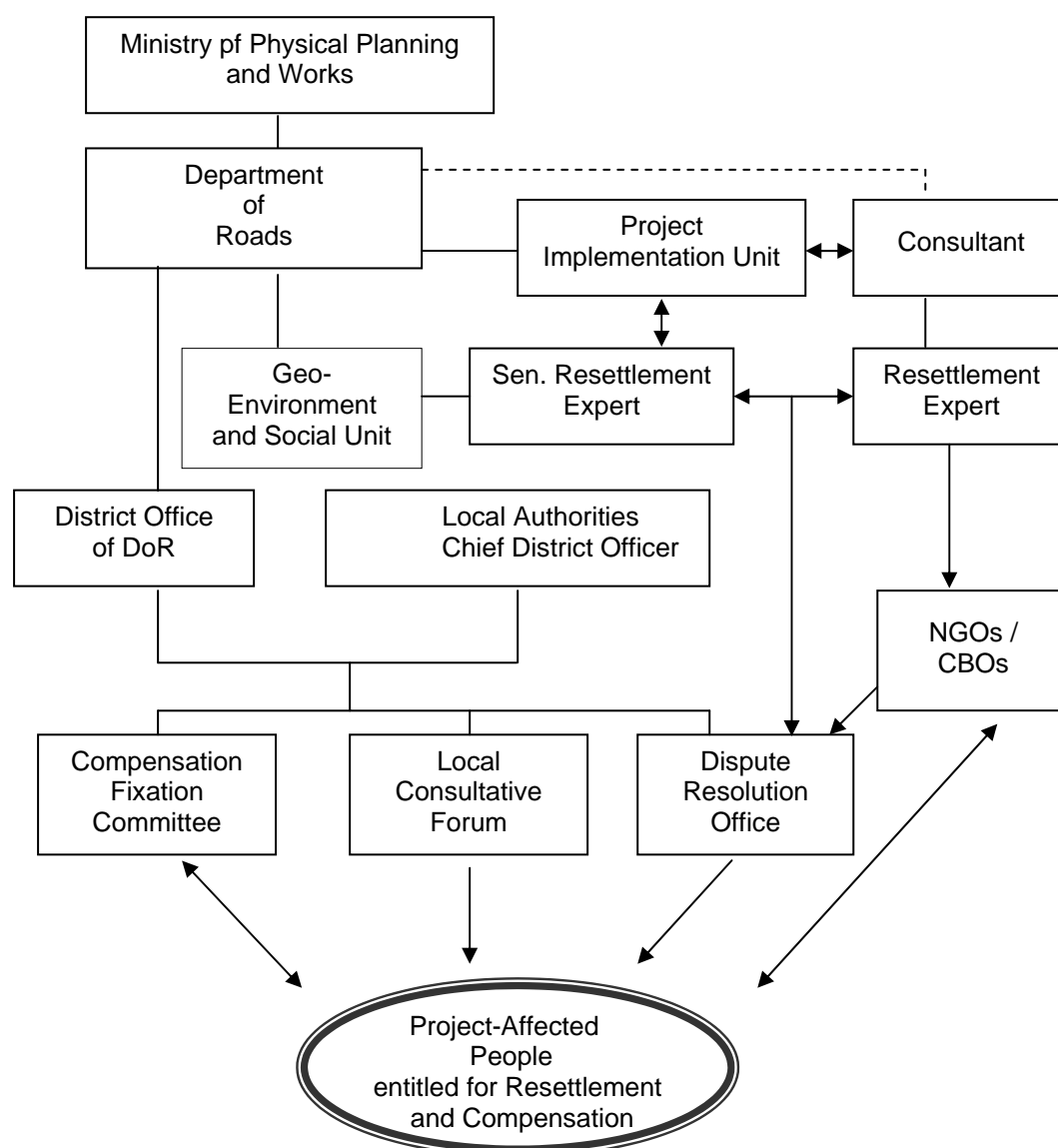
7.7 Institutional Responsibilities and Implementation Arrangements for RAP

7.7.1 Key Agencies at Different Level

At central level, the Ministry of Physical Planning and Works (MoPPW) will be the Executing Agency (EA) and Department of Roads (DoR) will be the Implementing Agency (IA) for this Sector Wide Road Program. For all sub-projects forthcoming under this Program a Project Implementation Unit (PIU) will be established at DoR, headed by the Project Manager (PM). This PIU will be responsible for the overall planning, implementation and coordination of the sub-projects. All aspects relating to resettlement and land acquisition activities will be addressed in close consultation and collaboration of the GESU of DoR (see below).

At District and village level, offices of various line ministries such as Home, Physical Planning and Works, Agriculture and Co-operatives, Forest, Health, Education and Sports and others will be consulted during RAP implementation. Similarly, CBOs, NGOs and Civil Society of the concerned project area will equally be considered during the preparation and the implementation of the RAP. The roles of key agencies involved are illustrated in Fig. 7.1.

Fig. 7.1: Diagram of key agencies involved in the resettlement process for rural road development projects



7.7.2 Geo-Environment and Social Unit (GESU)/or Social Unit (SU) of DoR

The Geo-Environment and Social Unit (GESU) plays a key role while incorporating proper social safeguard measures in all projects designs related to road development in Nepal. The GESU will have a Senior Resettlement Expert (SRE) to assist PIU. The SRE will monitor of land acquisition and resettlement operations and vulnerable/indigenous people's issues. S/he will report to the Project Manager at PIU. S/he will work in close coordination with the concerning Division Road Offices under DoR, field-based consultants' offices and Project NGO/s on the day-to-day activities of the resettlement plan implementation. A Social Development/Resettlement Specialist from the Project Supervision Consultants will support the SRE updating the subproject RAPs based on detailed design. S/he will also be responsible in supervision and coordination of all activities related to resettlement implementation for all the sub-projects.

In this context, the responsibilities of the GESU of DoR will include:

- Provide guidance and assistance to the project-engaged NGOs/CBOs in the implementation of public information dissemination, consultation and participation process among various stakeholders;
- Guide and assist all support units operating in the district, including the Consultants and the NGOs in the implementation of RAPs;
- Review and approve the RAPs prepared by the TA Team during the sub-project's planning phases
- Review and propose necessary RAP budget;
- Monitor RAP implementation and progress;
- Supervise the compensation payment process;
- Assist in redressing grievances concerning RAP activities;
- Coordinate with concerned government agencies and other ministries; and
- Consolidate all RAPs submitted by consultant and submit them to the funding donor(s) for review.

7.7.3 Implementing NGOs

NGOs experienced in resettlement, rehabilitation and livelihood restoration will be engaged as partner organization with PSC to provide facilitation services for implementation of resettlement plan and Activities.

The IA may establish at village Local Consultative Forums (LCFs). These LCFs will assist the Project, the Consultants' survey teams and the Compensation Fixation Committees (CFC) in informing people about the likely resettlement impact and solicit views of the affected people regarding compensation and relocation options.

The Resettlement Expert from the Consultants, with support from the LCFs and CFCs of the respective districts and partner NGO will execute and monitor the progress of the work. S/He will ensure coordination between the relevant departments, NGO, the Grievance Redress Committee and the affected persons. Close coordination will be ensured between District authorities and PIU on a day to day basis. If delays are experienced in land acquisition and compensation, DoR will engage special revenue officials for this purpose. Delays at District level will be minimized through close coordination and with the assistance of Chief District Officers.

The concerned NGO staff will undergo a week-long orientation and training in resettlement policy and management prior to the implementation of resettlement Activities. Refresher training will also provided to them after 1-2 months of program implementation for verifying and updating their knowledge on concerned issues.

A summary of Resettlement Action Plans in Nepali language will be made available to the local level NGOs and public offices in the sub-project sites.

7.8 Implementation Schedule for the Resettlement Action Plan

The Project Proponent will ensure that funds are delivered on time to the CFC and the implementing Consultants and partner NGOs for timely preparation and implementation of the RAP, as applicable. Civil works contracts will not be awarded unless required compensation payment has been completed. However, social preparation initiatives including income rehabilitation measures may continue and be completed even after civil works has begun.

The envisaged SWRP Program is expected to commence in early 2007. At present, the program foresees only one sub-project where a full RAP needs to be prepared, while the other sub-projects will make provisions for (minor) resettlement actions as provided in the respective management plans in the IEEs.

Civil works contracts for each sub-project road will only be awarded after completion of all compensation payments and title transfer activities of both voluntary and involuntary contribution of land and,

For the only new road construction project (Nagma-Gamgadhi) an indicative schedule for implementing the RAP is shown in the following table, assuming a sequential order of proposed activities. Some of these steps will overlap in their timing and some will be repeated throughout the project cycle.

Table 7.5: Implementation Schedule for individual RAPs

Activities	Schedule
Develop a centralized resettlement and social management unit at DoR (GESU)	
Deploy and train PIU in DoR, GESU*) and NGOs	First year
Mobilize Resettlement/Social Development Specialist from the PSC	First year
Continue implementing consultation, information dissemination and participation programs and grievance resolutions Consultation with local officials, APs and concerned groups/ departments	First year
Prepare and distribute copies of RAP, entitlement framework to affected APs/communities	First year
Verify inventory of losses	First year
Finalize list of entitled persons, establish compensation rates, effect compensation payments, ensure appropriate advance evacuation notification and implement land transfer procedures	First year
Provide rehabilitation support and other social preparation/ social mobilization programs	First Year
Contract and mobilize independent Monitoring agency	2008
Implement internal and external monitoring programs	2008

*) for institutional capacity building for GESU, see Chapter 10 of this ESMF

7.9 Cost Estimate and Financing for the RAP

For each sub-project of the SRN Program, the associated costs of land acquisition and resettlement, if any, will be itemized and included in the overall project costs under the budget for 'Environmental and Social Management Costs'. The detailed cost estimates for the currently selected 16 sub-projects of the SRN Program are presented in the respective IEEs, EIAs and, where applicable in the respective RAPs.

The cost estimates will include measures for (i) planning and budgeting for land acquisition and resettlement costs, annual budget, and sources of funding; (II) arrangements for approval of resettlement plan cost estimates; and (III) the flow of funds to reach people affected.

In this ESMF only indicative figures are provided (Tab. 7.6) to illustrate the budget estimate for an exemplary road upgrading project (Satbanjh-Jhulaghat, 37 km, in the far Western Nepal). Note that this specific example budget has included the costs for land acquisition for the required formation width of the road being 4.5 m. In this specific case, much of the existing road had already been in place, thus requiring only minimal (0.9 ha) land acquisition. However, should the GoN decide to acquire a total of 15 m of land on each side of the centre line of a new or upgraded road under this Program, the budget would be inflated accordingly.

Table 7.6: Exemplary Costs (in Rs) for Resettlement, Land Acquisition and Monitoring for Satbanjh-Jhulaghat Feeder Road (37 km) Upgrading Works

Measures/Activities	Costs in Rs	Remarks
House acquisition and compensation payments	1,000,000	For 5 nos of houses @ Rs 200,000 per house, type 2 stories, mud wall, corrugated iron sheet roof
Resettlement assistances, allowances for 5 HHs	200,000	Transport and displacement / hardship allowance
Land acquisition and compensation for production losses	4,000,000	0.9 ha (19.4 ropani) @ Rs 200,000 per ropani plus crop losses
Social Monitoring	500,000	1 social expert, 4 MM, plus office supply, transport
Social Audit	300,000	1 social expert, 2 technicians, 2 MM, plus office supply, transport
SUB-TOTAL	6,000,000	

7.10 Recommended Procedures for the Resettlement Action Plan

As requested by the Client, this ESMF shall also come forward with recommendations, as far as applicable for the forthcoming resettlement action planning.

The main recommendation is to implement, to the extent possible, all mitigation and monitoring measures as outlined in this framework, and as indicated in Chapter 6 of this document. Other suggestions would include:

- (i) The project will consider alternative-engineering designs to minimize adverse social impacts resulted from land acquisition. Where the social impact assessment indicates that land acquisition and/ or loss of assets is unavoidable, and in cases where a full EIA is applicable (see Ch. 3), a sub-project RAP needs to be prepared. Generally, GoN requirements specify the

- undertaking of a RAP if the land acquisition in the project site affects more than 200 people, takes more than 10 percent of any holding, and involves physical relocation of population.
- (ii) An abbreviated RAP is generally acceptable if fewer than 200 people are displaced even if more than 200 people are affected, and land acquisition is less than 10 percent and no physical relocation is involved. In case of most sub-projects of the SRN Program, however, the number of affected HHs that need physically to be relocated due to road upgrading works is expected not to exceed 20. The respective provisions are therefore subject to be included in the Environmental and Social Management Plan which are the core of the IEEs to be prepared for such project types.
 - (iii) In case of new road constructions (as is the case in the forthcoming SRN sub-project in Western Nepal, from Nagma to Gamgadhi in Jumla and Mugu Districts) the preparation of the RAP will require data from house-to-house and plot-to-plot socio-economic baseline survey and income restoration measures. The individual RAP documents will be prepared in close consultation with APs, along with active participation of secondary stakeholders, such as local or national government, policy makers, advocacy groups, elected officials and NGOs and the local VDC Chairperson and will be disclosed to the APs. Further consultation and participation program will be conducted to ensure that information on the project objectives, implementation schedule, resettlement and land acquisition, eligibility and compensation issues are properly understood and accepted by the affected communities.
 - (iv) During project implementation, resettlement process will be coordinated with the timing of the civil works. The project will provide adequate notification and assistance to affected people so that they will be able to move without undue hardship before the commencement of civil works.
 - (v) In the case of land acquisition, the procedures will follow the provisions of the Land Acquisition Act, and the RPF. The subproject RAP after its approval by GoN and the World Bank, will be translated into the local language and made available in a public place accessible to affected people and other stakeholders. The project will ensure that civil works are not started on any subproject sites before compensation and assistance to the affected population have been provided in accordance with the Resettlement Policy Framework.

Chapter 8

8 Vulnerable Community Development Framework

8.1 Introduction

The Sector Wide Road Program and Priority Investment Plan (SWRP & PIP) aims to carry out detailed technical and economic feasibility studies for new construction, upgrading and improvement of some 815 Km. The key objective of the study is to generate the total length of all weather national grid of road networks comprising both strategic and rural roads to allow accessibility to the populace not farther than four hours walk in the hills and two hours walk in the Terai. The project aims to carry out technical and economic feasibility studies for new construction, upgrading and improvement (rehabilitation) of selected strategic road network.

During the project implementation, the project may affect vulnerable people's communities in the areas of the planned sub-projects. Therefore, a Vulnerable Community Development Policy Framework needs to be prepared as a precautionary measure to define the policy, institutional and implementation framework to address impacts on vulnerable communities throughout the various stages of the foreseen sub-projects.

Social field surveys are carried out by the project's Consultants to identify all areas and sites where there will be adverse impact on vulnerable communities, especially where land acquisition and resettlement might be needed. In such cases a Vulnerable Community Development Plan (VCDP) will be developed to address particularly the needs of such vulnerable people. The Plan will make provisions to ensure meaningful consultations of target beneficiaries in all stages of the project, and to develop suitable assistance in accordance with the specific priorities and habits of those groups.

8.2 Implications for the SRN Program

The two major fields where the forthcoming road development projects potentially affect the entire local population are land acquisition and resettlement. In addition there are many other likely risks associated with the road construction works that may particularly impinge on vulnerable communities living in the zone of influence of the sub-project areas.

Issues of resettlement and vulnerable community support must therefore be addressed simultaneously within the framework or process. The framework for VCDP is prepared for the study project under the MoPPW/DoR in compliance with the World Bank¹ OP 4.10 and 4.12 on Indigenous Peoples and Involuntary Resettlement Policies, and the GoN's legal provisions and policies on the vulnerable communities. The VCDP Framework will be applicable to all sub-projects under the SRN Program where construction work may possibly affect

¹ Equally taking into due account ADB's policies and operational manuals on the same subjects

vulnerable communities. It will take the following categories of people into particular account:

- Poorest of the poor, irrespective of class, cast, gender and ethnicity (based on the local wealth ranking)
- Women headed poor households
- All *Dalit* and ethnic minorities/ indigenous groups as categorized by GoN being vulnerable
- Community members who are less able to care themselves without family or other support
- Landless, squatters and encroachers.

8.3 Potential Vulnerable Communities in Nepal

In the context of Nepal, vulnerable community means communities living in a remote location who are commonly landless, marginal farmers living below subsistence level and often *ex-kamaias* (bonded labourers). Moreover, these groups have no or limited access to public resources, and they almost never participate in national planning, policy, and do not partake in decision making processes or in development initiatives. As a result, their risk of falling below the income poverty line is extraordinarily high.

Formal and informal studies reveal that most of the *Janajati*, *Adhibasi*, *Dalit* and generally women fall under the category of vulnerable persons in Nepal. This is also reflected in the Government's Tenth Plan (see Chapter 3) which recognizes women, disabled, ethnic minorities and Dalit groups as the prominent poor and marginalized groups. Women in all social groups and regions have been proven as more disadvantaged than their male counterpart and even among women, widows, separated divorced and women headed households are particularly disadvantaged.

In Nepal, the term indigenous people (*Adhibasi*) equates with ethnic groups (*Janajati*). The constitution of Nepal recognizes indigenous people as *Janajatis* or Nationalities. The National Foundation for Improving the Living Standard of *Adhibasi/Janajati* has defined indigenous people as 'those ethnic groups or communities who have their own mother tongue and traditional customs, distinct cultural identity, distinct social structure and written or oral history of their own'. Following this definition, the same source identified 59 groups in Nepal as ethnic indigenous groups or nationalities.

Table 8.1: Classification of Vulnerable Groups/Janajati in Nepal

Endangered Groups	Bankariya, Kusunda, Kushbadia, Raute, Surel, Hayu, Raji, Kisan, Lepcha, Meche (10 groups)
Highly Marginalized Groups	Santhal, Jhangad, Chepang, Thami, Majhi, Bote, Dhanuk (Rajbansi), Lhomi (Singsawa), Thudamba, Siyar (Chumba), Baramu, Danuwar (12 groups)
Marginalized Groups	Sunuwar, Tharu, Tamang, Bhujel, Kumal, Rajbansi (Koch), Gangai, Dhimal, Bhote, Darai, Tajpuria, Pahari, Dhokpya (Topkegola), Dolpo, Free, Magal, Larke (Nupriba), Lhopa, Dura, Walung (20 groups)
Disadvantaged Groups	Jirel, Tangbe (Tangbetani), Hyolmo, Limbu, Yakkha, Rai, Chhantyal, Magar, Chhairotan, Tingaunle Thakali, Bahragaunle, Byansi, Gurung, Marphali Thakali, Sherpa. (15 groups)
Advanced Groups	Newar, Thakali (2 groups)

[Source: National Foundation for Indigenous Nationalities (NEFIN) 2004]

Adhibasi/Janajati among themselves are a diverse group who do not all come under one economic system. Based on the economic status and social features, the National Foundation for Indigenous Nationalities (NEFIN) 2004 has classified the *Adhibasi* indigenous groups in Nepal into five different categories (Table 7.1) into (i) endangered, ii) highly marginalized, iii) marginalized, iv) disadvantaged and v) advantaged groups. The first and second category of the ethnic groups seems more delicate from the involuntary resettlement point of view in Nepal.

The National Dalit Commission² defines *Dalits* as most deprived social groups in the country, comprising some 13% of the total population. This group lags behind others in every human development indicators: Literacy rate of *Dalits* (22.8%) is far below the national average (65%). Life expectancy of *Dalits* is 42 years as compared to the national average of 55. *Dalit* poverty is as high as 68%. Country-wide about 4.5 million *Dalits* are estimated to live below the poverty. The status of women, children and girls among *Dalits* are particularly worse.

Small farmers, landless, ex-*Kamayas*, squatters and encroachers due to their limited access to the economic resources and livelihood are equally classified as highly vulnerable group which is at permanent risk of facing severe poverty in Nepal. Elderly people, children and the individuals less able to care themselves within the communities are also persons who are any time prone to vulnerability. Depending on the local conditions, up to 10% of these groups may suffer from different forms of disability³. This strata of population is also highly vulnerable to any kind of adverse effects that may originate directly or indirectly from the proposed road project interventions. Therefore, they should be given due attention during involuntary resettlement activities of the road construction.

8.4 Legal Framework and Policies Focusing on Vulnerable Groups

Nepal does not have a separate plan and policy on vulnerable and indigenous people. However the groups potential to vulnerability such as children, elderly citizens, disabled, landless and small farmers, women, *Dalits* and marginalized, aboriginal and ethnic groups etc. are covered under different headings in the tenth five year national plan (2002-2007).

The Tenth Plan of GoN also defines that the areas where more than 50 percent of population is poor and the families have no extra income other than their own household production and which is sufficient for less than 9 months are designated as the poor areas. Likewise a family whose income is sufficient for less than three months is categorized as ultra poor who need to be supported for their livelihoods. One of the main thrusts of the Tenth Plan is the implementation of targeted programs for upgrading, employment and basic security of Dalits, indigenous people and disabled class. The policy provision also outlines that the government should pilot strong and separate package of program of basic security for vulnerable sections of society. Policies and actions for their protection and development have been also developed in the plan. The Plan states that targeted and empowerment programs shall be promoted to enhance the welfare of vulnerable, disadvantaged and exploited groups, the *Dalits* and indigenous scheduled caste groups.

The Plan has given emphasis in implementing different types of income generation supportive programs targeting the poor and vulnerable people. It is also recognized in the Plan that some *Dalits* being occupied as *kami*

² The National Dalit Commission was constituted in the Ninth Plan for the protection of their rights and inclusion in the mainstream of development programs. The acts and regulations of the commission are formulated as well as work related to setting up institutional structure has been undertaken.

³ National Foundation for Indigenous Nationalities (NEFIN) 2004

(blacksmith), *damai* (tailor) and *sarki* (cobbler) have suffered in recent years from loosing traditional markets for their products due to the increasing import of cheaper goods from urban foreign markets. Towards solving this problem, it seems necessary to design and implement different types of skill training programs aiming at specified groups.

Some of the other related acts⁴ on various vulnerable communities are (i) National Foundation for Upliftment of Adhibasi/Janajati, Act 2058 (2002) (ii) Bonded Labour Abolition Act, 2058, (iii) Children related Act, 2048 and (iv) Child Labour (abolition and regulation) Act, 2056. However, detailed plan and policies on vulnerable communities in Nepal is yet to be developed particularly on involuntary resettlement for the vulnerable communities.

The World Bank policy includes “the poor, women, and indigenous peoples, those less able to care for themselves (children, the elderly, and the disabled); and other groups not protected by national land compensation law (those without land use rights; host communities; and community members remaining in the original area after resettlement)” as vulnerable people’s communities. The ADB policy document on involuntary resettlement defines vulnerable groups as ‘those that fall below the poverty line, those without legal title to assets, household headed by women, indigenous people, ethnic minorities, and pastoralist.’ These donor agencies have given major focus to provide special attention to the vulnerable communities during involuntary resettlement activities.

8.5 Preparation of VCDPF for the SRN Sub-Projects

8.5.1 Objectives

This framework for preparing a VCDP is based on the development strategies of GoN as well as World Bank operational policies and guidelines. The principle objectives pursued are to:

- ensure that the project benefits are accessible to all vulnerable communities living in project areas;
- ensure that any specific impacts on vulnerable people are minimized and mitigated;
- ensure that the vulnerable communities’ participation in the entire process of preparation, implementation and monitoring of the project activities;
- minimize further social and economic imbalances within communities; and
- develop appropriate training/income generation activities in accordance to their own defined needs and priorities.

8.5.2 Approach

To fulfil these objectives, the following approach is suggested to be adopted in the forthcoming sub-project management of the SRN Program:

- Any loss or negative impact caused by the project will be mitigated as per the provisions of the Resettlement Planning Framework (RPF);
- frequent meetings, periodical review (like public audit) and interactions will be organized to monitor the project impact to mitigate any problem if encountered in time;
- to work closely with local NGOs working for vulnerable communities;
- provide opportunity to vulnerable communities for employment on the project works;

⁴ for more details, reference is made to Chapter 3 of the ESMF

- design, plan and involve vulnerable communities in training and income generation activities for skill enhancement so that they would come out from the state of vulnerability.

8.5.3 Components of the VCDP

The VCDP will include mitigation measures of potential negative impacts through modification of project design and development assistance to enhance distribution of project benefits. In case of land acquisition or structural losses in vulnerable communities, the Project will ensure that their rights will not be violated and that they will be compensated for the use of any part of their land or property in a manner that is socially and culturally acceptable to them. The compensation measures will follow the RPF of the Project.

Where the baseline survey and social impact assessments indicate the presence of vulnerable groups a sub-project VCDP will be prepared. Typically, a sub-project VCDP document will follow the format shown in Box.1:

<p style="text-align: right;">Box 1</p> <p style="text-align: center;">Format suggested for Preparing a Vulnerable Community Development Plan</p> <ol style="list-style-type: none"> 1. Description of the Sub-Project and implications for local vulnerable groups 2. Number of vulnerable people (by category of gender, caste, ethnicity and income level disaggregated baseline data) impacted negatively and by losses from project interventions and the magnitude and nature of these impacts. 3. Land tenure information 4. Documentation of consultations with vulnerable groups to ascertain their views about project design and proposed mitigation measures. 5. Targeted assistance to these groups, including training and income generation activities (Training and income generation activities will be based on Comparative Advantage Analysis of the area). 6. Modalities to ensure regular and meaningful consultations with these groups during project preparation and implementation. 7. Institutional arrangement and linkage with other project arrangements 8. Monitoring and evaluation, indicating where being supplementary to the overall environmental and social monitoring 9. Cost estimate and financing plan 10. Implementation schedule
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8.5.4 Preliminary Screening

During the planning and design phase of the study, the census household survey and other baseline socioeconomic survey will be conducted within the RoW and in the vicinity of the proposed sub-project area. The study team from the project preparation consultant will visit the sub-project sites. DoR and consultants will arrange public meetings in selected communities and interact with village leaders to exchange information about the project. At this visit, vulnerable people's communities, relevant community leaders, civil society, NGOs working for them and local authorities will be consulted. The screening will look into the name(s) and details of vulnerable households in the village especially assessing the number and percentage of such peoples' households along the zone of influence of the proposed project. If the results show that there are vulnerable households in the zone of influence of the proposed projects, a social impact assessment (see below) will incorporate vulnerable communities' issues and development opportunities in the area.

8.5.5 Consultation and Information Disclosure Mechanism for the VCDP

This ESMF seeks to ensure that vulnerable households in the sub-project areas are informed, consulted and mobilized to participate in the proposed project. Their participation can either provide benefits with more certainty, or protect them from any potential adverse impacts of the sub-projects. The main pre-requisite of the VCDP will be a preliminary screening process. Following to this, a social impact assessment will be conducted to determine the degree and nature of impact of each sub-project after that. Based on the findings, an action plan/mitigation measures (i.e. the VCDP) will be drafted.

The VCDPs will be submitted to the World Bank for review and approval three months before the commencement of sub-project activities. The VCDP will be made available at both central and district level project offices. Further, summary of VCDPs in Nepali language will be made available to the local level NGOs and the others concerned in the sub-project sites.

8.5.6 Social Impact Assessment (SIA) and Inclusion of Community Development Programs

The Design Consultant will be responsible for conducting the SIA and the development of an action plan with the help of vulnerable groups and organizations working for them. The SIA will gather relevant information on demographic data; social, cultural and economic situation; and both negative and positive social, cultural and economic impacts. Information will be collected from separate group meetings within the vulnerable communities. Ethnic minorities and Dalits' men and women, elderly peoples and children will be separately consulted from the zone of influence of the sub-project areas. Discussions will focus on the positive and negative impacts of the sub-projects and will collect and document the people's recommendations for the design and the project's management options.

If the SIA indicates that the potential impact of the proposed sub-project will be significantly adverse, threatening the existing socio-economic condition, or that the entire vulnerable groups in the area are likely to reject the proposed project, the EA in consultation with their representative, the civil society and NGOs, is well advised to consider other design options to minimize the anticipated or perceived potential impacts. In cases where the SIA identifies that a proposed sub-project is likely to have significant differential impact compared to the mainstream population a VCDP will be prepared.

Furthermore, specific social development programs might be considered to include in the project design:

a. Social/Community Development Program:

To improve livelihood and standards of living of vulnerable communities of the sub-project area, the SWRP & PIP may provide assistance through training/or providing opportunities of income generating activities. Consultations will be carried out with vulnerable groups during SIA to identify their skill, needs and priorities and training programs. A Comparative Advantage Area Analysis of the community will be carried out if the assessment team feel its requirement. Based on the findings, supplementary social/community development programs will be developed if required. Some of the examples of the program assessed by such pre-studies may include:

- Skill training on repair and maintenance and construction works (electrical, mechanical, house wiring, masonry, carpentry, sewing/knitting, handicrafts);
- Training on income generating activities (vegetable production, non-timber products collection and cultivation, food processing, agricultural

micro-enterprises, poultry, fishery/fish culture, bee-keeping, livestock raising, storing wood in the women's sheds , NTFPs, community forestry schemes etc.);

- Literacy courses to women;
- Hygiene and sanitation campaigns;
- Saving and credit schemes;
- Nursery establishment, plantation of fodder and fruit trees, improved grasses;
- Improved hill farming techniques and soil protection measures against erosion and mineral depletion.

8.6 Institutional Responsibilities and Implementation Arrangement

8.6.1 Linkage and Overall Responsibilities for Implementing the VCDP

The Resettlement Action Plan (RAP) and the VCDP will be implemented simultaneously in close coordination with each other. The Ministry of Physical Planning and Work (MoPPW) will be the Executing Agency (EA) and Department of Roads (DoR) will be the Implementing Agency (IA) for the entire SWRP. A Project Implementation Unit (PIU) at DoR, headed by the Project Manager (PM) will be established at the central department, which will be responsible for the overall planning, implementation and coordination of the proposed sub-project as well as the overall SRN Program. The same unit and institutional arrangement established within DoR for RAP implementation will also be responsible to implement the VCDP activities.

8.6.2 Contracting Experienced NGOs

Since vulnerable peoples' issues are sensitive, a local NGO experienced in vulnerability issues and livelihood restoration will be hired. This NGO will work as partner organization with the Engineering Supervision Consultant to provide feedback and facilitation services for implementation of the proposed VCDP activities. The project leadership has to ensure that the NGO is familiar with the policies of GoN, World Bank, ADB and other donor agencies' requirement on vulnerable communities.

The Senior Resettlement/ Social Development Expert will seek support from District project support units, Local Consultative Forums and the field offices of the Consultant to collaborate with the partner NGO will execute and monitor the progress of the work. S/He will ensure coordination between the relevant departments, organizations, NGO and the vulnerable groups. Another core task of this expert is to ensure that gender discrimination will be avoided by all support programs considered.

8.7 VCDP Budget

Each sub-project VCDP will have, as applicable, its own budget. A detailed budget will be prepared by the consultant taking into account of all activities associated with the formulation and implementation of the VCDP. The budget will include cost associated with recommended program activities, human resource cost, monitoring and other associated cost. Such budgets will be an integral part of the project cost, to be included in the cost item for Environmental and Social Management costs.

The budget will be made available during project implementation. The EA will ensure that adequate budget is available to implement VCDP. The EA will also

ensure that funds are delivered on time to the implementing Consultant and the partner NGOs for timely implementation of supplementary programs as devised in the VCDP.

8.8 Monitoring and Evaluation

A monitoring and evaluation program will be implemented to (i) record and assess project inputs and the number of persons in the vulnerable groups assisted, and (ii) confirm that former subsistence levels and living standards are being re-established.

The implementation of VCDP will be monitored both internally and externally with the objective of providing feedback to management on implementation and identifying problems and successes as early as possible to facilitate timely adjustment of implementation arrangements. DoR will establish a quarterly monitoring system involving project staff, implementing NGO, affected vulnerable communities, and local organizations of the vulnerable communities to ensure participatory monitoring arrangements. A set of monitoring indicators will be developed during VCDP implementation. Appropriate monitoring formats will be developed for effective internal and external monitoring and reporting requirements. In particular, the monitoring aims:

- to ensure that the standard of living of vulnerable groups are restored or improved;
- to monitor whether the time lines of the activities planned in the VCDP are being met;
- to assess if social uplift measures or social development support program are sufficient;
- to identify problems or potential problems; and
- to identify measures of responding immediately to mitigate problems.

Monitoring indicators are in principle the same as identified in the Resettlement Management Framework (see previous Chapter), applying two monitoring mechanisms, i.e. ongoing internal monitoring of process and output indicators; and external monitoring by an independent monitoring agency or establishing social audit system to assess the extent to which VCDP objectives have been met.

An overall impact evaluation will be carried out in the final year of the project to assess the changes in the overall living standards contributed by the project. This Audit shall be part of the foreseen Social Audit as described in the previous Chapter. For effective monitoring of the project impacts on the vulnerable groups, the socio-economic baseline established for the project will serve as comparative basis to cross-check and to verify project-induced impacts (positive and negative) on representative vulnerable households. Monitoring indicators will include gender, ethnic groups and income group specific indicators, and monitoring reports will present data accordingly. Indicators that can be monitored for this purpose will include how many vulnerable people participated actively in project activities, benefited from target assistance to enhance livelihoods, documentation of their opinions on project impacts and if any of their specific concerns were addressed during implementation.

Chapter 9

9 Institutional Framework for Implementing the ESMF

9.1 Key Players involved in the Implementation of the ESMF

9.1.1 Governmental and Non-Governmental Organizations

The various stages of the processes outlined in the previous chapters involve more than one government agency, different management levels within each agency, and various other parties, such as project unit, consultant, contractor, local community bodies, and the affected people themselves. The success of the proposed EA mechanisms depends heavily on a clear identification and allocation of responsibilities and functions throughout the ESMF process, as well as on the ability of the Project Management personnel, in collaboration with specialists from other agencies, to undertake appropriate actions throughout the various stages of the entire road development process. During the course of the implementation of the roads under sector wide concept, and depending on either upgrading or and new road works, a number of agencies/organizations may become involved such as:

- Department of Roads (DoR), including the Geo-Environment & Social Unit;
- National Planning Commission (NPC);
- Ministry of Physical Planning and Works (MoPPW);
- Ministry of Environment, Science and Technology (MoEST);
- District Development Committee (DDC) / Village Development Committee (VDC);
- Ministry of Forest & Soil Conservation (MoFSC) /District Forest Office (DFO);
- Ministry of Culture, Tourism & Civil Aviation, including Dept. of Archaeology;
- Ministry of Water Resources (MoWR);
- Ministry of Finance (MoF);
- Community based organisations;
- Non-governmental organisations;
- Compensation Determination Committee.

More specifically, the following key institutions have the following responsibilities with respect to implementing the ESMF:

1) *Ministry of Physical Planning and Works (MoPPW)*

The MoPPW is the umbrella agency in Nepal undertaking the planning and construction of the Strategic Road Network (SRN), to be implemented through its Department of Works (DoR). The overall responsibilities of the MoPPW comprise the coordination with the NPC and MoF for the final selection of the SRN sub-project sections, and the finalization concerning budget allocation.

(2) *Department of Roads and its Geo-Environment & Social Unit (GESU)*

The DoR, being the project proponent for the SRN Program, has primary responsibility for planning, surveying and supervision of the program. It coordinates, supervises and monitors the progress of road project development activities in the country at various stages of their implementation. The Department selects the sub-projects for the SRN program and prioritises the construction works, while the GESU's mandate is to supervise the environmental and social assessment activities. The DoR is also responsible for all feasibility studies relating to the selected projects, as currently being carried out by the Design Consultants.

With respect to the ESMF and the SRN program, the responsibilities of the Geo-Environment & Social Unit (GESU) encompass:

- Increase the awareness of DoR personnel involved in road development and maintenance programs with regard to environment and social safeguard aspects. Means to create this awareness are workshops and training courses both in-house and in the Division Road Offices.
- Participate in the EA screening and scoping processes
- Prepare the Initial Environmental Examination (IEE) Reports for all road projects where DoR is the proponent (e.g. in rehabilitation/upgrading works).
- Prepare the Environmental Impact Assessment (EIA) Reports for of road projects where DoR is the proponent (e.g. new road construction).
- Review, accept or reject recommendations submitted by the Feasibility Study for new projects, covering for example, alternative alignments, specific mitigation measures, propose environmentally sound techniques (e.g. bio-engineering) in construction and maintenance works, identify/change monitoring parameters and schedules
- Provide / verify / modify budget estimates for environmental and social safeguard measures.
- Reviewing the ToR for the environmental and social assessment studies, and forwarding them to MoEST or MoPPW for approval.
- Preparing Contract Specification, ensuring that specific environmental and social safeguard clauses are duly incorporated in the bidding documents, the BOQs, and in the construction contracts.
- Conduct geo-technical Investigations of roads under SRN to identify the potential sites requiring early attention to prevent the road closures on demand from DRO.
- Performing (or outsourcing) supervision and monitoring for compliance.
- Monitor compliance with Environmental (and Social) Management Action Plans as stipulated by the respective IEEs and EIAs
- Monitor compliance of Social & Environmental Impact (CSEI) and of road construction / rehabilitation projects as outlined in the Compliance of Social Action Plans (CSAP)
- Monitor compliance with Resettlement Action Plans (RAP) as applicable
- Coordinating with other agencies for implementing the EMP, RAP and Vulnerable Community Development Plan (VDCP).
- Conduct Social and Environmental Audit of road projects as required and scheduled.

(3) *Ministry of Environment, Science and Technology (MoEST)*

The MoEST¹ has responsibility for providing adequate environmental and social safeguards in the design and implementation of the SRN.

- The Ministry provides regulations and policies relating to environmental protection. It also determines the content and format for environmental assessment studies.
- The Ministry is responsible for the review of the Scoping Documents and the approval of the ToR for EIAs. It also reviews, comments and approves/rejects the reports obtained from proponents who are obliged to carry out a full EIA in line with the legal provisions, based on the finding during the scoping process.
- The Ministry reserves the right to supervise all project-related activities that are likely to have impacts on the social and environmental sectors. It has the mandate to enforce the EMP in coordination with other stakeholders.
- The National EIA guidelines (1993) and the Environment Protection Regulation (1997) specify that the MoEST is to conduct general environmental and socio-economic audits 2 years after a project comes into operation, to verify the project's performance in relation to the planned safeguard measures.

4) *National Planning Commission (NPC)*

The NPC has the responsibility for formulating the periodic plans for the country. It also prepares policies relating to various economic and development sectors. Within the NPC, the Environment Council formulates environmental policies relating to all areas of the government's operations. The Council is directly responsible to the Prime Minister and therefore has direct access to all executive decision making in Nepal.

(5) *Ministry of Forest and Soil Conservation (MoFSC)*

The MoFSC has the responsibility for all forestry management aspects for any roads which pass through forest land, conservation area, national park, wetland, buffer zone, or areas of sensitive ecological habitats. In such circumstances, the MoFSC has to be consulted and involved during IEE/EIA studies (Feasibility Study Stage), and when any trees are felled during the construction stage, to give their prior approval or ask for corrective and compensatory measures.

(6) *Local Authorities DDC / VDC and Ministry of Local Development (MoLD)*

Where road construction is to be labour-based and staged, it may be necessary to coordinate with Local Authorities. Formation of Road Building Groups (RBG) is among the main responsibilities of the Local Authorities. RBGs are utilised, for example, in roadside and/or compensatory plantation and the maintenance of plantations.

Special tasks of the Local Authorities may include, but not be limited, to:

- Coordination and undertaking of social and economic development activities.
- Similarly, for using public land, quarry/borrow areas, spoil disposal, relocation of infrastructure facilities etc. will also need coordination with local authorities.

¹ formerly the Ministry of Population and Environment (MoPE)

- Reporting claims brought forward by PAPs to higher authorities
- Reporting to higher authorities on direct and indirect observations on project-induced impacts.
- Facilitation and promotion of employment of vulnerable groups and SPAPs.
- Participation in the Environmental Audit.

7) *Department of Archaeology*

This Department has responsibility for all aspects relating to historical sites and assets that may be affected by any intended projects. The DoR guidelines state that the Department of Archaeology must be informed when a road alignment is located within 50 m of a cultural or religious site. They may be involved in the finalisation of IEE/EIA studies. The Department must also be notified immediately by the contractor and the Project Management/ Supervision Engineer in cases where the excavation works detect archaeological items. In such cases, excavations must stop immediately, until the Department gives approval for continuing the works or requires conservation of the site².

9.1.2 Consultants

There has been a consulting industry in Nepal for about three decades. However, environmental assessments are still new and unfamiliar to many firms. Under the proposed sector-wide road development works, the proponent (DoR) will appoint a qualified consulting firm to carry out the environmental and social assessment works. Similarly, expert consultants would also be engaged to carry out environmental compliance monitoring of the EMAP, the RAP and the VCDP. Furthermore, the consultants have responsibility for supervising all social and environmental safeguard measures outlined in the EMAP/RAP. They have responsibility to verify that all safeguards are reflected correctly and clear in the bidding documents, in the BoQs and in the works contracts.

9.1.3 Contractors

The capacity of the construction industry has been increasing in terms of equipments and human resources in Nepal. However, it is noted that in general, contractors have not yet developed adequate sensitivity for environmental protection, nor awareness of its importance.

The main responsibilities of contractors during the implementation of road related projects include undertaking construction works in accordance with the bidding documents, including compliance with this EMP and social safeguard measures, prepared during EIA / IEE Studies, and those identified in the RAP and the VCDP. Contractors are, among others, responsible for occupational health and safety measures.

² Note that contract clauses must make provisions for adequate regulation of defect liabilities in case of such findings, causing delay of works beyond the control of the contractor.

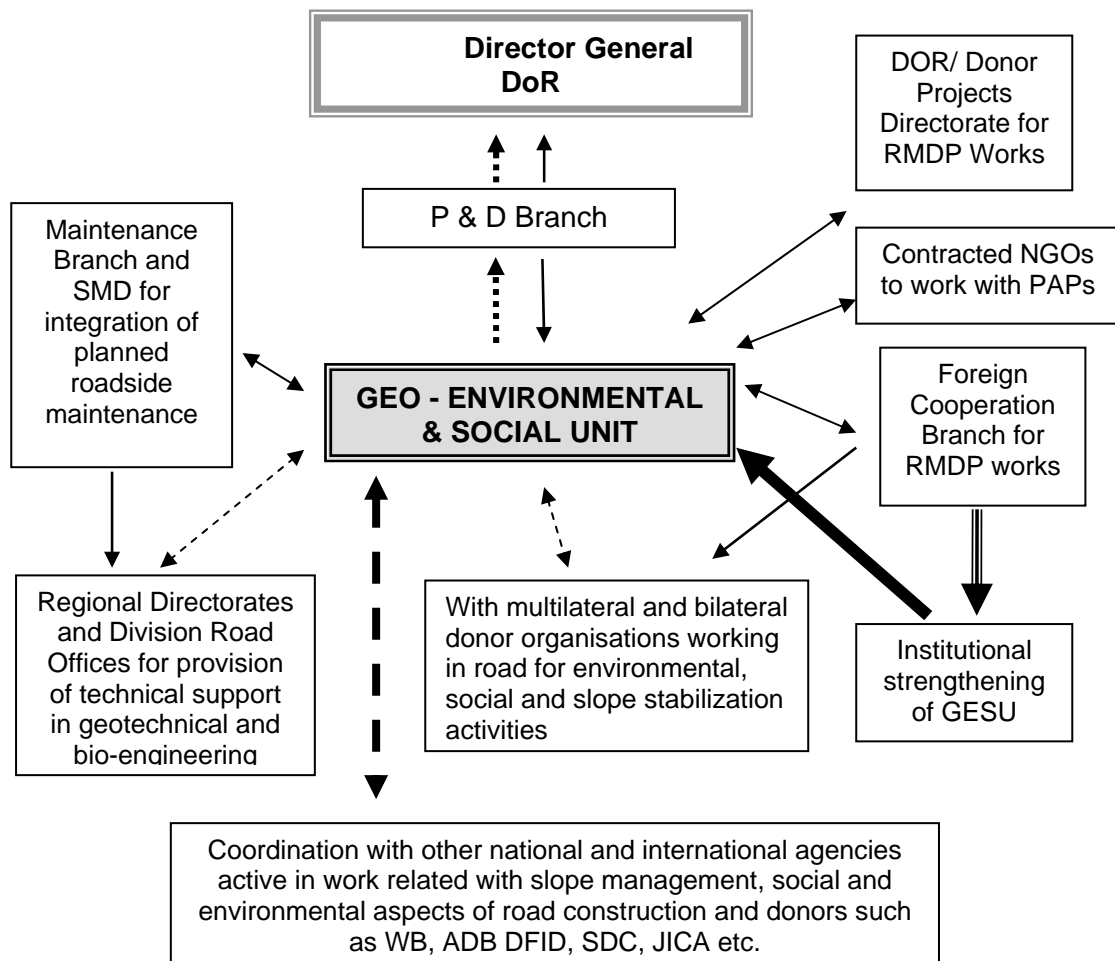
9.2 Interactions and Arrangements between the Key Institutions

The process of Environmental and Social Impact Assessment as well as the monitoring of the EMAP involves substantial linkage and coordination between various line agencies.

As illustrated in diagram 9.1 the Geo-Environment & Social Unit plays a key role in coordinating and managing this process. This is particularly important in bringing uniformity to the environmental and social assessment, reporting, management, and the monitoring process for the relatively large number of projects that will be contained in the SRN Program during the next decade.

The GESU will also liaise with NGOs that are contracted by short-listing for grassroot work with project-affected communities. These NGOs are instrumental in supporting the implementation of the ESMF.

Fig. 9.1: GESU's organizational relationship with other entities, with respect to ongoing road development projects



Chapter 10

10 Institutional Strengthening of the Geo-Environment and Social Unit of the Department of Roads

Upon request of the Client (WB and DoR) the Consultants had to focus on institutional strengthening of the Geo-Environment and Social Unit of the Department of Roads. Following their ToRs, the Consultants studied in close consultation with the representatives of the Geo-Environment & Social Unit (GESU)¹ at various levels the institutional capacity relating to the Unit's ability to fulfil its functions efficiently and effectively. Emphasis was laid on identifying gaps with respect to the forthcoming Strategic Road Network (SRN) Program and its requirements, to adequately address the social and environmental assessment and management aspects.

10.1 Identification of Opportunities, Weaknesses and Limitations

The Geo-Environment and Social Unit (GESU) of the DoR has, among others, the responsibility for social and environmental issues, as well as geo-technical and bio-engineering aspects pertaining to road building and maintenance within the DoR. Details referring to the current and tasks and mandates of the GESU are presented in the previous Chapter 9 of this ESMF.

The joint study of GESU's institutional and organizational capacity relates to both individual and organizational competence and effectiveness in identifying problems, making recommendations for their resolution and implementing the recommendations in the form of service delivery to the wider environment. Being relevant not only for the SRN Program but all of the Department's road development activities, this relates primarily to capacity building aspects within the GESU of DoR, aiming at individual strengthening in terms of expertise and skills, goal-orientation and the organization's resources to undertake responsibilities for social and environmental safety aspects to be properly included in all of Nepal's road development programs. The training plan, being a result of this need identification process, is presented in a separate document entitled 'Training Plan for Environmental and Social Safeguard Measures Relating to Road Development Projects in Nepal'.

The process of review and assessment was initiated by the Consultant's Social Expert, including extensive literature study² and interviews and consultations with relevant senior officials within the DoR³, World Bank and other specialists

¹ The Unit was formerly nominated 'Geo-Technical and Environmental Unit' (GEU), but changed since Sept.06 into 'Geo-Environment and Social Unit (GESU)

² See Annex 8 of the ESMF

³ Initial discussions of the Consultants were held with Mr. G. Regmi, Deputy Director General, DoR; Mr. Kamal Pande, DDG, Planning & Design Branch, DoR; Mr. Ayodhya Pd. Shrestha, Chief, GEU/DOR on 12/27/2005; Mr. Kamal Pande, DDG, Planning & Design Branch, DoR; Mr.

involved in similar donor funded projects. In particular, the Social and Environmental Management Framework prepared for the Rural Access Improvement and Decentralization Project (RAIDP, 2004) proved to be particularly helpful in identifying institutional capacity issues related to the country's road and transport sector.

The Consultant undertook an updating and comprehensive analysis of the latest setting in the Unit, together with the Head of GESU, Mr. Krityanand Thakur in late October-November, 2006. Based on this consultation, a set of institutional reforms for the GESU and improvements is recommended to increase their capacity for better coping with the ongoing and forthcoming environmental and social management tasks entailed by road projects in Nepal.

The need assessment for increasing the Unit's capacity took three aspects into account:

- (i) institutional issues linked to coordination, interactions and communications with external entities,
- (ii) organisational issues relating to internal structural, manpower levels and mix, budgets, logistics, and
- (iii) individual level, referring to manpower, level of expertise, training, task distribution and responsibilities.

The updated need assessment formed the basis of an institutional strengthening proposal, described in detail in a separate document entitled 'Training Plan for Environmental and Social Safeguard Measures Relating to Road Development Projects in Nepal'.

10.2 Organisation of the Geo-Environment & Social Unit of DoR

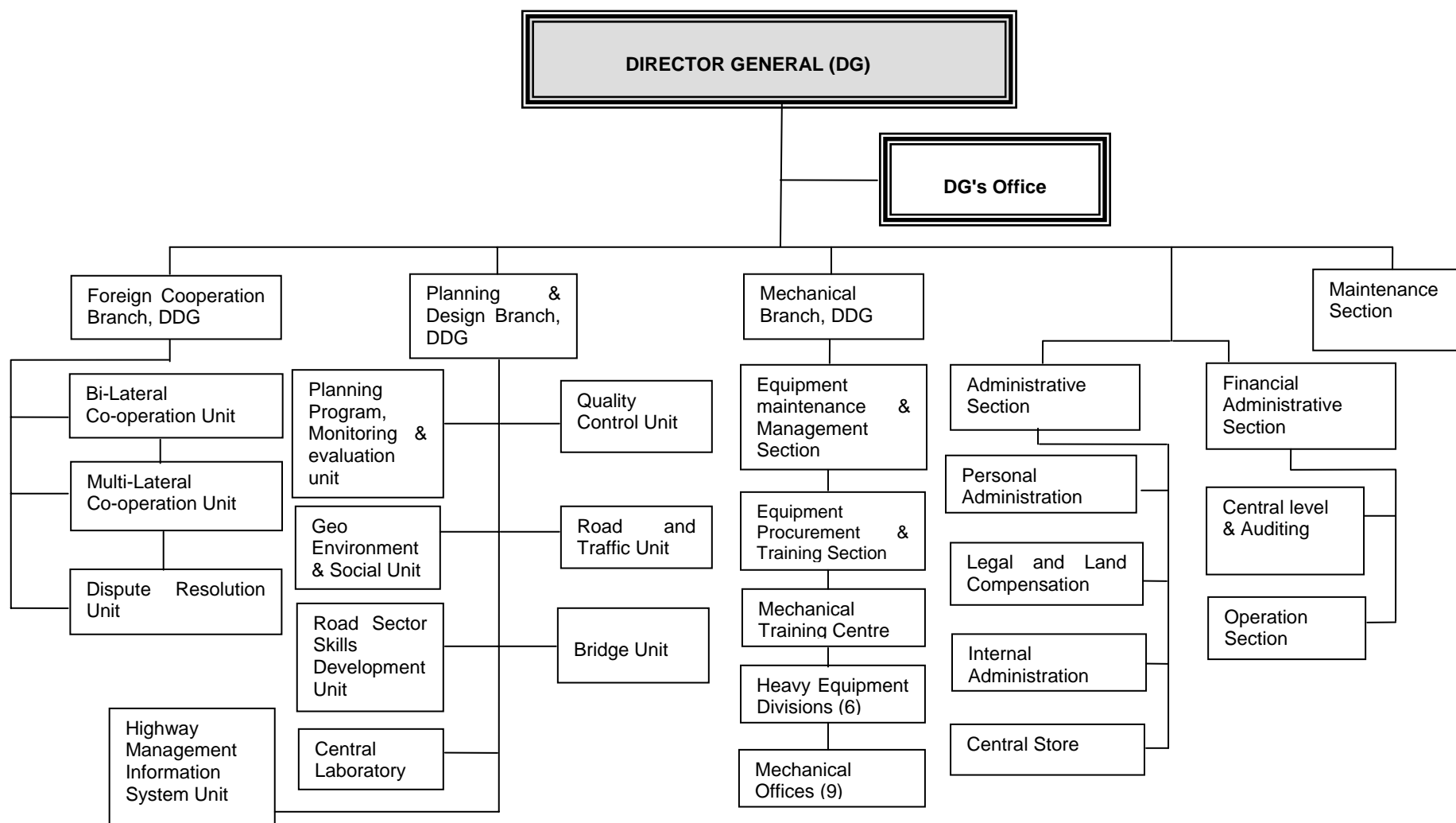
10.2.1 Development of the Unit

Originally, a Unit was set up in 1988 as the "Environmental Management Coordination Unit" of the DoR to support the Arun Access Road for the proposed Arun-III Hydropower Project and reformed as a permanent cell under Planning & Design Branch with a new name as Geo-Environment Unit (GEU) in the year 1994. In the beginning from 1994 to 1999 the unit remained supported with Overseas Development Agency (British) and World Bank financial support for Road Maintenance and Rehabilitation Projects. The British support was mainly focused in DoR's capability building and strengthening in bio-engineering area whereas World Bank's support was focused in the field of environmental sector. The preparation of a Reference Manual on Environmental and Social Aspects of Integrated Road Development was completed later in 2003, funded by DoR's Institutional Strengthening Component of the Road Maintenance and Development Project (RMDP).

Ayodhya Pd. Shrestha, former Chief, GEU/DoR on 03/19/2006, for analyzing the institutional aspects of the GEU.

In addition, institutional capacity information had been obtained through contacting the RMDP Institutional Strengthening Project Office between December 2005 and March 2006.

Fig. 10.1: Organizational Chart of the Department of Roads and the embedding of the Geo-Environment & Social Unit



In 2005, DoR in its Master Plan for Strategic Road Network stressed on development of road to supplement Poverty Reduction Program. After the initiation of implementation of enhancing poverty reduction impacts in some road projects in 2006, assisted by a foreign donor Asian Development Bank (ADB), the role of GEU was further expanded to incorporate the social aspects of road development projects. Thus DoR has renamed GEU into Geo- Environmental & Social Unit (GESU) to cover the social aspect & render prompt & efficient services with the development & strengthening of the roads.

10.2.2 Organisational Linkage and Sections of the GESU

The organisational chart of the DoR (Fig.10.1) shows its different branches and units indicating their respective functions.

The GESU Unit consists currently of four sections:

- (i) Environmental Section;
- (ii) Administration and Facilities;
- (iii) Geo-Technical Section and Bio-Engineering Section; and
- (iv) Research & Development Section.

Note, that there is yet no section established to administer all tasks associated with social aspects in road development programs. At present, GESU is staffed with only 3 engineers, none of which has participated in previous institutional strengthening programs focusing on environmental and social assessment skills.

10.3 Findings on the Institutional and Organizational Capacity of the Geo-Environment & Social Unit of DoR

The findings of this preliminary institutional and organisational assessment were presented by the Consultants in an in-house seminar at DoR in April 2006, as well as in detailed discussions with the GESU staff in October/November 2006. In additions the findings and recommendations were broadly presented in a work session with major donors at the DoR auditorium on 22 November 2006. Thus, the parties involved unanimously adopted the recommendations described hereunder.

10.3.1 General Institutional and Organisational Issues Identified by Donors

World Bank experience in relation to the environmental and social dimensions of roads and road projects in Nepal, indicates a lack of political and administrative commitment in the adherence by project authorities to their legal and policy obligations particularly with respect to social issues. The Bank also appears to be concerned with inadequate initiatives by project implementers in the areas of:

- carrying out social analysis for planning and preparing social and environmental plans,
- unreliable costing estimates in such plans, and
- Unsatisfactory scheduling of resettlement activities with civil works.

The lack of proper implementation of EMAP and SAP standards reportedly results in inadequate attempts to mitigate the losses and sufferings to those affected by projects. Another area of concern, identified by the World Bank in the projects it funds, is the lack of public participation in the project cycle.

10.3.2 In-house Assessment of the Institutional Limitations and Weaknesses of GESU

The DoR/GESU's core concerns are threefold. First, ensuring appropriate institutional arrangements for road management and maintenance. Second, enhancing the staff capacity, equipment and budget framework of its Geo-Environment and Social Unit to adequately address potential environmental and social impacts associated with project executions. Third, establishing appropriate institutional arrangements and mechanism for safeguarding the interest of the Project Affected Persons (PAPs) including Vulnerable Communities and Indigenous Peoples likely to be impacted by the implementation of road projects.

To meet the latter end, the DoR has prepared a number of useful manuals and guidelines to manage issues of environmental and bio-engineering, as well as other technical aspects of road construction and maintenance. However, these are applied on ad-hoc basis, and apparently only a limited number of engineers at the Kathmandu headquarter are aware and have direct access to these sources, but not the supervision personnel at work sites and at the Divisional Road Offices.

During the past years DoR's own Institutional Strengthening Program included several important steps towards addressing these shortcomings: The most prominent document in this direction was the preparation of the 'Reference Manual for Environmental and Social Aspects of Integrated Road Development (2003)' consisting of environmental and social issues related road development. However, this Manual lacks an in-depth review of the required legal framework as a result of which its implementation in the social and environmental fields may be problematic.

10.3.3 Specific Issues Identified at Institutional Level

During the need assessment and gap identification process, the following key issues were identified that relate to institutional arrangements and coordination:

- There is no clear allocation of responsibility for social and environmental issues between the relevant institutions. For example, there is no established linkage between the GESU and other Ministries or Departments for projects having far-reaching implication on social and environmental issues. At best, the Unit is invited to attend respective planning and follow-up meetings as an observer only.
- Lack of adequate and timely inter-departmental and inter-ministerial coordination to remove implementation bottlenecks and resolve problems of overlapping authority and coordination. Long process of clearance and approval of projects involving other Ministries and Departments delay project implementation. Clearer allocation of responsibilities and formalised consultation processes should greatly reduce these problems.
- There are no or only weak internal or self evaluation mechanisms in place that could be used as reference (lessons learned) from former project implementations and offer opportunities for corrective measures in the ongoing processes, leading to more efficient solutions and minimizing environmental and social damages in the field.

10.3.4 Specific Issues Identified at Staff and Logistic Level

- The Unit at present suffers from frequent changes in its leadership often resulting in a discontinuation of initiatives. Four Chiefs have headed the Unit during the last two years. This is caused by the current poor Public Sector HR arrangements and undue external influence in all aspects of the day-to-day operations of the DoR. It appears that all public sector

institutions suffer from this problem, and can only be resolved by either a wholesale reform throughout the public sector, or by establishing a Road Authority that is free to operate outside the current public sector constraints

- A large number of engineers have received training abroad in environmental issues, whilst employed in the Unit. However, the Unit has not retained any of them, meaning that all training efforts are largely wasted.
- GESU staff has no skill and expertise for conducting survey works required for data analysis and project preparation.
- With the increase in the DoR road construction, upgrading and maintenance activities, the demand for increased volume of environmental and social tasks has also increased, without a corresponding increase in the capacity of the Unit to manage this increased workload.
- In spite of its relative new mandate to deal with all social aspects of road projects (e.g. preparation of Resettlement Action Plans as necessary) the Unit has no staffing provision, training material and guidelines to execute such tasks. Without provision of a permanent position for a Senior Social Expert there will be severe shortcomings in implementing the ESMF, in institutionalising the process from planning to monitoring phases, and there will be no successful internalisation of the lessons learned and documented from ongoing and past projects.
- Key officials and engineers assigned to the Unit do not have adequate training in social and environmental issues. The Unit has hardly any expertise to review or evaluate projects documents (environmental and social assessment studies) prepared by consultants. Of the 248 officials and engineers trained in social and environmental issues over the years, none of them could be utilised by the Unit.
- The Unit at present is suffering from a severe shortage of experts and skilled manpower to cope with the ongoing and forthcoming tasks (e.g. this SRN program alone will produce, on behalf of DoR/GESU, a series of 15 IEE and one EIA document that need to be reviewed, commented and prepared for submission to the MoPPW and MoEST respectively – a time frame of at least 6 months of intensive labour would be foreseen, under the condition that skilled and sufficient staff would be at hand for only these tasks.
- The Unit has no separate Monitoring and Evaluation (M&E) Desk or Section that could be effectively used in improving its operations and/or providing suggestions for procurement of external consulting and contract services.
- The lack of incentives adversely affects motivation and commitment of the officials.

10.3.5 Specific Issues Identified at Procedural Level

- The Research and Development Section (R&D) has no System Analyst and hence lacks a database needed to construct a MIS for the Unit. This makes the wider dissemination of the data on a systematic basis impossible.
- The DoR itself takes a long time in processing project proposals, IEE /EIA Reports, etc. due to a shortage of skilled technical personnel.
- The DoR is equipped with various Environmental Laws, Manuals, Handbooks, etc., but these are used on ad-hoc basis.

- Environmental auditing is seldom done due to lack of funds, logistics and expertise in the field.
- The Reference Manual is used during the design and implementation stages. However, it appears that this Manual lacks an appropriate legal framework for its implementation to meet donor requirements for compensation.
- Poor budgeting and lack of required logistics and facilities adversely affect the Unit's performance and capability to carry out the tasks it is mandated for.

10.4 Conclusions

Policymakers and project planners are becoming increasingly aware of the potential negative environmental and social impacts of road projects in Nepal. As a result, the need for inclusion of environmental and social considerations, techniques and skills to be included in road planning and management has been identified. Such awareness is particularly prevalent among policymakers and project planners in the DoR. It is this awareness within the DoR, together with identical concerns by Donors and their Agencies, that has led to the present study concerning social and environmental issues in DoR road projects. But the DoR in its present form has inadequate resources and operational autonomy to deal with the issues.

The preliminary assessment of the capacity of GESU both at institutional and individual levels shows inherent weaknesses in the Unit's ability to effectively coordinate with other concerned agencies and to address the social and environmental issues of road projects. The findings and discussions with relevant representatives also suggest that the GESU in its present form, including one Head of Unit and two engineers, has very limited capacity to either manage or mitigate the various side effects during road project implementation.

The present conclusions are:

- (i) At its institutional and organisational level, the GESU enjoys only an observer status in policymaking and implementation in DoR as well as in other concerned agencies. Its authority to manage effective coordination is therefore very limited.
- (ii) The GESU, in its present situation, has very little capacity to deal with the most of the social issues that are potentially associated with road development projects, because it does neither have a social desk nor the personnel and budget required.
- (iii) The Unit's environmental desk lacks the capacity to perform supervision and compliance monitoring for ongoing road development projects.
- (iv) The Unit does not have the required resources and suffers from inadequate and unpredictable funding. As a result, it is unable to discharge its assigned tasks satisfactorily, perform at desired level and hence, deliver the expected services at an optimum (or required) level.
- (v) At an individual level, the Unit has benefited from training in bio-engineering. Engineers trained in this field have succeeded in stabilising and protecting highway slopes. However, it lacks experts and skilled manpower in the field of environmental and social assessment, and, above all, in adequately reviewing and preparing IEEs and EIAs.
- (vi) The existing staff does not have adequate incentives or motivation to undertake works that are often considered thankless and not valued. As a

result, the Unit has failed to retain experts trained in social and environmental fields.

10.5 Recommendations for Upgrading the Institutional Capacity of the GESU

The existing weaknesses in the ability to implement adequate environmental and social safeguards for road projects are caused by a combination of weak technical and resource capacity, low morale, inadequate enforcement and monitoring. However, these all stem from inappropriate institutional arrangements between the many institutions currently involved in these important functions. Unless these external weaknesses are addressed adequately, the DoR's GESU will be unable to carry out its functions properly, regardless of its internal capacity.

These recommendations therefore address constraints that are external to the GESU (institutional recommendations), and constraints internal to the GESU (organisational recommendations).

10.5.1 Develop Standardized Procedures

Clarity is required in the roles, responsibilities and hence functions for each of the institutions involved in the development, implementation and enforcement of environmental and social functions associated with road projects in Nepal. Such clarity is necessary if these institutions are to fulfil their functions efficiently, without duplication with other institutions. It will also make the purpose of reporting much clearer and make monitoring, auditing and problem identification much more straightforward. Most importantly, all of these benefits should also result in a far more effective implementation and enforcement of appropriate environmental and social policies and standards. At present, such institutional clarity and clearly defined mandates are lacking, with the result that decision making is slow, cumbersome and bureaucratic; problems are difficult to identify (and hence rectify); and accountability, reporting and auditing weak.

The following set of recommendations is made to overcome these existing institutional weaknesses:

- (1) Environmental/social and internal standard regulations should be established clearly by the Ministry for the Environment. These should be clear and include detailed project preparation, supervision and reporting requirements (defined in terms of what information is to be provided, not how the work is to be carried out, which should be the responsibility of the implementing agency, i.e. the GESU and DoR).
- (2) Standards need to be elaborated that should stipulate study and survey mechanisms related to the environmental and social assessment activities, such as techniques for baseline information, methods for measuring standard (and really required) bio-physical and social parameters, formalization of household surveys, monitoring indicators and verification techniques, compliance control and enforcement, compensation requirements, and public consultation processes, grievance procedures, audit procedures,
- (3) In establishing appropriate policies and standards, the MoEST should discuss what measures should be included from the Department of Forestry and Department of Archaeology. However, responsibility for this function should ultimately rest with the MoEST who should ensure that the resulting policies and standards are consistent and realistic. Note that

these standards and policies may well cover many or all government sectors.

- (4) The implementation of these standards and regulations should be the responsibility of the relevant implementing agency, which for roads is the DoR. Thus the DoR should be ultimately responsible for ensuring that the environmental and social policies established by the MoEST are implemented and enforced properly, as applicable for road projects.

10.5.2 Prepare Regular Business Plans

- (5) Based on the Policies and Standards imposed on it by the MoEST, DoR senior managers should inform the GESU managers what it expects from the Unit over the coming year (and longer if possible).
- (6) In return, the GESU management should be required to submit a Business Plan for its Unit for the start of each financial year, detailing what resources it believes that it will require over the coming year, in terms of expertise, physical resources and finance, in order to achieve its objectives. These plans would therefore include some proposals for staff training, risk management assessment and a cash flow forecast for the Unit for the coming year. This Business Plan would (following discussions between the GESU and DoR managers) be approved and would form the basis on which the obligations of each would be explicitly described.

10.5.3 Allocate Clearly Defined Responsibilities

- (7) Within the DoR, the senior management should clearly allocate responsibility for environmental and social aspects for all of its projects to the GESU (as the relevant unit). The Unit's manager would be required to account for the Unit's performance to senior DoR managers. This would predominantly involve the submission of relevant reports to senior DoR managers, who should stipulate what summary information and format these reports should take.
- (8) Subsequently, the responsibility of DoR managers is to ensure that the resources allocated in the Unit's approved Business Plan are provided completely and on a timely basis. They would also monitor the performance of the Unit through the submission of regular reports from the Unit's managers, and the use of expert and independent audits.
- (9) The responsibility of the Unit's managers is to organise the available resources within the Unit in whatever way they deem appropriate, in order to achieve the Unit's objectives. They should be given far greater managerial and operational autonomy in this respect. They would also be required to submit reports on the performance of the Unit in the format stipulated by the DoR managers, on a regular and timely basis.
- (10) In carrying out its mandatory functions, the GESU would delegate on-site authority to the relevant supervising Engineer, stipulating what are his environmental and social obligations (and any operational requirements. This includes any requirement to involve Local Authorities during the work. These requirements would be detailed in the contract documents.
- (11) The DOR has a policy to move towards labour-based methods and staged construction, in combination with using private sector contractors for construction works. If labour-based construction methods are adopted, the role of Local Authorities including VDC, DDC under the Ministry of Local Development (MoLD) may increase and needs accordingly be defined. Close coordination with Local Authorities should help in mobilising local communities, particularly when employing bio-engineering

works, compensatory plantation and the subsequent care for the saplings. Additional coordination with DDCs will be necessary if socio-economic activities such as micro credit, cooperatives, skill trainings etc. are to be promoted, implemented and sustained for an adequate period after the completion of the project implementation.

- (12) Where possible, the formation of Local Road User Committees, District Road Construction Committees or Village Road Construction Committees might be considered when seeking both support from local communities, be it for monitoring or implementation of supplementary support programs.

10.5.4 Enhance Inter-Agency Coordination

- (13) To increase the overall project implementation efficiency, close coordination between GESU/DoR and ES/MoPPW is needed. A permanent mechanism with officially defined responsibilities should be established between the two units. Any review works, comments and approval should be carried out by the established mechanism. Despite the provisions made by the Environmental Protection Act (1996) makes GESU/DoR 'the Proponent' and MoPPW the 'Concerned Agency' a combined review, discussions and comments on IEE Final Report before approval and EIA Reports before forwarding it to MoEST will save considerable time, labour and resources for finalizing EA studies.
- (14) A close coordination between local agencies and project management through District Road Office is also equally important if the projects are to be implemented on labour-based concept. It becomes more relevant if socio-economic enhancement program are also to be implemented under the road project. For sustainability of such socio-economic enhancement programs, it will be necessary to clearly define time frames and payment conditions to exclude undesired later claims.
- (15) Institutional linkage between the road sub-projects and the Department of Forest is also an important issue, particularly when the road passes near forest protection or conservation areas, national parks, wetlands etc. In such instances, looking at importance level of possible impact on forest resources, representation from Department of Forest can also be invited as observer in the mechanism developed between GESU/DoR and ES/MPPW for finalizing IEE Report and forwarding EIA related documents to MoEST.
- (16) Institutional Linkage will be necessary between the Project management Office/DoR and Office of Chief District Officer (CDO), Chief of district office of Land Revenue and Local Development Officer in District Development Committee, particularly for planning and implementing Resettlement Action Plan. A compensation Determination Committee (CDC) will be formed by involving above said officials to determine compensation rate for land and property, and approve their implementation. They also participate in grievance resolution related with acquisition, compensation and rehabilitation issues.
- (17) Linkage between Project Management Office and Local Stakeholders, NGOs/CBOs are also needed for developing a system of coordination, cooperation, grievance resolution and smooth implementation of project without social tension and problems.

10.5.5 Enhance and Ensure Quality Control for Private Sector Involvement

Coordination, networking and linking with civil service and private sector environment will expand the Unit's capacity to perform and deliver service which can in the long run help its institutionalisation and survival. Implementation of

project/sub-project specific plans can be undertaken by the proposed re-organized Unit (GESU) mainly by outsourcing through local consultants and implementing NGOs.

- (18) Standardize and ensure transparency and accountability for outsourcing contracts, both for consulting activities (e.g. preparation of environmental and social assessment studies) and construction works. Contracts should only be awarded to companies with proven good records in previous or similar development projects, based on credible and accountable references. Data on private sector companies becoming involved in such contracts shall be subjected to a meticulous evaluation system which is to be stored in the data bank of the M&S Section (see organisational chart, Fig. 10.2).
- (19) The implementation task will be awarded through open tender. The consultants (local) winning the contract will engage, subject to approval by GESU, an implementing NGO to work in the field of public consultation, focussing on resettlement procedures, compensation and ad hoc environmental requirements. The Consultants (and the contracted NGO) will be responsible to prepare, upon request, awareness material, and leaflets in vernacular for information dissemination, conduct disclosure sessions, etc. All contracted parties will be requested to follow the prescribed reporting formats and schedules.
- (20) Roadside monitoring and evaluation of the environmental & social safeguard measures will be done first by the concerned implementing agency (mainly the implementing NGOs), to be followed by the Supervising Consultants. At the same time, GESU staff must be put in a position to be present at sites in order to evaluate the implementation activities to ensure their transparency and accountability and assess project effectiveness⁴.

10.5.6 Formalize Supervision and Compliance Mechanisms

- (21) Similarly for Studies, the Unit shall be made responsible for developing detailed environmental & social safeguard guidelines that are to be followed by all contracted parties working in DoR projects. The Unit must ensure that the content and spirit of such guidelines are duly reflected in the ToRs for the contract documents. The process should be formalised and standardised to facilitate the supervision, monitoring and auditing of the contracted works by the Unit at pre-defined schedules. In such way it can be ensured that the contracted parties have complied with the required standards and policies. Appropriate penalties (as specified in the contract documents) need to be strictly applied in case of any non-compliance.

10.5.7 Carry out Institutional Training for Skill Development

- (22) A Training Plan should be implemented at earliest stage, in line with the training modules prepared for the SRN Program. Priority training modules, to be carried out as DoR in-house courses, are (i) skill training for Environmental and Social Assessment Studies, (ii) training in Code of Good Practice in road construction works typical for Nepali conditions, (iii) procurement and quality control in procuring private sector service, and

⁴ The concerned Donor Agencies will continue to respond to any objections raised by concerned stakeholders by conducting their own monitoring and evaluation. They can also engage independent monitors and evaluators 2 to 3 years after project termination to assess project effectiveness, if necessary

(iv) Training of Trainers on the above topics relating to environmental and social safeguards in road development programs. The training is designed for selected staff of the DoR (including all candidates for GESU) and from line agencies like the MoPPW, MoEST and others. The training might also include selected representatives from the private sector.

- (23) Based on specific need assessment a similar institutional strengthening program may be considered to include selected staff of the MoPPW who is involved in reviewing and approval of EA studies associated with road development programs. Under the present arrangements, the Environmental Section of the Ministry of Physical Planning and Works (ES/MoPPW) is authorised to review and approve the TOR and Final Report of IEE study into road (SRN) projects. They are also authorised to forward the scoping document, TOR and EIA Report to MoEST for approval for SRN roads. Thus, there is a close linkage between ES/MoPPW and GESU. However, there is no such permanent institutional mechanism yet adopted to maintain a close coordination for maximum efficiency in review and approval process of EA studies. It is thus recommended to include selected staff of the MoPPW that will be engaged in reviewing tasks of environmental and social assessment documents. At the same time it must be assured continuity of the trained personnel remaining involved in these review tasks.

10.5.8 Re-organisation of the Geo-Environment & Social Unit

Within the GESU, the following recommendations are made, in order that it can fulfil its responsibilities (as specified above) efficiently and effectively: The Unit should be structured as shown in Figure 10.2 below.

The Unit should be headed by an Environmental (Civil) Engineer of the rank of a Divisional Engineer with a minimum tenure of three years. It is recommended that this manager should have the combine qualifications of both a technical and an environmental engineer. He/she should be sourced from either the public or private sector, wherever the best candidate is available. It is of significant importance to create this post as a long-term occupation in order to ensure continuity and sustainability of organisational re-structuring. However, he/she should not have permanent tenure, and the DoR senior managers should be able to remove him if he fails to fulfil his duties (as should be the case for all other DoR staff).

In order to ensure adequate professionalism and motivation, as well as retention of key staff, this individual should receive conditions of employment and remuneration that are set by the DoR senior management and are commensurate with that available in the private sector. The candidate's public sector grade of employment should be irrelevant. In return, the conditions of employment should stipulate his/her functions and obligations.

The recommendations include a re-structuring at both institutional and organization levels the addition of three more sections, namely a Social Section, a Monitoring and Evaluation (M&E) Section, and a Grievance Desk.

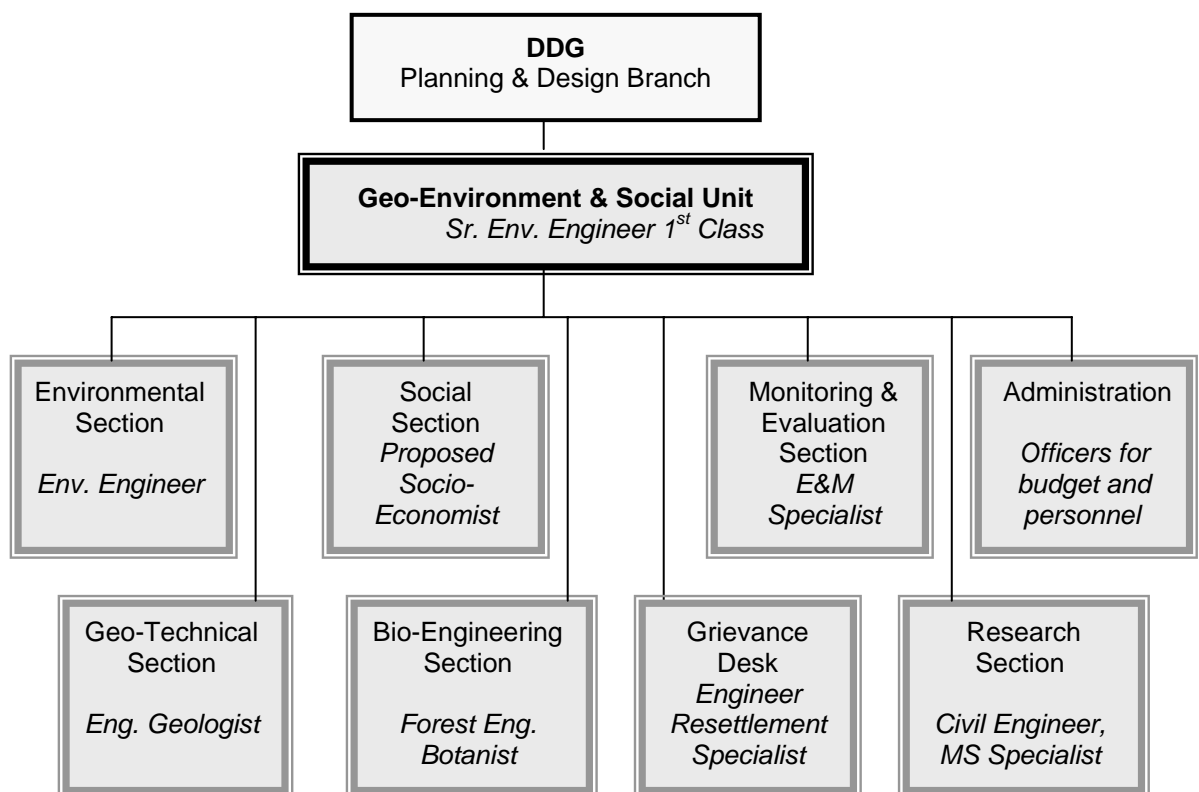
- a) The **Social Section** should be headed by a trained Socio-Economist. In case, such expertise is not available internally, efforts should be made to get one from other Ministries/Departments. If that is not feasible, procurement should be made from the private consulting market on contract basis. The section should be adequately manned with skill and expertise in view of the complex nature of social plans, frameworks and guidelines which the Unit may be required to apply as mitigation measures. The addition of a Social Section will also justify for recently renaming the Unit as Geo Environmental and Social Unit (GESU).

b) The proposed **M&E section** should be staffed in similar manner. The importance of M&E in project implementation can hardly be overemphasized. Monitoring is required for project success on regular basis for continuous assessment of project implementation in relation to agreed schedules, use of inputs, infrastructure and services provided. Monitoring provides managers and other stakeholders with continuous feedback on implementation. It also identifies actual or potential implementation bottlenecks at an early stage helping project managers to facilitate timely adjustments to project implementation. Evaluation is the periodic assessment of a project's relevance, performance, efficiency and impact (both predicted and unanticipated), and to judge whether or not project implementation is on its right track. Impact evaluation should be made, by independent evaluators, at least two years after project termination. A slot should be created for engaging a senior and experienced System Analyst to prepare a sound data base for the Unit as well as networking with the other Departments and sections of the DoR. Such a data base can be the basis of a MIS.

c) It is further recommended to include a **Grievance Desk** in the GESU to enable the Unit to take up timely and adequate corrective measures while addressing the incoming grievances from ongoing projects. This section should be furnished with a well publicised and dedicated telephone hotline and fax to receive suggestions and comments pertaining to environmental and social issues from PAPs and/or other stakeholders sharing their concerns and interest in ongoing and planned road projects.

In the light of the above, the following Organizational Chart may be proposed for a reorganized Geo-EU (see Fig. 10.2).

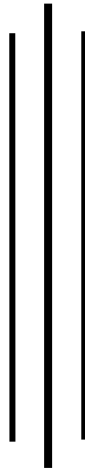
Fig 10.2: Proposed Re-Structuring of the GEU into a Geo-Environment and Social Unit



The single 4 WHD vehicle is that is currently deployed under this unit is totally insufficient. Apart, this vehicle is more than 10 years old it requires major repair and maintenance. For the time being at least two nos. of motorbikes are required as transportation facility to motivate the Engineers working in the unit.

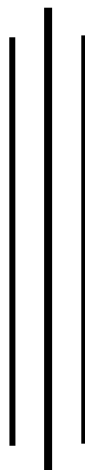
Above all, the GESU needs to be furnished with sufficient and regular budget to manage the above mentioned tasks and to ensure efficient functioning of the unit.

Government of Nepal
Ministry of Physical Planning and Works
Department of Roads



Environmental & Social Management Framework

A guide to the environmental and social
issues associated with new road
construction and upgrading



(Final Version) April, 2007

ANNEXES

**Annex 1 The Consultant's Terms of Reference
for Preparing the ESMF**

Annex 2 Environmental Code of Practice

**Annex 3 Glossary for Technical Terms used in
the ESMF**

Annex 4 Reference List

Annex 1
The Consultants Terms of Reference
for Preparing the ESMF

ANNEX 1

Note: The following text is extracted from the General ToR for the SWRP&PIP provided to the Consultants. Hereunder, only those **sections are printed in bold** which relate to the Environmental and Social Management Framework:

TERMS OF REFERENCE FOR CONSULTING SERVICES FOR STUDY FOR SECTOR WIDE ROAD PROGRAM & PRIORITY INVESTMENT PLAN

1. Background:

Geographically, Nepal comprises a mountainous region, hill districts, and lowland plains. The economy is dominated by agriculture, which represents 44 percent of Gross National Product (GNP) and employs the majority of the population. Apart from trails and air transport, roads are the only means of transport. They are essential to economic development, carrying approximately 90 percent of freight and passenger traffic. Road transport in Nepal is vital to reducing isolation and distributing economic development to remote areas.

Nepal's road network can be broadly divided into two parts: the Strategic Road Network (SRN) and the Rural Roads (RR). The SRN is currently being updated to include approximately 5500 kilometers of completed and proposed national highways and feeder roads. It carries most of the road traffic and provides the national transportation links between main centers and to neighboring countries. Within the SRN is the loosely defined core road network (CRN). It comprises approximately 1,500 km of national highways with the highest traffic volumes (greater than 1,000 vehicles per day). The CRN carries the bulk of longer distance commercial traffic movements, linking all major commercial centers, economic centers and main border crossings. The RR comprises approximately 4,600 km of district roads, plus trails, tracks and suspension bridges.

His Majesty's Government of Nepal (HMG/N) has prepared a Priority Investment Plan (PIP) for the Road Sector as part of the Road Maintenance and Rehabilitation Project (RMRP) funded by the World Bank. In addition to it Department of Roads (DoR) has recently carried out a North-South Road Corridor study and prepared a 20-year Road Master Plan for the Road Sector covering the 10th, 11th, 12th and 13th Five-year plans of His Majesty's Government of Nepal. Based on these Plans and Study along with the aims and objectives set in the current 10th Five Year Plan and National Transport Policy (2058) HMG/N plans to carry out a Study for Sector Wide Road Program & Priority Investment Plan. Part of the proceeds from Road Maintenance and Development Project (RMDP) under the loan assistance from the World Bank (IDA Cr. 3293-NEP) will be utilized to carry out proposed Study.

The key object of the Study is to prepare a sector wide investment plan for the road sub-sector in order to provide all weather motor able access within four hours walk from remote settlements.

The study consists of two parts:

Part I - Sector Wide Road Program & Priority Investment Plan for The Strategic Road Network

To generate the total length of all weather national grid of road networks comprising both strategic and rural roads to allow accessibility to the populace not farther than four (4) hours walk in the hills and two (2) hours walk in the Terai. The consultant shall estimate an optimum investment need based on expected traffic volume and other economic activities in the area.

To Review the present Priority Investment Plan (PIP) and update it for the period of ten years (2007-2016) covering about 5000 km of existing strategic road network out of which 2800 km of upgrading and improvement (rehabilitation). The updated plan shall include additional 2200 km for new construction including optimum maintenance costs forecasts for all the strategic road networks required for that period.

Part II - Detailed Technical and Economic Feasibility Study of Selected 600 km of Roads

To carry out detailed technical and economic feasibility studies for new construction, upgrading and improvement (rehabilitation) of about selected 600 Km of the Strategic Road Network. The roads for the study will be screened from the updated plan. Out of the 600 km of roads about 200 km will be studied for new construction and the rest about 400 km for upgrading and improvement excluding the roads whose feasibility studies have already been carried out.

Part I Sector Wide Road Program & Priority Investment Plan for The Strategic Road Network

2. Objectives

The main objectives of **Part I** are:

- a. to develop and suggest a futuristic national grid of road networks including both the strategic and rural roads based in the twenty year road master plan, district road transport plan and the north-south road corridor study.
- b. to prepare an appropriate Priority Investment Plan (PIP) of strategic road network covering about 7200 km roads for the period from 2007 to 2016 and a review process under the policy objectives set by the twenty year road master plan identifying potential programs and projects for the strategic road network.
- c. to determine the optimal balance among construction of new roads (national highways, feeder roads and bridges) and improvement, rehabilitation and maintenance of the existing strategic road network**
- d. to determine an appropriate level of expenditure on investments for construction and maintenance given local resources and absorptive capacity constraints (financial, technical and human resource related) and the probable level of foreign assistance in the sub-sector during the period of ten years starting from the year 2007.**
- e. to forecast the optimum maintenance costs of the strategic road networks required for the period from 2007 - 2016.
- f. to review the present Priority Investment Plan (PIP) prepared under the policy objectives set by the Eighth Five Year Plan (EFYP) and assess the achievements set forth in that PIP regarding the construction and improvement, rehabilitation and maintenance of the existing strategic road network only.
- g. to compare different budget scenarios from 2007 to 2016 for the strategic road network and present the consequences of budget constraints to the society (network net

present value), road users (network road users) and road agency (short term and long term agency investment and maintenance expenditures).

- h. to characterize the current network average condition and forecast the average network condition over time for the different evaluated budget scenarios.
- i. to determine the optimal investment plan with allocation of resources between geographic regions, surface types, road work types and functional classification of roads.
- j. to present a list of strategic road network links, for the defined proper level of road agency expenditures, containing for each link the corresponding basic characteristics (length, width, roughness, traffic etc.), recommend road work, road work cost, road work timing, net present value, rate of return and net present value per road cost ratio.
- k. to present the result of the network evaluation on a map produced preferably with a GIS system.
- l. to train about six DOR engineers and assist DOR to establish HDM-4 system within Department of Roads to improve the technical capacity of DOR in network planning using HDM-4 model.

3. Scope of the Services

The Consultants shall carry out all engineering, economic and socio-environmental studies, including topographical surveys and pavement strength tests, needed to prepare the Priority Investment Plan of strategic road network. Sectoral investment studies on development, upgrading and improvement of the strategic road network, will be conducted and overall maintenance strategies would be developed based on the World Bank's Highway Development and Management Model (HDM-4), which the consultants will calibrate to suit the Nepalese conditions. While preparing the PIP regional balance shall be taken into consideration. The followings are the detailed description of the main tasks to be undertaken by the Consultants:

(I). Review of Technical Studies and Detailed Work Program

The Consultant will review all relevant studies carried out in the past and extract any information that may be used in the present study. The present existing PIP along with the twenty-year road master plan, district roads transport plan and north-south road corridor study would be the guiding reference for the future PIP. Based on such information and their initial findings, the consultants will update and revise the original work plan submitted with their proposal and provide a detailed schedule of work including the timing of key events and present it as part of Inception Report.

(II). Traffic Forecasts and Network Analysis

- (a) Traffic Studies:** The Consultants will review the existing traffic data from the Highway Management and Information System (HMIS) publications, Traffic Engineering and Safety Unit (TESU), Road Network Development Project (RNDP) and other consultants working for Road Maintenance and Development Project (RMDP). They shall prepare a program of additional data collection and assess present strategic road traffic demand. The program will include, to the extent required, additional classified traffic survey for both passenger and goods traffic showing the origin and destination along the roads of study. The consultant shall also carry out the axle load survey in all major roads along which instances of overloading persists.

- (b) **Traffic Forecasts:** The Consultants will prepare traffic volume and mix forecasts for strategic highways and feeder roads. The choice of appropriate forecasting model will be preceded and determined by an assessment and analysis of (i) overall economic development prospects and the resulting total transport demand, (ii) the likely future modal distribution of traffic between strategic road network and the other transport network in Nepal. Different scenarios could be developed and evaluated as appropriate.
- (c) Wherever predominantly stable growth conditions and only gradual changes in socio-economic conditions are expected to prevail, the Consultants will extrapolate from past trends, making adjustment that may be necessary to account for changes that are likely to modify these trends. Where major rapid changes in socio-economic conditions are expected, the consultants will prepare traffic forecast in three stages: (i) estimation of volume and location of future tourism, agricultural, industrial and mining input and consumption, including imports and exports; analogous estimates of population and personal income growth and of the income elasticity of demand for transport will be necessary; (ii) translation of population and output/consumption forecast into traffic-both by volume and by origin and destination and (iii) distribution of traffic to the various transport modes, taking into account both perceived and total distribution costs and any major planned transport projects (such as under construction Banepa - Sindhuli - Bardibas Road, and under study Kathmandu-Terai Fast Track, and the Kathmandu Outer Ring Road). The resulting transport growth rates will be applied to be base year traffic estimates to produce road traffic forecasts for the strategic road network.
- (d) The Consultants should consider the almost uni-modal set-up to Nepal's transport system. Use of a traffic assignment and forecasting model shall be supported by the rationale for the Consultant's choice and present it as part of their proposal.
- (e) On the basis of the traffic forecasts and taking into account the limited existing network, the consultants will assess whether the segments additional to the existing grid of roads (including upgrading of existing roads) are necessary to meet future traffic demand and sustainable taking into account environmental considerations. The Consultants will prepare a simple model of traffic forecast based on the above analysis for the strategic road network. The demand for roads would be e.g. a function of productive potential, social service delivery needs, accessibility, aggregate transport costs and resource mobilization capacities.

(III). Technical Data Collection

Strategic Road Network: The consultants will review and update the following technical data in the format required by the HDM-4 model. An important component of the services will be to involve DOR personnel with activities related to use of HDM-4 for preparing the investment plan including on the job and specific training to introduce capability within DOR in operation of HDM-4 software for Highway Development and Management.

- (a) **Vehicle Operating Costs (VOC):** The Consultant will review the VOC model developed for the Road Maintenance Project in the past and update it for use in the future.

The consultant will define current vehicle operating costs and travel time costs for Nepal by performing a Level 1 and Level 2 calibration of the HDM-4 model, following the guidelines presented on the Volume 5 of the HDM-4 documentation. Priority should be given to establish economic vehicle fleet costs, fleet utilization and physical and power characteristics and calibrating the desired speed and fuel consumption.

- (b) **Construction and Maintenance Costs:** The Consultants will review and update estimates of unit costs for construction and maintenance works to be used in the modeling phase (HDM and transport model), based on existing data from construction, upgrading and improvement works carried out in the recent past. Costs should be considered both in financial as well as economic terms.
- (c) **Road Data:** The Consultant will review the present PIP and adopt the same system for road data for both paved and unpaved roads. As adopted in the present existing PIP the Road data for unpaved roads will be limited to roughness, CBR of the natural sub-grade, thickness and characteristics of the pavement materials, road geometry and the carriageway and formation widths. It shall be collected on sample basis for typical sections and estimated elsewhere. The sampling rate will depend on the economic importance of the roads considered.
- (d) **Bridges:** The Consultants will review and if necessary update the existing inventory of bridges recently prepared by the local consultant for the Road Maintenance and Development Project. The inventory includes a summary description, classification based on types and sizes and conditions of all bridges and ferries on the strategic road network. A review of unit maintenance costs for bridges will also be included in the study.
- (e) **Air Transport Network:** The Consultants will review and update the basic data of air transport network in order to estimate basic unit costs to compare with other modes of transport affecting rural accessibility.

(IV). **Road Inventory and Database**

The consultants will produce the road data described above primarily for the network modeling. The Consultant will review the existing formats, in which information has been gathered and presented, and suggest changes in the formats if necessary. As of this effort, the consultants will review inventory procedures established by DOR/MRCU. In addition to reviewing the DOR/MRCU inventory procedures, they will also develop nodes and links for the new roads added to the strategic road networks.

(V). **Analysis and Evaluation**

Strategic Road Network: The analysis would consist of a prioritization of construction, upgrading and maintenance investments based on the network modeling, ranked according to economic criteria considering most likely sectoral budget ceiling limitations.

For analysis of the maintenance options of the existing roads of the Strategic road network, consultants will group the referenced roads into categories or groups of homogenous sections with similar characteristic such as traffic range, pavement type and condition (roughness level), structural strength and so on.

Sections requiring special attention should be analyzed separately. For all groups of sections defined above, the consultants will define the investments and the corresponding maintenance needs that will be technically justified to match the capacity of the segment to future road transportation demand. The consultants will use HDM-4 to compare the options and select the economically viable option for the full network. The options to be considered shall include construction of new sections and realignments including by pass to the major settlements; widening of existing pavements reconstruction on existing alignment improved road standards (upgrading); provision of full strength pavement overlays (including widely leveling course where needed); periodic maintenance operations such as thin premix overlays, single or double surface dressing courses; improvement of sub-grade strength through better compaction methods and/or stabilization; improvement of embankments and addition of drainage structures to prevent damages from flooding; and so on. The consultant shall study the roads and road sections under the performance based maintenance system and critically examine its suitability in the Nepalese conditions.

(VI). Priority Investment Plan

The consultants will prepare a national grid of road network consisting both strategic and rural roads to provide road accessibility at a distance of not more than 4 hours walk. Based on the national grid and the above data and analysis the consultant will prepare a priority investment plan for about **5000 km** of existing strategic road networks and about **2200 km** of additional new roads.

The consultant should prepare the plan based on the optimum phasing of investments and maintenance over a 10-year period, indicating the optimum balance among: (i) construction and upgrading of the strategic road network; (ii) rehabilitation and maintenance of existing roads and bridges of the strategic network. It is expected that the consultants during the course of their work will compare several strategies for the development of the strategic transport networks and its maintenance taking into account the specific physical and economic conditions, likely environmental impacts and necessary mitigation measures and natural constraints of Nepal relevant for road development such as inter alia, the country's difficult topography, limited absorptive capacity, scarcity of human resources in the road sector, land use predominantly for agriculture, ecologically/environmentally sensitive areas, and relatively uneven distribution of population centers.

The consultant will compare different budget scenarios and present the consequences of budget constraints to the economy (society net present value), to road users (network road users costs), road network (network average road roughness and percent of the network in good and fair condition) and to road agency. The budget scenario to be evaluated could be for example: a) optimal expenditures, b) 75% of optimal expenditures, c) 50% of optimal expenditures, d) expected level of expenditures.

The consultant will present a table with the results of the network evaluation by road link, for the expected level of expenditures and other budget scenarios. The table will present at least for each road link the basic characteristics (length, width, surface type traffic, roughness, etc.), the proposed road work, the year of the proposed road work, the road work cost, the road work cost per kilometer, the net present value, the rate of return, and the net present value per road work cost ratio. The structure of the table should be suited to present the main results in a map preferably with GIS system.

The consultants will review the availability of local (HMGN and Road Board Funds) and foreign financing for the road sub-sector in Nepal, make reasonable assumptions of future levels consistent with the lending programs of the major

donors in the sub-sector (ADB, IDA, Japan, SDC, DFID etc) and match these against the optimized programs in the 10 year plan to be reviewed periodically.

Part II Detailed Technical and Economic Feasibility Study of Selected 600 km of Roads

2. Objectives

The primary objectives of the consulting services are:

- a. **to conduct detailed technical and economical feasibility study of selected 600 km roads which does not have detailed study carried out earlier, for upgrading, improvement and new construction. The roads for the study shall be chosen during the preparation of Interim Report of the Priority Investment Plan in month 6-7 of the services in close consultations with DOR. Out of the total 600 km of roads for the feasibility study, about 400 km of the roads shall be studied for upgrading and improvement including bridges and the rest 200 km for new construction.**
- b. **to review and update the existing detailed feasibility studies of roads carried earlier under the Road Maintenance and Development Project, for the present economic and socio-environmental parameters provided these roads rank high in the PIP list.**

3. Scope of the Services

The following sections outline the anticipated tasks required to bring the proposed extensions and improvements to the Strategic Road Network for possible appraisal by the Bank in 2006. The services include:

a. Technical Economical Feasibility Studies of the prioritized roads:

The consultant will carry out the technical and economical feasibility study of the prioritized roads for new construction of approximately **200 km** of roads and for upgrading (rehabilitation and improvement) of approximately **400 km** of the strategic road network including bridges.

The consultant will evaluate, using an economic evaluation model (HDM-4 or Road Economic Decision Model, RED) for each road, a series of project-alternatives considering different investment levels, which will be compared with a without project alternative that will represent a do-minimum scenario and not do-nothing scenario.

b. Initial Environmental Examinations and Environmental Impact Assessments:

The study also includes Environmental Impact Assessments for New Construction and Initial Environmental Examinations for roads proposed for Upgrading as specified in the DoR Reference Manual for Environmental and Social Aspects of Integrated Road Development and Public Works Directives, Part II Procedural Directives Ch 2 and 3, HMG/N acts and regulations and applicable Bank Guidelines.

Detailed Scope of Works

The consultants will carry out the following tasks:

- (i) **Review studies and documents pertaining to the proposed feasibility study, including DOR planning documents; previous feasibility studies and**

analysis; road traffic data and available forecasts (vehicle, cargo, and passenger); relevant environmental and social impact studies; and available survey data (including maps, aerial photographs, etc.).

- (ii) Carry out desk study of the investment plan to refine and select the roads for detailed feasibility for new construction and upgrading. The desk study will include preliminary cost estimates and a preliminary economic assessment based on available traffic data and also possible environmental and social impacts.
- (iii) Conduct a meeting with DOR to consider the results of above tasks to reach a decision on the roads to be studied in more detail. It is expected that about 200 kilometers of roads linking the district headquarters and about 400 kilometers of roads for upgrading, (rehabilitation), will be included for further study.
- (iv) Undertake a field survey of the selected routes for both upgrading and new construction. This field review will include only those routes identified following the initial desk analysis and review of overall feasibility.

The fieldwork will include reconnaissance (drive along at existing dirt roads and walk over along the suggested alignment for proposed construction) surveys, socio-economic data collection, data on passenger and freight movements, an initial review of the environmental factors pertinent in the selected road corridor and mapping of affected socio-environmental assets. The Consultants should attempt to identify at this stage any particularly vulnerable groups whose social, economic or environmental capability could be threatened by the proposed road construction or land acquisition.

- (v) For project components proposed for upgrading (rehabilitation) work, conduct a field survey to ascertain existing condition of road (including drainage, bridges, and other physical structures); prepare an inventory of required works (including bridges), carry out geological/geo-technical/material survey; and assess pavement design. Based on typical contracting arrangements and unit-based pricing, prepare a cost estimate of each project component including projected cost of bridges.
- (vi) For project components of new construction providing access to district headquarters, conduct a field survey and establish alternative alignments, identify features affecting design (man-made and geographical), and conduct a geological/geo-technical/material survey. Establish typical cross sections in sufficient number and detail to develop cost estimates for the construction. Identify issues pertaining to land acquisition and recommend approaches to be taken.
- (vii) Prepare a preliminary design of proposed project components. For upgrading (improvement/rehabilitation) works this will include adjustments to alignments, improvements or new construction of drainage, bridges, etc. For new roads provide alignment, profile, and cross section on an appropriate scale and details for the terrain and conditions. The scale for the drawings will be not less than 1:25000.
- (viii) It is intended that the construction and upgrading activities would be undertaken using Labor-based methods to the extend possible, with contracts let to local contractors supervised by HMG/N appointed construction management consultants Accordingly, the Consultants are required to specify simple work specifications, flexible road geometric, simple and community managed bioengineering measures, cost effective road structures in their design.
- (ix) Develop methodology to forecast passenger and freight traffic movements on the proposed roads to be used in the economic analysis. These should be based on

the populations served and anticipated trip production and freight generation rates. Forecasts of traffic levels on the sections of road to be upgraded will be based on surveys of existing demands and future growth estimates.

- (x) In consultation with the DoR, develop a comprehensive list of unit item rates to form the basis of the project cost estimates. In order to develop the Rates and Cost Estimates Consultants are required to apply appropriate HMG/N Norms and Specifications with proper and timely interactions with concerned Branches/Sections of DoR.
- (xi) The consultants will prepare detailed economic feasibility and sensitivity analyses for each new proposed hill road to fair weather standard (as per DoR guidelines) road based on estimates of transport benefits and costs (construction and maintenance) for each project. The economic analyses will include Internal Rates of Return, Net Present Value calculations, first year Benefit-Cost ratio, and sensitivity analyses to one-year delays in construction, increases in construction costs, decreases in benefits, and staged approach possibilities. The benefit calculation will estimate transport cost savings resulting from the replacement of foot paths, tracks and air transport with truck and bust transport, and agricultural producer surplus (using methodologies acceptable to the World Bank) resulting from road construction and improved level of access. The above work will entail basic surveys of traffic on footpaths, tracks and roads by mode (including estimation of local seasonality factors), and basic surveys of agriculture data (areas, products and average yields from District Development Committee data).
- (xii) The Consultants will also prepare the detailed economic feasibility analysis for the upgrading to sealed gravel or bituminous standards (as per DoR Guidelines) of the existing sections of earthen or gravel roads. These analyses will be based on vehicle operating cost savings attributable to existing traffic movements. The work will entail traffic surveys and traffic forecast based on seasonality factors and calculation of the current number of closure days per year. As in the case of new roads, the Consultants should prepare detailed feasibility and sensitivity analyses.

To evaluate the economic evaluation of improving unpaved roads, the consultant could use the Roads Economic Decision Model (RED) developed by the World Bank to evaluate the investments in unpaved roads.

- (xiii) **Prepare a social impact analysis in accordance with Bank guidelines and requirements of the Government. Include consultation with local communities affected by the project, possibly through community meetings, local leaders, and non-government and other community organizations. Mitigate adverse social impacts to the extent possible through the project design with costs incorporate in the economic evaluation. Identify positive benefits to, for example, human resource development. If resettlement is required, advise the Government on the requirements for a resettlement plan and assist with defining the basis for the plan.**
- (xiv) **Throughout the study, involve the local communities and residents within the areas of influence of the proposed roads in a program of consultations and community involvement. This will require liaison with local community leaders, local NGOs and local officials, as well as interviews and dialogue with the local populations particularly disadvantaged and vulnerable groups in the effected areas.**

The objectives of the community involvement activities should be to maximize the potential benefits, minimize the adverse impacts, and to gain the acceptance, commitment and participation of the individuals and groups affected by the road. The voluntary participation of local communities is also desirable as a means to increase their commitment with future maintenance requirements.

- (xv) Prepare an environmental impact assessment (EIA) and Initial Environmental Examination (IEE) in accordance with Bank guidelines and requirements of the Government, and report results of the social analysis (SA) appropriate for project appraisal. Mitigate adverse impacts to the extent possible through the project design (inclusive of such measures as supporting DOR's Geo Environmental Unit), with costs incorporated in the economic evaluation. In addition to negative impacts (such as blasting construction techniques) assessments, explore the opportunities to support environmental enhancement measures, such as forest and other natural resource conservation along the road corridor.
- (xvi) Following the completion of the feasibility study, cost estimates, and environmental studies and revised economic appraisals, the Consultants will develop and present their recommendations in regard to the timing, phasing and implementation of the proposed project components. Specifically, this will include recommendations in regard to the most appropriate contracting procedures and packaging of the project components. The Consultants will also develop, in conjunction with Department, the necessary organizational requirements both within the Department and also in regard to the contractors and supervision consultants.
- (xvii) Prepare a Project Appraisal Document at the end of study period, which will bring together all the main findings in respect of the various components in such a form as to assist with possible project appraisal by the World Bank. The document would include details of each project sub-component, economic and financial costing, Initial Environmental Examination and EIA statements (including land acquisition and resettlement issues), social assessment, estimated benefits, and overall economic and technical justification as well as project implementation schedule and implementation arrangements.

4. Training

The consultants will be required to conduct on the job and training to about six DOR Engineers in HDM-4, GIS Applications and Project Planning and prioritisation during execution of their services including: a) collecting road network data; b) storing, managing, and evaluating road network data; c) calibrating HDM-4 for road user costs and unit road agency costs; d) using HDM-4 for project evaluation, programming, and planning of road works; and e) presenting the results of their work efficiently to decision makers with proper tables, graphs and maps to be created in GIS system.

5. Report and Time Schedule

Item	SWRP & PIP		Feasibility Study	
	No. of Copies	Timing (in months) from start date	No. of Copies	Timing (in months) from start date
Inception Reports	15	2.5	15	7
Progress Reports and Technical Reports	15	Every Month (month 4 onwards)	15	Every Month (month 8 onwards)
Interim Reports	15	7	15	11
Draft Final Reports	30	13	30	14

Appraisal Document	NA	NA	15	14
Final Reports	30	15	30	15

(a) Sector Wide Road Program & Priority Investment Plan

The Inception Report shall summarize the consultant's initial findings and mobilization of staff, a first assessment of available data and of site conditions, and a detailed revised work program and schedule of activities. **Progress Reports** shall contain a brief summary of the work accomplished in the preceding months, an outline of work expected to be completed during the next progress reporting period, and consultants' comments or recommendations on any unforeseen conditions that may affect the progress or quality of their work. **The Interim Report** shall contain a summary of the findings and recommendations of the consultants on review of studies, calibration of network models, GIS application, network data traffic studies and forecasts, capacity of existing strategic network models, HDM-4 and GIS application, network data traffic studies and forecasts and capacity of existing strategic network. **The Draft Final Report** shall include the result of analysis of the scope of works outlined above for PIP including review process. **The Final Report** shall be reflecting all revisions required after receipt of comments from HMG and IDA on the Draft Final Report.

(b) Feasibility Study

The Inception Report will include the initial mobilization activities and will specifically present the suggested route alignments in previous studies and changes made in that alignment if any, recommended by the Consultant. The report will contain, among others, the proposed economic analyses methodology for the new road construction and road upgrading components for approval. The report will also contain the results of the initial screening exercise, which will select the final **600 km** (approximately **200 km** new construction and approximately **400 km** for rehabilitation and upgrading) from the investment plan as agreed during the inception. **Interim Report** will include the results and findings from the walk over and/or drive along survey and on the changes recommended on route alignments for further study. The findings in terms of the Initial Environmental Examination on local people by the road construction and analyses for each project sub-component will also be presented together with recommendations for further study, as required. This report will also present the initial results of the project costing, including unit rates, draft quantities and draft of the study including IEE and EIA as applicable. **Project Appraisal Report** will incorporate all Components of the proposed Project in accordance with the requirements set down in **3 (xvi)** of **Detailed Scope of Works**. **Final Report** will document all aspects of the study and provide details of the program and strategy for implementation incorporating the revisions required after receipt of comments from HMG and IDA on the **Draft Final Report**. **Progress Reports** will include a brief summary of work completed, work proposed, staffing arrangements and any other contractual matters.

All data collected during the course of the study will be documented, collated, and presented as annexes. All data, reports and relevant documents will be provided on electronic disk in a readily usable format.

6. Data and Facilities to be provided by the Client

Data on Pavement Condition, Road Roughness, and Traffic Studies available in the Department of Roads will be made available to the Consultants. In addition the client will make available previous documents and reports, which are in its possession.

7. Obligation of the Consultants

The consultant shall provide all the technical and support staff required to carry out their services. The Consultant shall also be responsible for providing all other necessary facilities and logistic support for its staff, including accommodation, transportation, office and survey equipment, material testing, communication, utilities, office etc.

The consultants will carry out confirmatory surveys on information available with DOR and collect additional necessary data for the execution of their services from field surveys. Some of the necessary data for the execution of the services are:

(i) Pavement:

Width: The consultants will measure pavement and shoulder widths as needed but at least once in every kilometer.

Curvature and Gradient: Using suitable instruments, the consultants will determine the average curvature in degrees per km and the average gradient in m/km for each road section referenced in the network.

Structures and CBRs: The Consultants will open test pits in the existing pavements and shoulders every 25 km or less, if required in order to determine the existing pavement structure, measure thickness of each individual layers, determine bearing capacity and measure CBR and moisture content of the natural sub-grades and shoulders. Between two test pits, the dynamic cone penetration (DCP) test will be carried out on the shoulders to assess the variability of CBRs of the sub-grades and on the pavement layers (if driving the DCP through the macadam layers is not found possible, then the consultants will bore a pre-hole through it) to assess the pavement thickness and bearing capacity profile and to determine the structural strength of the pavements. DCP on pavements should be at 2 km intervals for national paved highways and roads with more than 500 vehicles per day and at 5 km intervals on other paved roads. The consultant will ensure that deflection data (Section (iii) below) is available for some of the sites selected for the DCP.

(ii) Roughness:

The consultants will review the existing roughness data from the reports of the consultants who have carried out similar tests for DOR in different projects in the recent past and if required use a vehicle mounted response-type road roughness measuring system to collect additional data. The system will be calibrated and periodically checked in accordance with the International Roughness Index (IRI) standard. Consultants may limit the number of runs per section to one in each direction unless the existing conditions warrant otherwise.

(iii) Deflection:

The consultants will review the data collected by different consultants who have carried out such tests for different DOR projects in the recent past, and if required, measure additional existing pavement deflections under a standard 8 Ton axle. All measurements will be carried out when the pavements are soaked, preferably about the end of the monsoon, or else the values should be adjusted suitably to represent soaked conditions. The deflection values will be correlated to the structural numbers determined from the Dynamic Cone Penetrometer (DCP) measurements.

(iv) Pavement Condition:

The consultants will review the Pavement Condition survey of strategic road networks carried out by consultants employed by DoR in the recent past, and if required carry out additional surveys using the same methodology, at a sampling rate of 5 percent (50 meters in every one kilometer), to determine the surface distress (measured by the Surface Distress Index) and the dominant mode(s) of distress (e.g., cracking, potholing, raveling and rutting) in each of the referenced road section.

Addendum to Social Aspects of the ToRs

Part I Priority Investment Plan for the Strategic Road Network

Part I: Objectives

To prepare a sector wide social impact management framework, including recommendations for strengthening institutional capacity and arrangements.

Part I Section 3. Scope of Services

The consultant's service will include but not limited to the following:

- A detailed review of DOR's past or recent relevant experience on similar works in Nepal and assess lessons learned. Field discussions with people impacted by RMDP would serve as a good source for identifying what worked, what did not, and what key lessons can be identified from this experience used to strengthen future operations in the sector.
- An assessment of the capacity of DOR (or lower level agencies) to identify and ensure implementation of effective social mitigation measures, preferably incorporated as part of standard project preparation practice.
- An assessment of HMGN and Bank policies on involuntary resettlement settlement, identification of any gaps, and recommendations to bridge these gaps.
- On the basis of the analysis defined above, prepare a sector wide social impact management framework, including recommendations for strengthening institutional capacity and arrangements. Prepare the appropriate mitigation instruments - as a minimum a Resettlement Policy Framework, Vulnerable Communities Development Framework and sub-project RAPs and VCDPs prepared as necessary.

Addendum to Environmental Aspects of the TORs

1. Priority Investment Plan for the Strategic Road Network

Part I: Objective

- Assess the current standards of environment and social assessments being carried out in DOR;
- Assess the policies and operational procedures to address, mitigate and manage the environment and social issues in DOR; test for compliance in practice on a sample basis and identify areas that need modification/strengthening; and
- Recommend how the preparation (planning and design), implementation and supervision arrangements might be enhanced, and how any identified environmental issues might be mitigated.

Part I: Scope of Work

(1) Environmental regulations

- (a) Review of existing Nepali regulations, policies, guidelines, frameworks pertaining to EA, EIA and road construction and compare with World Bank safeguard policies and identify any gaps; and

- (b) Review of Nepali regulations concerning forestry, natural habitat, national parks a, conservation areas, pest management, cultural and archaeological property, and disclosure policies and compare with the World Bank policies and identify gaps. Determine which aspect of each regulation/policy is pertinent to DOR.
- (2) Assessment of DOR capacity to implement environment regulations and management and an analysis of the quality of implementation
- (a) Analysis of the current practices and institutional mechanism for application of the above mentioned policies and guidelines. Identify the gaps between the practice and the regulations;
- (b) Assess the current standards and quality of environmental assessments being carried out in DOR;
- (c) Assess the capacity of the DOR to carry out environmental management implementation in projects. Namely, capacity to: (i) develop TOR for IEE, EIA and environmental assessments; (ii) review EIA; (iii) develop environmental management plans; (iv) undertake all the clearance requirements for IEE, EIA etc. through the concerned Ministry and Ministry of Population and Environment; (v) conduct public consultations; (vi) incorporate all the recommendations of the IEE, EIA, and EMP in the contractual documents; (vii) supervise/monitor the environmental requirements; and (viii) ensure quality control of all environmental management activities.
- (d) Assess the existing policies and operational procedures and implementation mechanism to address, mitigate and manage the environmental issues in DOR. Test for compliance in practice on a sample basis and identify areas that need modification/strengthening. The sampling will analyze the following:
- (e) **Procedures:** The Consultant will review the processes undertaken to analyse, predict and manage the identified environment and social issues in design of these selected projects. The Consultant will establish whether the proposed remedial (prevention, mitigation and compensation) measures are commensurate with the nature and scale of the environment and social impacts of the projects. This will include, but not be limited to, reviewing (i) the engineering codes of practice followed for project design, with particular relevance to environment management; (ii) the construction management practices and environment management specifications being followed at site; (iii) implementation of tree plantation and roadside vegetation strategies; (iv) implementation of environmental enhancement measures, such as enhancement of roadside water bodies or public property resources; and (v) overall compliance with adequate environmental, social and health safeguards, during construction.
- (f) **Supervision and monitoring:** The Consultant will review the mechanisms for supervision and monitoring environmental and social issues in both the implementation and operation periods of the sample projects.
- (g) **Policies:** The Consultant will establish whether all the applicable environment, forestry and social policies and legal requirements have been met by the projects. The Consultant will also review the existing

DOR policies with respect to the management of the environment and social issues at all levels and all stages of project preparation and implementation;

- (h) **Discussion of alternatives:** The Consultant will verify whether all reasonable alternatives were considered during preparation of the current projects; and will critically review the final choice of road (alignment, pavement, road cross-section and construction material) with respect to the environmental and social setting of the projects, and program objectives such as connectivity and accessibility to physical, economic and social services and infrastructure.
- **Consultation process:** The Consultant shall establish whether concerns from all stakeholders including the local governments and the vulnerable groups (such as women, agriculture laborers etc.) were addressed in planning and designing the sample projects. This will include verifying the consultation process at DDC, VDC and Ward levels and how the public concerns have been addressed or not addressed by the project.
- (i) Based on the analysis conducted in (a) to (e) recommend concrete measures to be included in Study for Sector wide Road Program and Priority Investment Plan to bridge the gaps identified.
- (3) Institutional strengthening of the DOR for environmental management
- (a) Based on the analysis above, summarize the potential environmental requirement under the Study for Sector wide road program and Priority Investment Plan.
- (b) Prepare or revise if already existing, a compendium of mitigation measures differentiated by ecosystem types and environmental impacts and an environmental code of practice (suggested outline in Annex 1);
- (c) Determine the institutional mechanism for environmental management;
- (d) Prepare training plan;
- (e) Prepare legal framework necessary to ensure environmental management within DOR; and
- (f) Determine consultation and disclosure mechanism (See Annex 2 for suggested framework).
- (4) Methodology
- The Consultant will develop sampling criteria and select an adequate sample of districts for this study, so as to be representative of the entire programme in the identified districts. The selection criteria will be such that a variety of geographical terrain such as undulating, hilly regions, and Terai regions are covered in the study. The Consultant will select the districts in close consultation with the DOR.
 - The Consultant will carry out a desk review of the relevant documented guidelines to address environment and social issues, standards, procedures and processes that are being applied in the program.
 - The Consultant will carry out detailed field surveys for physical verification of actual contracts on a large and credible number of ongoing projects (in various stages of completion) representing the diverse social

and environmental variations. The field surveys are expected to (i) determine the extent to which these guidelines, standards, procedures and processes are actually being applied in practice; (ii) identify and assess environmental and social impacts arising from the planning/design, construction and operation of the projects in their particular setting; and (iii) identify all other relevant issues including those described in the scope of work.

2. Technical and Economic Feasibility of selected 600 km of roads

The current TOR is for specific roads identified under the priority investment plan. Since these are highways under category A, individual EIA and EMPs are required for each road under the Environmental Assessment safeguard policy. The following is suggested to be included in addition to the existing scope of services.

- (a) **Environmental overview:** The consultant will appraise the environment of the proposed roads and issues arising from the planning/design, construction and operation of the projects in their specific setting. Typically this will include aspects such as: climate, topography, geology, soil characteristics; ambient air quality, ambient noise levels; quality and availability of water; flood drainage, alteration of the natural drainage patterns (surface and ground water flows); flora & fauna - their ecological value; agricultural practices, grazing and land utilization; availability of construction material, handling of earthwork, conservation of topsoil and reuse; use of quarries and borrow areas and their rehabilitation; public and workers' safety, etc.
- (b) **Impacts on land use:** The Consultant will carry out an assessment of the land use/utilization pattern within the influence area, and direct, cumulative and induced impacts thereon from the projects. This will typically include potential impacts such as exploitation of natural resources; land use transformation - particularly the loss of grazing/pasture land and common property resources; urban-industrial development and ribbon development, etc.
- (c) **The consultants will review and update environment management plans (EMPs) Frame Work to be adopted by DOR in line with HMGN and Bank policies. The IEE of the sub-projects for the first year program shall include EMP to mitigate the environmental impacts. These plans will be developed based on actual field investigations for the respective projects (separate from the surveys undertaken for the current/ongoing projects). The EMP will also assign to appropriate agencies the recommended actions necessary to mitigate identified risks and enhance the overall preparation, design and supervision arrangements for the project.**

Environmental Codes of Practice

The environmental codes of practice shall include typical designs of mitigation/enhancement measures, complete with technical specifications for material and workmanship.

- (1) **Environmental Impact Screening Process**
- (2) **How to Apply the Environmental Codes and Specifications**

- (3) General Principles of Environmentally Sustainable Planning, Design and Construction**
- (4) Construction Camps and Site Operations (includes Haul Roads, Material Stockpiling, Facilities for Workers, etc.)**
- (5) Tree Plantation and Roadside Vegetation (includes Planting Operations, Maintenance, Selection of Species, Community Participation, Aesthetic Effects, etc.)**
- (6) Erosion Control**
- (7) Slope Stability**
- (8) Temporary Sediment and Pollution Control Devices**
- (9) Quarry Development, Operation and Reinstatements (includes Blasting, Pre-splitting, and other Safety Concerns)**
- (10) Gravel Extraction and Borrow Areas – Development, Operation and Reinstatements/Redevelopment**
- (11) Drainage and Flood Prevention**
- (12) Bridge Works (includes Scour and bank Protection)**
- (13) Traffic Control During Construction**
- (14) Protection of Chance Found Cultural Property; Removal of Burial Sites or Graves**
- (15) Public and Workers' Safety during Construction (includes Transport and Storage of Explosives)**
- (16) Waste Management and Site Redevelopment (including Spoil Disposal, Balancing Cut and Fill, etc.)**
- (17) Additional Measures for Roads through Forest Areas, Wildlife and Natural Habitats (includes Swamps, Temporary Wetland such as Paddy Fields, other Habitats and Breeding Grounds)**
- (18) Additional Measures for Roads in Hills and Undulated Terrain**
- (19) Other Site Specific Mitigation/Management measures (such as for Rivers, Lakes, etc.)**
- (20) Supervision, Monitoring and Compliance.**

Screening and Consultation Framework

- (1) Key Environment Management, Social Development and Participation Issues**
- (2) Analysis of Institutional and Organizational Issues**
- (3) Overall Screening and Consultation Framework**
- (4) An information strategy (objectives of road programme/project for local communities, relevance to the felt need of the communities).**

- (5) Collaborative and participatory mechanisms between communities and local/project authorities (enabling communities to participate in identifying and selecting road improvements, as well as in monitoring the implementation and operation).**
- (6) Mechanism for ensuring continued consultation (communities to be consulted about their needs, constraints and priorities, and discuss access/mobility needs as well as the levels and kinds of services needed).**
- (7) Local employment opportunities (from road improvement/maintenance works).**
- (8) Gender Strategy for the project (includes women's equitable access to employment opportunities).**
- (9) Empowerment and local control (includes decision-making by community representatives)**
- (10) Mechanisms for monitoring and evaluation.**

Annex 2

Environmental Code of Practice

ANNEX 2

Environmental Code of Practice for Road Construction

1. General Principles Guiding Environmentally Sustainable Planning, Design and Construction of Roads

1.1 General

This Guideline aims to assist road planners, site engineers and supervisors with a set of technically specified solutions, tailored to Nepalese conditions, to illustrate the general principles of environmentally sound and sustainable planning, design and construction of road structures. It also refers to drainage and flood prevention, roadside planting, work safety and health concerns, and protection of wildlife and cultural assets.

This Annex makes references to a number of documents in use by the former GEU. Major reference documents are the 'Environmental Codes of Practice, Study on Environmental and Social Aspects of Pradhan Mantri Gram Sadak Yojana, New Delhi, India, Feb, 2004', and the 'Roadside Bio-Engineering Manual of ODA, ORN #16, 1999'.

The Guidelines for the Code of Practice in road construction activities relates particularly to the project preparation stage to avoid/address environmental concerns through modifications in project design and the due incorporation of mitigation measures. It needs to be observed, however, that in addition to these guidelines and project planner needs also to consult and follow the construction guidelines as outlined by the DoR.

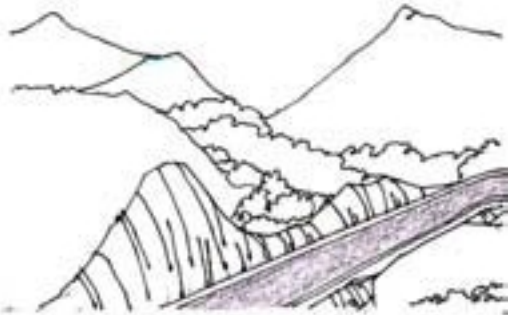
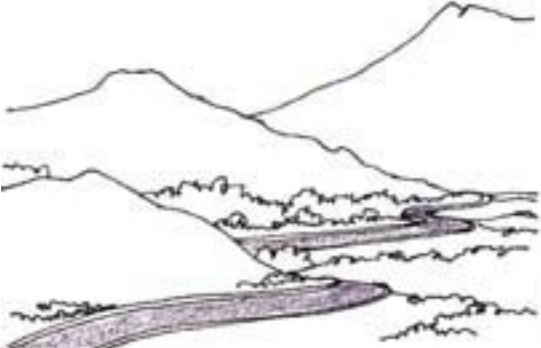
1.2 Finalization of the Road Alignment

All requirements of latest publication of Nepal Roads Standard (NRS), and Design Standards for Feeder Roads of DoR, GON in selection of alignment should be met with. In addition, adequate public consultations with the communities for information disclosure and to identify the concerns and preferences need to be taken up during selection of the alignment (see 'Chapter 8 - Public Consultation Framework' of this document). Finalization of alignment shall be carried out in accordance with the provisions presented below.

The alignment should be...

- Short
- Easy and safe to construct and maintain
- Economical
- Laid on firm ground
- Aesthetic and
- Having least adverse environmental impacts
- Ensure good drainage
- Adequate view of possible hazards ahead

A good road alignment shall conform to the natural topography as far as possible to avoid excessive cut and fill:

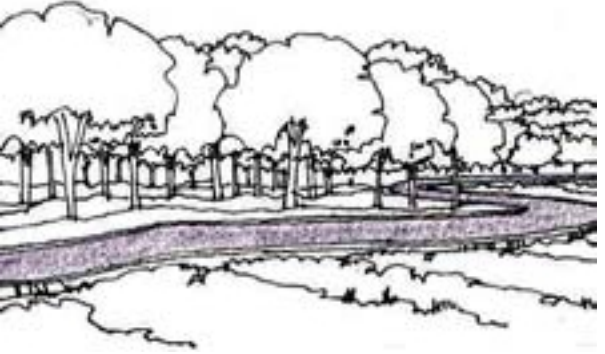
High Impact Road	Low Impact Road
	
<p>High standard roads</p> <ul style="list-style-type: none"> • Good geometrics • Moves large volume of traffic rapidly and safely • Huge cuts and fills, stability of slopes • Damage to vegetation, and • Disruption to natural drainage patterns 	<p>Low standard roads</p> <ul style="list-style-type: none"> • Conforms to the natural topography • Suitable for low volume rural roads and low travel speeds • Reduced environmental impacts <ul style="list-style-type: none"> ○ Reduces the cut and fill, ○ Reduces damage to vegetation ○ Minimize changes to natural drainage patterns.

An inventory of all environmental features along the proposed road is to be prepared and marked on topographic / thematic map (of scale 1:10,000). This would be conducted by the Project (may be assisted by consultant), and also in co-ordination with the local community through site walk-through survey. Consultations with the local communities are to be conducted during walk-through to obtain their suggestions and incorporate their concerns to address the potential environmental impacts. Suggestions of the community during the walk-through are to be incorporated, to the extent possible, while finalizing the alignment. A simple checklist to be filled up while carrying out the walk- through survey is given in **Table A2-1**.

Table A2-1 : Environmental Assessment and Screening Matrix

		Pre-construction			Construction												Operation & Maintenance			Remarks
	<div>Project Activity</div> <div>Resources</div>	Land acquisition	Delineation	Survey	Site Clearance	Workforce Camp	Water Source	River Training	Excavation	Embankment	Spoil Disposal	Blasting	Bridge Culvert	Road side drain & outlets	Bio-Engineering	Canal	Vehicular Operation	Porters	Maintenance work	
Physical	Topography																			
	Climate																			
	Hydrology																			
	Geology/Soil																			
	Water Quality/Water Source																			
	Air and Noise																			
Biological	Forest																			
	Wildlife																			
	Aquatic Life																			
	Biodiversity																			
	Conservation Area																			
	Wet Land																			
Soci-economic	Education																			
	Economy																			
	Gender Issues																			
	Institutions																			
	Culture																			
	Population/Ethnicity																			
	Health																			
	Land use																			
	Food Sufficiency																			
	Agriculture/Farming																			
	Industry																			
	Aesthetic																			

Elements to investigate and, to qualify and quantify to the degree possible are:

<p>Inventorize the following ...</p> <ul style="list-style-type: none"> • Unstable slopes, landslides and erosion prone area. • Land use (productive agricultural land, forest, grazing areas etc.) • Scale of resettlement • Trees • Forests, if any (Dense forest area with more than 40% grown cover and thin or open forest area with less than 40% grown cover); conservation areas, national parks • Drainage lines, rivers and water crossings • Irrigation water courses • Water bodies • Cultural properties • Utilities • Community facilities • Schools • Hospitals • Major settlements, and • Seasonal markets or cultural congregations 	 <p>Route Alignment to avoid felling trees</p>
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In hill and mountain areas, non-irrigated dry *bari* lands are generally suitable for locating a road alignment without major technical problems. Forest areas on the other hand, particularly in the vicinity of streams are generally steep, difficult and unstable, and should be avoided where possible. Irrigated *khet* lands are unsuitable on account of fertility and associated high agricultural production and technology because of drainage related maintenance problems during road operation.

In case of flood-prone areas and/or areas with very flat slopes, particularly in the *Terai*, hydrological surveys have to be conducted before alignment finalization. Inputs derived from these surveys such as the need for provision of culverts/bridges or other cross/roadside drainage structures should be considered in the alignment finalization. Routes involving higher costs on drainage compared to alternative routes should be avoided. In case of hill areas, geological studies have to be conducted to determine locations of loose rock, soil or potential sites for land slides, which may need to be avoided.

Recommended Practices for Alignment Finalization ...

- Follow existing main trails, as far as possible
- Follow natural topography
- Conform alignment to within property boundaries
- Adopt geometrics that do not compromise on safety requirements
- Avoid crossing power transmission lines, water mains, etc
- Avoid alignments affecting vegetation and felling of trees
- Avoid alignments passing through very unstable slopes.
- Avoid alignments close to streams
- Avoid encroachment of water bodies, and
- Avoid passing through natural designated forests, sanctuaries, national parks and wetlands.
- The road should cross the ridges at their lowest elevation. Relative economics are to be worked out before deciding upon the alignment.
- Hairpin bends are to be kept to a minimum. If unavoidable the alignment should be such that a flat hill slope is obtained for its location.
- Provide adequate cross-drainage structures to ensure that natural drainage patterns are not altered

1.3 Design considerations

All the road designs should conform to the specifications prescribed by Nepal Road Standard and design standard for feeder roads, as appropriate

Drainage: For large catchment areas with low ground slopes, the accumulation of water may cause flooding on the up-stream of the road. The increased velocity of water passing through the culverts causes scour on the down-stream and alters natural ground levels and scouring of land. Hydrological studies are to be conducted in large catchment areas to limit the afflux and provide adequate waterway for cross-drainage structures.

Enhancements:

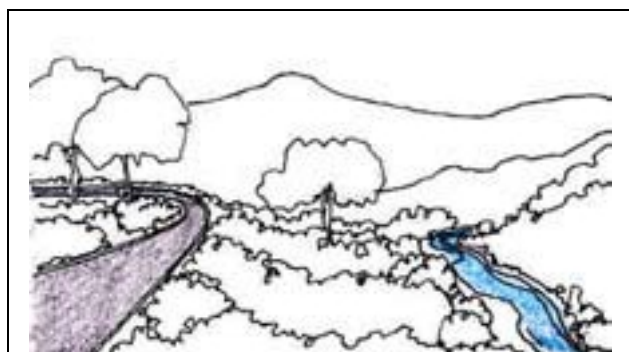
- i. Cattle crossings to be provided at normal crossing routes for safety of both cattle and road user.
- ii. Ramps for access to and from agriculture lands for cross traffic are to be provided to avoid damage to embankment and roadside drains.
- iii. Shoulders should be paved at destination/roadside villages and provide bus bays to avoid traffic obstruction.
- iv. Where possible, the embankment should be widened to provide a platform for stacking materials for maintenance and to ensure that the shoulders are kept free for movement of traffic.

Reduce roadway width when...

- Land is not available
 - Through built up areas
 - Through irrigated lands
- Voluntary land donation is resisted
- Land holdings are small and land take affects livelihood and
- The project road is "link route"

Low embankment height reduces...

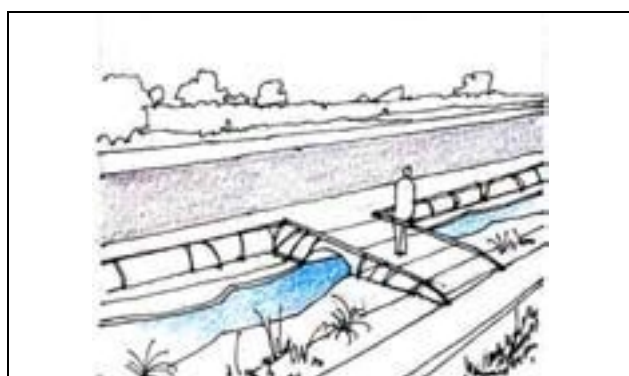
- Quantity of earth work
- Redevelopment costs of borrow areas
- Dune sand accumulation in desert areas and
- Requirement of land for construction of road



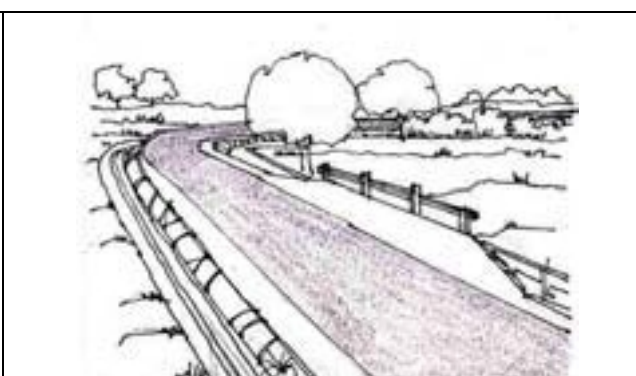
Align Road Away from Drainage Channels



Provide Adequate Openings



Ramp for Lateral Traffic



Widening of Shoulders for Storing Maintenance Materials

Community Concerns: Community concerns, expressed during consultations are to be addressed to the extent possible in the design of the road. The concerns need to be documented and checked for addressal. In case any of the measures are not incorporated, the same needs to be intimated to the community with adequate explanation after design finalization.

Road Signages: Adequate informatory, cautionary and warning road signs should be provided to ensure traffic safety, especially in the event of adoption of lower standards. The signboards should be placed such that they do not block the line of sight.

1.4 Environmental Considerations

Environmental considerations for various activities and sub-activities in road construction projects are presented in **Table A2-2** and **A2-3**. Measures for the same are to be incorporated in the project preparation stage to offset environmental impacts in the subsequent stages.

Corridors prioritized as per the core network shall be subjected to screening – whilst utilizing the screening checklist described in sub-section 4 of this Annex.

The Feasibility Study then has the task to identify the magnitude of the issues / impacts for finding adequate technical mitigation solutions and safeguard measures.

Some of the key environmental concerns to be mitigated...

- Land, including loss of productive topsoil
- Drainage
- Land use and livelihood the issue/s
- Vegetation, cutting of trees
- Forests, wild life, fisheries and aquatic habitat
- Water bodies and water quality
- Slope stability
- Wetlands
- Structures, and
- Common property resources

1.5 Integrating Environmental and Social Provisions in Bid Documents

The environmental and social considerations discussed above have to be incorporated suitably in the Detailed Design and the bid document to ensure implementation. Towards this end, the following steps should be taken by the Project Office.

- Detailed Drawings for the environmental provisions as per the environmental codes of practice are to be included in the Design. The drawings are to include specifications of the materials used and also the detailed bill of project area as quantities in the bid document.
- Cost implications of environmental measures suggested by the environmental codes of practice have to be included in the estimates for the project.
- Monitoring arrangements towards the implementation of the environmental provisions are to be specified.

Construction scheduling –factors to consider...

- Overall scheduling to incorporate climatic factors, snow fall, harsh weather conditions
- Agricultural practices and harvesting seasons
- Timing of specific activities to avoid special weather conditions
- Events of importance in the project area as festive seasons etc.
- Availability of local labour during harvest seasons

- As per the directives of the MoPPW/DoR, the contractor is expected to submit for approval of the engineer, the general methods, arrangements, orders and timing for all the activities in the works along with monthly cash flow. In scheduling the construction works, it is expected that the contractor considers all the risks and schedule the activities, which are likely to be impacted by weather phenomenon in a period in which these phenomenon are unlikely to occur. This would also need review and final approval of the engineer.

Timing of activities-factors to consider...

- If there is a time lag (more than a fortnight) between WBM and black-topping, the surface needs to be suitably blinded and may have to be re-rolled as per the instructions of the 'Engineer'.
- The time lag between the prime coat and the final black-topping shall be minimum and in any event be not more than 3 days.
- Sealed coat shall immediately follow the 20 mm carpet on the same day.

Table A2-2: Environmental concerns in Detailed Design Preparation

Activity	Items to consider	Measures to address	Detailed in Chapter
Survey walk	Topography	Inventories of environmental features avoidance, design modification to minimize adverse environmental implants Incorporating community concerns in to finalizing alignment.	
	Geology		
	Forests		
	Drainage lines/rivers/water crossing		
	Irrigation water courses		
	Water bodies		
	Grazing lands		
	Cultural properties		
	Utilities		
	Community facilities		
Detailed Survey	Major functions		
	Geological, geotechnical studies in hill areas	Stability analysis and measures to address slope instability in hill slopes and high banks	
	Topographical surveys	Work out requirement of cut and fill	
Identification of Material Sources	Hydrological surveys in flood prone areas (particularly in Terai)	Identification of flood prone areas and measures to avoid afflux Identification of agricultural use of land	
	Borrow Material	Material extraction from existing quarries Location Criteria	3
	Quarry Material	Material extraction from existing quarries minimized	4
	Water availability	Identification of perennial/community/private sources Utilizing community water sources without conflict of uses	5
Assessment of environmental impacts	Climate factors	Scheduling construction considering the special weather phenomena	
	Water bodies	Provision of silt fencing Rehabilitation of water bodies	
	Stability of slopes	Measures for slope stabilization	7
	Soil Erosion	Erosion control measures	8
	Land use changes	Land use control measures adjacent to the road	18
		Empowering a VDCs/DDC/Municipalities to regulate development	
	Agriculture lands	Avoidance from setting up construction camps, borrow areas	2
		Conservation of top soil and reuse	3
		Site restoration after construction	6
	Cultural properties	Avoidance through design modifications	18
		Planning for relocation & rehabilitation	
	Common Property Resources	Avoidance through design modification	1
		Planning for relocation in consultation with community	
	Drainage	Provision of adequate number of CD structures	10
	Trees	Compensatory plantation & roadside plantation	9
	Forest areas	Avoidance through design modifications	1
		Environment Management measures during construction	
Precautionary measures during	Natural Habitats	Avoidance through design modification or formulating additional measures for avoiding impacts	1
	Top soil	Stockpile top soil and preservation	6
	Construction sites	Provision of pollution control measures	14

Activity	Items to consider	Measures to address	Detailed in Chapter
construction to avoid environmental impacts		All measures to ensure public and worker's health/safely, standby emergency facilities	15
		Waste management	12
	Borrow areas	Arrangement with land owners to include redevelopment	3
	Quarry areas	Rehabilitation of quarry areas if new quarries are opened	4
	Public workers health & safety	Personal Protective Equipment to be provided	14
		Public safety at construction site to be under taken	
		Measure for workers health & hygiene at construction camp	2, 14
Consultations with community	Land for borrowing	Agreement to include borrow area rehabilitation	3
	Water for construction	Agreements with owners/community for utilizing water	5
	Site for construction camps	Rehabilitation of the land after construction	2
	Removal of trees	Compensation for the trees cut	9
	Cultural properties	Avoidance through modification of alignment	17
		Relocation costs to be covered in the project, if needs relocation	17
	Common property resources	Avoidance through modification of alignments	2
		Relocation costs to be covered in the project, if needs relocation	2
	Traffic during construction	Provision of alternate routes or prior notice to the users	1
Finalization of alignment	Concerns of community	Community concerns to be incorporated	1
	Environmental impacts identified	Impacts identified are to be mitigated by incorporation of provisions as per these Codes	1
	Design aspects	Impacts that can be mitigated through design modifications should be incorporated	1
Preparation of detailed drawings	All concerns/impacts identified	Designs for enhancements and mitigation measures including cost provisions	All

Table A2-3: Environmental Concerns during Project Implementation - to be identified in the EMP

Activity and Sub Activity	Impact/s	Measures	Detailed in Chapter
Pre-Construction Activities			
Alignment Marking	-Nil-	i) Co-ordination with DoR	1 2
Relocation of Utilities	Impact on current usage	i) identification of relocation site in advance	2
		ii) Scheduling the activity in consonance with the community usage pattern	2
Tree Felling	Compliance with Forest Act in case trees are on forest land	i) Prior clearance from Department of Forest; coordinate with district forest officer	1, 9 15
	Loss of canopy	ii) Compensatory plantations & landscape designs	9
Clearance of Land	Affect on livelihood	i) As per project provisions for compensation and resettlement	2
	Affects on standing crops	ii) Scheduling of activity and coordination; compensation	1
	Affects on cultural properties	iii) Modification of alignments for avoidance or relocation of the cultural properties	17
	Affect on natural habitats	iv) No clearance of vegetation beyond existing RoW.	15
Diversion of Forest Land	Compliance with Forest Act	i) Activity scheduling to avoid delays, confirmation to legal requirement	15
	Affect on flora	ii) Precautionary measures during construction in forests	15
	Pollution from construction activities	iii) Precautions while operating equipment machinery	13
Transfer of Land Ownership	Grievances from community	i) Addressal through Grievance Redressal Mechanism & Consultations	1
	Affect on livelihood	ii) Provision to entitlement as per resettlement framework	1
Location of Storage Yards, Labor Camps, & Construction Sites	Pollution from construction camps, storage yards and labor camps	i) Location criteria to be adopted	3
	Pressure on location infrastructure	ii) Infrastructure arrangements to be as per guidelines	3
Procurement of Equipments and Machinery	Machinery likely to cause pollution at settlement and natural habitats	i) Machinery to be procured shall be in conformance with approved specifications	13
	Safety concerns in machinery operation	ii) Safety equipment for workers; safety awareness and practice	14
Identification and	Conflict of users in case of	i) Consultations and arrangements at	6

Activity and Sub Activity	Impact/s	Measures	Detailed in Chapter
Selection of Material Sources	water	contractor-individual levels, documentation of agreement	
	Borrowing causes depressed land	ii) Consultations and arrangements at contractor-individual levels, documentation of agreement	4
	Pollution due to material extraction from borrow and quarry areas to surrounding environment	iii) Precautionary measures during siting of borrow areas and quarry areas	4 5
	Disturbance to Natural Habitats	iv) Avoidance to location of material source in Natural Habitats	15
Identification of designated locations of waste disposal	Pollution due to location close to settlements, water bodies & other sensitive areas	i) Site selection in conformance to criteria provided	13
Construction Activities			
Site Clearance			
Clearing and grubbing	Effects on road side vegetation	i) Restricted movement of machinery/equipment	2 13
	Debris generation creating unsightly conditions	ii) Disposal/storage of grubbing waste and possible reuse	12
Dismantling of existing culverts and structures, if any	Generation of debris creating unsightly conditions	i) Disposal of waste and likely reuse	12
	Flooding due to interception to drainage paths	ii) Provision of diversion channels and/or scheduling construction of culverts in dry months	10
Planning Traffic Diversions and Detours	Trampling of vegetation along traffic diversions	i) Activity scheduling, identification of alternative track	15 9
Material Procurement	Loss of topsoil	i) Stripping and storing topsoil	7
	Formation of stagnant water pools due to borrowing/quarrying	ii) Rehabilitation plan for borrow areas and quarry areas	4 5
	Illegal quarrying/sand mining	iii) Conformance of quarries selected to the EMP requirements including quarry rehabilitation plans	5
	Uncontrolled blasting at quarries	iv) Controlled blasting to the extent required.	5
		v) Conformance to blasting rules as per the Explosive Act of GoN	1
Transport of materials to site	Fugitive emission from transport trucks	i) Covering of material with tarpaulin or use of covered box trucks during transport	12
	Dust emission from haul roads	ii) Haul road management	13
Storage of materials	Contamination of water sources, leaching into ground water	i) Provision of impervious base to storage areas	3
Handling of earth	Dust rising and increase in particulate concentration in ambient air	ii) Use of dust suppressants like water sprinkling	13
Handling of Soil and Dust	Increase of particulate concentration and contamination of nearby areas	iii) Use of dust suppressants like water sprinkling	13
Handling of granular material	Risk of injury to workers	iv) Use of Personal Protective Equipment	14
Handling of bituminous materials	Leaching of materials, contamination of water sources	v) Provision of impervious base at bitumen storage areas	13
	Air pollution	vi) Control of emission from mixing	13
Handling of oil/diesel	Contamination of accidental spills	vii) Prevention of accidental spills, affecting cleaning immediately after spill	15
	Pollution due to incomplete burning	viii) Ensure complete combustion of fuel through regular maintenance of equipment	12
Waste management	Littering of debris at construction site	ix) Waste to be disposed at disposal locations only	12
	Contamination of surroundings due to runoff from construction site	x) Preventing of runoff from entering water bodies	12 10
Operation of construction equipments and	Air and Noise pollution	xi) Conformance to Emission Standards and Norms	13 14

Activity and Sub Activity	Impact/s	Measures	Detailed in Chapter
machinery			15
	Operational safety of workers	xii) Conformance to Safety concerns of the road users and workers in operation, first aid provision and mandatory provision of Personal Protective Equipment	14
Movement of Machinery	Trampling of vegetation	xiii) Restriction of movement within ROW	15
	Damage of Flora and natural habitats	xiv) Minimizing impact on vegetation	15
	Damage to roadside properties	xv) Minimizing impacts on private and common properties, including religious structures	17
Earthworks			
Cutting	Uncontrolled blasting in case of rock cutting	i) Controlled blasting to be made mandatory	5
	Loss of topsoil	ii) Preservation of topsoil for reuse	7
	Waste generation	iii) Safe disposal of waste and possible reuses	12
Embankment construction	Interruption of drainage	i) Drainage channels to be provided with culverts in advance to embankment construction	10
	Dust Rising	ii) Dust suppression with water	13
	Excess water/material usage	iii) Minimizing height of embankment	1
		iv) Scheduling embankment construction in wet months, if possible	1
		v) Compaction with vibratory rollers is suggested	1
	Erosion causing impact on embankment/slope stability	vi) Slope stabilization measures as seeding, mulching and bio-engineering techniques	8.
	Formation of rills/gullies	vii) Construction of temporary erosion control structure as per requirements	8
	Contamination of water	viii) Control measures as silt fencing, vegetative barriers etc.	8
		ix) Avoiding disposal of liquid waste into natural water courses	10 11
Maintenance at construction camp	Collection of rainwater in construction camps	x) Temporary drains during construction	3
	Waste water from labor camps	xi) Disposal of waste water into soak pits	3
	Contamination of soil	xii) Removal of oil/other chemical spills & wastes	3
Cutting embankments of surface water bodies	Impact on the drainage flows in and out of the water body	xiii) Restoration of drainage channels	10 11
	Embankment stability	xiv) Design of slopes of the water bodies, slope protection	8
Sub-Base and Base courses			
Granular sub-base	Extensive extraction of quarry materials	i) Use of locally available materials	5
Wet mix macadam	Extensive water requirement	ii) Scheduling the activity in wet months	1
		iii) Avoiding conflict to use due to water extraction from construction	6
Shoulders treatment	Movement of machinery for compaction	iv) Restricting movement on adjacent land	13
Culverts and Minor Bridge Works	Interruption of water flow	i) Provision of diversion channels	11
	Pollution of water channels during construction	ii) Control of sediment runoff	11
	Safety of workers	iii) Mandatory use of personal protective equipment	14
Surfacing			
Bituminous surface	Workers safety during handling of hot mix	i) Mandatory use of personal protective equipment	14
	Damage to vegetation (burning/cutting)	ii) Avoiding use of wood as fuel for heating bitumen	14
		iii) Hot mix plant location on waste lands	14
	Contamination due to bituminous wastes	iv) Reuse of land filling of bituminous wastes	12
	Impacts on air quality	v) Ensuring compliance of hot mix plants with the standard emission standards	13
Concrete surfacing for roads crossing built up areas	Contamination of surroundings due to concrete mixing	vi) Mixing concrete at designated locations away from habitation and agricultural land	3
Road furniture/Signage	positive	To be provided as per design	

Activity and Sub Activity	Impact/s	Measures	Detailed in Chapter
Shoulder protection	Requires material extraction from quarries	i) Use locally available material	5
		ii) Ensure that all shoulders are clear of debris or construction materials	7
Enhancements	positive	i) To be included in Detailed Design Report	1
Post construction activities			
Clearing of construction camps			
Camp site restoration	Change of land use due to setting up of construction camp	i) Camp site to be restored to its original condition as per the rehabilitation plan	3
		ii) Restoration of top soil	7
Dismantling of campsite	Waste generation at the construction site	iii) Disposal at waste at designated locations	12
Clearing of water Channels, side drains and culverts	Generation of debris and silt	i) Removal of debris and disposal	12 13
Rehabilitation of borrow areas	positive	i) Top soil restoration, re-vegetation	7

2. Site Preparation

The preparation of site for construction involves: (i) Marking and clearance of the required RoW of all encroachments by the Project Management prior to mobilization of Contractor; and, (ii) Site preparation by the Contractor prior to commencement of construction. The land acquisition and resettlement issues involved are to be addressed as per the provisions of the Resettlement Framework for the project.

2.1 Site Preparation Activities by the Project Management

After finalization of the alignment, the Project Management (PM) shall be responsible to stake out the alignment by establishing working benchmarks on ground. It shall be the responsibility of the PM to take over the possession of the proposed RoW and hand over the land width required clear of all encumbrances to the Contractor.

The addressal of social and resettlement issues shall be carried out by the PM as per the provisions of the Resettlement Framework (See Chapter 6 of ESMF) and the Screening and Consultation Framework (See Chapter 3 of ESMF). Activities pertaining to the clearance of land and relocation of utilities need to be initiated by the PM well in advance to avoid any delays in handing over of site to the Contractor.

PM's responsibilities before handing over site ...

- Clearance of encroachments within proposed RoW
- Initiation of process for legal transfer of land title
- Alignment modification or relocation/removal of utilities in consultation with the various government departments, and
- Obtain clearances required from government agencies for
 - Felling trees, and
 - Diversion of stretches of forestlands etc.

2.2 Site Preparation Activities by the Contractor

The Contractor shall verify the benchmarks soon after taking possession of the site. The Contractor, prior to initiation of site preparation activities, shall highlight any

deviations/discrepancies in these benchmarks to the PM/Engineer¹ in writing. The contractor shall submit the schedules and methods of operations for various items during the construction operations to the PM/Engineer for approval. The Contractor shall commence operations at site only after the approval of the schedules by the PM/Engineer.

The activities to be undertaken by the contractor during the clearing and grubbing of the site are as follows:

- The clearance of site shall involve the removal of all materials such as trees, bushes, shrubs, stumps, roots, grass, weeds, part of topsoil and rubbish. Towards this end, the Contractor shall adopt the following measures: (i) Limiting the surface area of erodible earth material exposed by clearing and grubbing; (ii) Conservation of top soil and stockpiling as per the provisions stated in the contract clauses and (iii) Carry out necessary backfilling of pits resulting from uprooting of trees and stumps with excavated or approved materials to the required compaction conforming to the surrounding area.
- To minimize the adverse impact on flora and vegetation, only ground cover/shrubs that impinge directly on the permanent works shall be removed. Cutting of trees and vegetation outside the working area including RoW shall be avoided under all circumstances. In case the alignment passes through forest areas, official from District Forest Office shall be consulted for identification of presence of any rare/endangered species with in the proposed road way. Protection of such species, if found, shall be as per the directions of the Forest Department of forest and as suggested by the Environmental Management Plan in the IEE/EIA study Report.
- The locations for disposal of grubbing waste shall be finalized prior to the start of the works on any particular section of the road. The selection of the site shall be approved by the PM/ The 'Engineer'. The criteria for disposal of wastes shall be in accordance with the provisions given in Chapter 12 of this Annex, i.e., "Waste Management" and Site Redevelopment.
- In locations where erosion or sedimentation is likely to be a problem, clearing and grubbing operations should be so scheduled and performed that grading operations and permanent erosion and sedimentation control features can follow immediately, if the project conditions permit.
- Dismantling of (Cross Drainage) structures and culverts shall be carried out in a manner not to damage the remaining required portion of structures and other surrounding properties. The disposal of wastes shall be in accordance with the provisions in Ch.12, "Waste Management" and Site Redevelopment. The following precautions shall be adopted: (i) The waste generated shall not be disposed off in watercourses, to avoid hindrance to the flow; and (ii) All necessary measures shall be taken while working close to cross drainage channels to prevent earthwork, stonework as well as the method of operation from impeding cross drainage at rivers, streams, water canals and existing irrigation and drainage systems.
- The designated sites duly approved by PM or The Engineers shall be cleared of its existing cover for setting up of the construction sites, camps and related infrastructure facilities, borrow areas and other locations identified for temporary use during construction. The contractor shall comply with all safety requirements in consideration

¹ The Engineer – the engineer according to FIDIC

as specified in Ch.14 – “Occupational Health and Safety”. Before initiation of site preparation activities along these lands to be used temporarily during construction, it shall be the responsibility of the Contractor to submit and obtain approval of the site redevelopment plan from the PM/ The Engineers. The letter/contract agreement between the owner(s) of the land parcel for temporary usage shall include site redevelopment to its original status. The guidelines for the same are furnished in Ch. 13 - Construction Plants & Equipment Management; Ch.3 - Construction Camps and Site Operation; and Ch. 4 - Borrow Areas.

- Site preparation shall involve formation of the road base wherein it is ready for construction of protective/drainage works, carriageway, shoulders, parapets and other road furniture. In hilly terrain, trace cut are already undertaken by the PM during surveys for alignment marking and design preparation. The PM shall transfer the land for civil works to the Contractor after peg marking of the alignment.

3. Construction Camps and Site Operation

The terms and conditions of this Code of Practice pertain to the silting, development, management and restoration of construction camps to avoid or mitigate impacts on the environment. The area requirement for the construction camp shall depend upon the size of contract, number of laborers employed and the extent of machinery deployed. The key activities requiring addressal during the project stages are presented in **Table A2-4**.

Table A2-4: Key Activities of Different Stages

Stages	Activities
Pre-construction	Proper Site Selection
	Development
Construction	Maintenance and Management
Post-construction	Closure and Restoration to original condition

3.1 Pre-Construction Stage

The Contractor shall identify the site for construction camp in consultation with the individual owners in case of private lands and the VDC/Municipality in case of public lands. The suitable sites shall be selected and finalized in consultation with the Project Management (PM) or the Engineer². Take site photos for settling later disputes.

The contractor will work out arrangements for setting up his facilities during the duration of construction with the land owner/local bodies. The arrangements will include the restoration of the site after completion of construction. The arrangements will be verified by the PM/local bodies to enable redressal of grievances at a later stage of the project.

After finalization of the site, the contractor shall submit to the PM/Engineer a detailed layout plan for development of the construction camp, indicating the various structures to be constructed including the temporary structures to be put up, site roads, drainage, lighting, waste management and other facilities. The plan will include the redevelopment of sites to

² ‘Engineer’ as per FIDIC/Consultant

pre-construction stage. As a reference, the campsite should cover a minimum area of 3,000 m² for 60 workers (= *Thumbs Rule*).

Selection of construction camp/site locations ...	
<p><i>Avoid the following ...</i></p> <ul style="list-style-type: none"> • Lands within 500m of habitations, markets, schools, health posts etc. • Irrigated agricultural lands, productive land • Lands belonging to small farmers, vulnerable groups • Lands under village forests/community forest • Lands within 100m of community water bodies and water sources as rivers • Lands within 100m of watercourses • Low lying lands • Lands supporting dense vegetation • Grazing lands and lands with tenure rights • Lands where there is no willingness of the landowner to permit its use 	<p><i>Prefer the following ...</i></p> <ul style="list-style-type: none"> • Waste lands • Lands belonging to owners who look upon the temporary use as a source of income • Community lands or government land not in use for beneficial purposes • Private non-irrigated lands where the owner is willing, and • Lands with an existing access road

Towards the provision and storage of drinking water at the construction camp, the contractor shall ensure the following provisions:

- The contractor shall provide for a sufficient supply of cool potable water in the construction camps. The contractor shall identify suitable community water and agreement sources as hand pumps, spring and ponds for procuring drinking water, in consultation with the VDC/Municipality or local beneficiary communities.
- Only in the event of non-availability of other sources of potable water, the Contractor shall obtain water from an existing open well, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with dust and waterproof trap door.
- Every water supply or storage shall be at a distance of not less than 15m from any wastewater / sewage drain or other source of pollution. Water sources within 15m proximity of toilet, drain or any source of pollution will not be used as a source of drinking water in the project.
- A pump shall be fitted to each covered well, the trap door shall be kept locked and opened only for cleaning or inspection, which shall be done at least once a month.
- When possible, contractor can procure drinking water in their water tankers or from private/government water supply tankers after ensuring drinkable quality of water. In every site, adequate and suitable facilities for washing clothes and utensils shall be provided and maintained for the use of contract labor employed therein. Separate and adequate bathing facilities shall be provided for the use of male and female workers.

Arrangement with landowners...

The contractor shall submit to PM/ The 'Engineer' the following:

- Written No-objection certificate of the owner/cultivator
- Extent of land required and duration of the agreement
- Photograph of the site in original condition
- Details of site redevelopment after completion

Such facilities shall be conveniently accessible and shall be kept in clean and hygienic conditions.

Sanitary arrangements, latrines and urinals shall be provided in every work place on the following scale:

- Where female workers are employed, there shall be at least one latrine for every 25 females or part thereof.
- Where males are employed, there shall be at least one latrine for every 25 males or part thereof.
- Every latrine shall be under cover and so partitioned off as to secure privacy, and shall have a proper door and fastenings.
- Where workers of both sexes are employed, there shall be displayed outside each block of latrine and urinal, a notice in the language understood by the majority of the workers "For Men Only" or "For Women Only" as the case may be.
- The latrines and urinals shall be adequately lighted and shall be maintained in a clean sanitary condition at all times, and
- Water shall be provided in/near latrines and urinals by storage in drums or piped supply.

Arrangements for Waste Disposal

- Disposal of sanitary wastes and excreta shall be into septic tanks.
- Kitchen wastes shall be disposed into soak pits. Wastewater from campsites will be discharged and disposed in a kitchen sump located at least 15 meters from any body of water. Sump capacity should be at least 1.3 times the maximum volume of wastewater discharged. The bottom of the pit should be filled with coarse gravel and the sides shored up with board, etc. to prevent erosion and collapse of the pit.
- Solid wastes generated in the construction site shall be reused if recyclable, inert materials shall be disposed off in landfill sites and combustible materials shall be buried if it is not hazardous.

First Aid Facilities

- First Aid Box will be provided at every construction campsite and under the charge of a responsible person who shall always be readily available during working hours of the work places. He shall be adequately trained in administering first aid-treatment. Formal arrangement shall be prescribed to make motor transport or ambulance available to carry injured person or person suddenly taken ill to the nearest hospital. If hospital is far away, proper medical clinic facility should be made available at camp where emergency treatment is available. Thereafter, the injured shall be taken to hospital.

Fire fighting arrangement

- The construction camps shall be equipped with fire fighting equipment and facilities. The staff residing there shall be regularly trained to use such facility during fire outbreak. Proper pictorial posters should be used to indicate to everyone the location of fire fighting equipment.

Interactions with host communities

- To ensure that there is no conflict of the migrant labor with the host communities, the contractor shall issue identity cards to laborers and residents of construction camps.

- He equally should conduct regular awareness campaigns to maintain good social relationship with local communities.
- Of paramount importance are regular awareness/training programmes for all laborers to address and avoid prostitution and spread of sexually transmissible diseases (HIV/AIDS)

3.2 Construction Stage

Construction camps shall be maintained free from litter and in hygienic condition. It should be kept free from spillage of oil, grease or bitumen. Any spillage should be cleaned immediately to avoid pollution of soil, water stored or adjacent water bodies. Following precautions need to be taken in construction camps.

- Measures to ensure that no leaching of oil and grease into water bodies or underground water takes place;
- Wastewater should not be disposed into water bodies;
- Regular collection of solid wastes should be undertaken and should be disposed off safely;
- All consumables as the first aid equipment, cleaning equipment for maintaining hygiene and sanitation should be recouped immediately;
- PM/ The Engineer will monitor the cleanliness and appropriate management of construction campsites and ensure that the sites are properly maintained throughout the period of the contract to the satisfaction of the PM and as envisaged by contract agreement.

Site Restoration: At the completion of construction, all construction camp facilities shall be dismantled and removed from the site. The site shall be restored to a condition in no way inferior to the condition prior to commencement of the works. Therefore, photographic documentation is recommended to verify and settle possible disputes. Various activities to be carried out for site restoration are:

- Oil and fuel contaminated soil shall be removed and transported and buried in waste disposal areas;
- Construction campsite shall be grassed and trees cut replaced with saplings of similar tree species;
- Saplings planted shall be handed over to the community or the land owner with due arrangements meeting the cost for further maintenance and watering for at least five years; and
- Soak pits and septic tanks shall be covered and effectively sealed off.

3.3 Storage Site

- Storage of general materials: brick on edge flooring or sand flooring will be provided at the storage places of construction materials to avoid soil and water contamination due to oil spillage;
- Storage of cement: damp-proof flooring, as per standard codes;
- Storage of blasting materials: shall be as per the specific provisions of law (Explosive Act of GoN).

4. Borrow Areas

Embankment fill material is to be procured from borrow areas designated and approved for the purpose. The properties of the borrow material shall be tested and recorded on standard format. Precautionary measures need to be incorporated during borrow area location, material extraction and rehabilitation. Table A2-5 presents key activities involved in borrowing material acquisition:

Table A2-5: Key Activities during Different Stages

Stage	Activities
Pre-construction	Siting
	Development
Construction	Operation
Post-construction	Restoration

4.1 Project Planning and Design Stage

Design measures for reduction in quantity of earth work will have to be undertaken to reduce the quantity of material extracted and consequently decrease the borrow area requirement.

Borrow area siting should be in compliance with standard EMP recommendations provided in the IEE/EIA. The Detailed Design shall contain (i) Guidelines for locating /excluding sites of borrow material; (ii) The arrangements to be worked out with the land owner/community for the site; and (iii) Sample designs for re-development and/or rehabilitation of borrow areas to remain in environmentally friendly condition (e.g. avoidance of establishing mosquito breeding grounds or garbage dump sites)

4.2 Pre-construction Stage

The contractor shall identify the borrow area locations in consultation with the individual owners in case of private lands and the local bodies in case of public lands, after assessing the suitability of the material. The suitable sites shall be selected and finalized in consultation with the PM/ The Engineer.

Borrowing to be avoided on...
<ul style="list-style-type: none"> • Lands close to toe line, but in no case less than 1.5m • Irrigation agricultural lands • Grazing land • Lands within 0.8 km of settlements • Environmentally sensitive areas <ul style="list-style-type: none"> ○ Designated protected areas/forests ○ Unstable site-hills ○ Water-bodies ○ Wetlands ○ Caves and karstic landforms ○ Streams and seepage areas ○ Areas supporting rare plant/animal species

Planners and designers shall duly investigate if roadside borrow pits would be allowable,

as such structures pose additional accident risks, may weaken or soak the embankment, and serve as public garbage dumpsites.

The Contractor will work out arrangements for borrowing with the land owner/local bodies. The arrangements will include the redevelopment after completion of borrowing. The arrangements will be verified by the PM/local bodies to enable redressal of grievances at a later stage of the project. 'The Engineer' of PM shall approve the borrow area after inspection of the site to verify the reclamation plan and its suitability with the contractor and landowner. The contractor shall commence borrowing soil only after the approval by the PM.

Arrangements with landowners...	Redevelopment plan to address...
<ul style="list-style-type: none"> • Contractor shall submit to PM • Written No-objection certificate of the owner/cultivator • Extent of land required and duration of the agreement • Photograph of the site in original condition • Details of site redevelopment after completion 	<ul style="list-style-type: none"> • Land use objectives and agreed post-borrowing activities • Physical aspects (landform stability, erosion, re-establishment of drainage) • Biological aspects (species richness, plant density,) for areas of native re-vegetation • Water quality and soil standards • Public safety issues

4.3 Construction Stage

No borrow area shall be operated without permission of the Engineer. The procurement of borrow material should be in conformity to the guidelines laid down in standard code of practice adopted for the project. In addition, the contractor should adopt the following precautionary measures to minimize any adverse impacts on the environment:

- i). The unpaved surfaces used for haulage of borrow materials will be maintained dust free by the Contractor through sprinkling of water twice a day during the period of use.
- ii). To avoid any embankment slippage, the borrow areas will not be dug continuously, and the size and shape of borrow pits will be decided by the Engineer.
- iii). Borrow pits situated less than 0.8 km (if unavoidable) from villages and settlements should not be dug for more than 30 cm after removing 15 cm of topsoil and should be drained.
- iv). The Contractor shall maintain erosion and drainage control in the vicinity of all borrow pits and make sure that surface drains do not affect the adjacent land or future reclamation. This needs to be rechecked by the engineer responsible.
- v). In case the borrow pit is on agricultural land, the depth of borrow pits shall not exceed 45 cm and may be dug out to a depth of not more than 30 cm after stripping the 15 cm top soil aside. Incase of stripping and stockpiling of topsoil, provisions of Ch. 7, "Topsoil Salvage, Storage and Replacement" need to be followed.
- vi). To prevent damages to adjacent properties, the Contractor shall ensure that an undisturbed buffer zone exists between the distributed borrow areas and adjacent land. Buffer zone shall be 3 m wide or equal to the depth of excavation, whichever is greater.
- vii). Incase of riverside, borrow pit should be located not less than 15 m from the toe of the bank, distance depending on the magnitude and duration of flood to be withstood.

viii). In no case shall the borrow pit be within 1.5 m from the toe line of the proposed embankment.

4.4 Post Construction Stage

All reclamation shall begin within one month of abandonment of borrow area, in activities and land accordance with the redevelopment plan. The site shall be inspected by the PM/The Engineer after density achieved in implementation of the reclamation plan.

A viable option to explore is the re-shaping of borrow pits for aquaculture purposes, as long as soil and water supply conditions would be conducive to develop fishponds out of the borrow pits. In such cases, the Contractor shall be obliged (as per clauses) to use his machinery in re-shaping/inserting dividing bunds in the pit so the entire site will be readily usable as fish culture enterprise.

Certificate of Completion of Reclamation is inflow and outflows in to be obtained by the Contractor from the landowner stating that “the land is restored to his/her satisfaction”. The same is to be submitted to the PM/The Engineer.

Checklist of items for inspection by PM/The Engineer
<ul style="list-style-type: none"> • Compliance of post-borrowing activities and land use with the reclamation plan • Vegetation density targeted, density achieved in case of re-vegetation, species planted as per reclamation plan • Drainage measures taken for inflow and outflows in case borrow pit is developed as a detention pond • Decrease of risk to public due to reclamation • Condition of the reclaimed area in comparison with the pre-borrowing conditions

5. Quarry Management

The general practice adopted is to procure materials from existing quarries operating with the requisite permits. Notwithstanding, specific environmental safeguard to be included in the Works Contracts need to be observed with respect to exploiting new quarries. **Table A2-6** presents the activities to be carried out whilst engaging in quarry operations.

Table A2-6: Key Activities during Various Stages

Stage	Key Activities
Pre-construction	Plan, Design and Establish new quarry
Construction	Precautions during quarry operations
Post-construction	Implementation of quarry site closure and landscape Redevelopment Plan

5.1 Project Planning and Design Stage

The PM shall provide in the Detailed Design Report and the bid document, a list of licensed quarries operating within the district and adjoining districts. In addition, these shall contain the following: (i) Sustainable quantity of materials available in quarries; (ii) Alternative /existing quarries and distances; and (iii) Adequacy of materials for the project in these quarries.

Only in the event of non-availability of existing quarries, shall the Contractor open a new quarry. The bid document shall include the exhaust quarry redevelopment as per needs of the landowner / community.

5.2 Pre-construction Stage

The Contractor shall select an existing licensed quarry identified in Detailed Design Report for procuring materials. The Contractor shall establish a new quarry with the prior consent of the PM\The Engineer only in cases when: (i) Distance from existing quarries is uneconomical; and (ii) Alternative material sources are not available. The Contractor shall prepare a Redevelopment Plan for the quarry site and get it approved by the PM\The Engineer.

Operations & redevelopment plan for new quarries to contain....
<ul style="list-style-type: none"> • Photograph of the quarry site prior to commencement. • The quarry boundaries as well as location of the materials deposits, working equipments, stockpiling, access roads and final shape of the pit. • Drainage and erosion control measures at site. • Safety Measures during quarry operation. • Design for redevelopment of exhaust site. <p><u>Option A:</u> Re-vegetating the quarry to merge with surrounding landscape: This is done by conserving and reapplying the topsoil for the vegetative growth</p> <p><u>Option B:</u> Developing exhausted quarries as water bodies: The pit shall be reshaped and developed into pond, for harvesting rainwater. This option shall only be considered where the location of quarry is at the lowest point, i.e. surrounding areas / natural drainage slopes towards it.</p>

The construction schedule and operation plans should be submitted to the PM\The Engineer prior to commencement of work. The plan shall contain a detailed work plan for procuring materials that includes procurement, transportation and storage of quarry materials.

5.3 Construction Stage

Development of site: To minimize the adverse impact during excavation of material following measures needs to be undertaken:

- i) Adequate drainage system shall be provided to prevent the flooding of the excavated area
- ii) At the stockpiling locations, the Contractor shall construct sediment barriers to prevent the erosion of excavated material due to runoff.
- iii) Construction of offices, laboratory, workshop and rest places shall be done in the up-wind of the plant to minimize the adverse impact due to dust and noise.
- iv) The access road to the plant shall be constructed taking into consideration location of units and also slope of the ground to regulate the vehicle movement within the

- plant.
- v) In case of storage of blasting material, all precautions shall be taken as per The Explosive Act of GoN.
- Quarry operations including safety:
- i) Overburden shall be removed and disposed as per Ch. 13 "Waste Management and Site Redevelopment".
 - ii) During excavation slopes shall be flatter than 20 degrees to prevent their sliding
 - iii) In case of blasting, the procedure and safety measures shall be taken as per The Explosive Act of GoN.
 - iv) The Contractor shall ensure that all workers related safety measures shall be done as per Ch. 15, "Occupational Health & Safety".
 - v) The Contractor shall ensure maintenance of crushers regularly as per manufacturer's recommendation.

Stockpiling of the excavated material shall be done as per stockpiling of topsoil explained in Ch 7, "Topsoil Salvage, Storage & Replacement."

During transportation of the material, measures shall be taken as per Ch. 14, "Construction Plants and Equipment Management" to minimize the generation of dust and to prevent accidents

The PM/The Engineer shall review the quarry site for the management measures during quarry operation, including the compliance to pollution norms.

5.4 Post Construction Stage

The Contractor shall restore all haul roads constructed for transporting the material from the quarries to construction site to their original state.

The PM/The Engineer shall be entrusted the responsibility of reviewing the quarry site for the progress of implementation of Redevelopment Plan.

The Contractor shall be responsible for the Redevelopment Plan prior to completion, during the defect liability period. The PM/The Engineer shall be responsible for reviewing this case of redevelopment prior to issuing the defect liability certificate.

6. Water for Construction

This Code of Practice pertains to the procurement of water required for construction, except for bituminous works. Water is required during all stages of road construction such as embankment, sub-grade, granular sub-base (GSB) and water-bound macadam (WBM) as well as construction of structures. Relevant activities as per stage are:

Table A2-7: Key Activities at Various Stages

Stage	Key Activities
Project Planning & Design Stage	Scheduling construction to suit water availability
	Identification of alternate water sources
Pre-construction Stage	Arrangements for procuring water
Construction	Extraction of water

6.1 Project Planning & Design Stage

The Detailed Project Report shall contain the following information:

- Estimate of water requirement during different seasons based on construction schedule of various stages of the project,
- Identification of potential sources of water for construction,
- Arrangements to be worked out by the contractor with individual owners, when water is obtained from private sources,
- Permits required for tapping new sources, as per the requirements of the local bodies, and
- Whether scarcity of water would have any impact on schedule of construction.

<p>In water-scarce regions, provide additional information in the Detailed Design Report and IEE/EIA</p>

- | |
|--|
| <ul style="list-style-type: none"> • Exploring possibilities for use of existing perennial sources, through interactions with water user groups as the villagers, relevant local bodies and the Government Department, keeping in view that the water extraction does not infringe upon the usufruct rights of the existing water users. • Identification of potable water source for domestic use of workers and for use in cement - based construction such as cement concrete roads, culverts and other cross drainage works. • Identification of alternate water sources, water-harvesting techniques may be explored for use in hilly areas to avoid water extraction from the existing community sources. |
|--|

In water scarce regions, if water-harvesting structures are to be constructed, suitable locations and mechanism for sitting these structures shall be identified. These are envisaged to be permanent water tanks for collection of stream water. Detailed drawings of water harvesting structures based on site conditions will need to be worked out and presented in the Detailed Design Report.

Scheduling Construction in Water Scarce Areas: As part of the project preparation, the PM shall conduct an assessment of water requirement and availability in water scarce regions as: arid regions. As possible, the schedule for construction in these water scarce areas shall be prepared such that earthwork for embankment is carried out just before monsoon, so that water requirement for subsequent construction works like granular sub-base and water-bound macadam are met in monsoon and post monsoon season. Carrying out these activities even during the monsoon is possible as the rainfall may not be high enough to disrupt construction.

6.2 Pre-construction stage

Prior to commencement of extraction of water for construction, the Contractor shall work out arrangements as specified in the Detailed Design Report.

<p>Arrangements for procuring water by contractor...</p>

- | |
|---|
| <ul style="list-style-type: none"> • In case of community water sources, the Contractor shall carry out consultations and obtain written consent of VDC/Wards for extraction of water through written arrangements • In case of private water sources, the Contractor shall not commence procurement of water from a source unless and until the written consent of all current registered owners of the parcel or parcels on which the source is located has been obtained. • In case of new tube-wells, the Contractor shall obtain clearances required from the local bodies, as required. The sitting of such tube-wells shall be at a distance of not less than 20m from any septic tank/soak pit or other source of pollution. |
|---|

- In case of water harvesting structures (if required), the Contractor shall in consultation with the residents, identify suitable locations for sitting the structure and construct the same.
- In case of perennial sources, the Contractor shall adhere to all administrative procedures pertaining to procurement of water from such sources.

6.3 Construction Stage

During construction, the Contractor shall be responsible to monitor the following:

- The arrangements worked out with the local bodies/individual land owners for water extraction is adhered to;
- Extraction of water is restricted to construction requirement and domestic use of construction workers only;
- Water requirement for curing of concrete shall be minimized by pooling of water over the concrete or by covering with wet gunny bags;
- Water used for mixing of mortar/concrete and subsequent curing is free from injurious amount of oil, acids, alkalis, salts, sugar, organic materials or other substances that may be deleterious to concrete or steel; and
- The potable water used for drinking purposes of construction workers shall be of approved standard.

Prior to issuing project completion certificate to the contractor, the PM shall verify the following:

- Payment of all dues to the local bodies or the individual owners of the wells against the water extracted, and
- Restoration of the premises of water extraction points to their original status after construction.

7. Topsoil Salvage, Spoil Management, Storage and Replacement

Loss of topsoil creates commonly long-term impacts along roads due to (i) site clearance and widening for road formation; (ii) development of borrow areas; (iii) temporary construction activities as construction camps, material storage locations, diversion routes etc. This subsection of the Environmental Code of Practice includes environmentally sound removal, conservation and replacement of topsoil. Table A2-8 lists the key activities that need to be addressed during the different project stages.

Table A2-8: Key Activities during Various Stages

Stages	Key Activities
Pre-construction	Siting up construction activities
Construction	Stripping & Stockpiling
	Erosion Control measures
Post-construction	Reuse Topsoil

7.1 Project Planning & Design Stage

The alignment finalization shall be done to minimize uptake of productive land, as laid down in Section 1 of this Annex (General Principles of Environmentally Sustainable Planning, Designs and Construction). At the project preparation stage, the following shall be investigated: (i) Extent of loss of top soil due to widening and siting of construction activities; (ii) Estimates of borrow area requirements; and (iii) Area requirement for topsoil conservation. The bid document and the Works Contracts shall include all due provisions that necessitate the removal and conservation of topsoil at all locations opened up for construction by the Contractor.

7.2 Pre-construction Stage

The arrangements for temporary usage of land, borrowing of earth and materials by the Contractor with the land owner/local bodies shall include all necessary precautionary measures for conservation / preservation of topsoil. The key principle of good planning practice is to minimize the use and the disturbance of topsoil.

7.3 Construction Stage

It shall be the responsibility of the Contractor to strip the topsoil at all locations opened up for construction. The stripped topsoil should be carefully stockpiled at suitable accessible locations approved by the PM/The Engineer. At least 10% of the temporarily acquired area shall be earmarked for storing topsoil. In case of hilly areas, topsoil with humus, wherever encountered while opening up the site for construction shall be stripped and stockpiled.

The **stockpiles for storing the topsoil** shall be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile is restricted to 2 m. A minimum distance of 1 m is required between stockpiles containing different materials.

In cases where the topsoil has to be preserved for more than a month, the stockpile is to be stabilized within 7 days of forming. The stabilization shall be carried out through temporary seeding. It consists of planting rapid-growing annual grasses or small grains, to provide initial, temporary cover for erosion control.

Locate stockpiles in...

- A secure area away from
 - Grade, Subsoil & Overburden materials;
 - Pit activities; and
 - Day-to-day operations.
- Areas that do not interfere with future pit expansion;
- Areas away from drainage paths and uphill of sediment barriers.
- Areas away from settlement, school, health posts,
- Areas safe from flooding

Vegetative material for stockpile stabilization:

- Use local grasses (e.g. *Vetiver*), legumes, herbaceous, or woody plants or a mixture thereof
- Selection & use of vegetative cover to take into account soil and site characteristics such as drainage, pH, nutrient availability, and climate to ensure permanent growth

After spreading the topsoil on disturbed areas, it must be ensured that topsoil is seeded, and mulched within 30 days of final grading.

During construction, if erosion occurs from stockpiles due to their location in small drainage paths, the sediment-laden runoff should be prevented from entering nearby watercourses. The Contractor shall preserve the stockpiled material for later use on slopes or shoulders as instructed by the Engineer and specified in the Environmental Management Plan.

Preserving stockpiles – Precautions:

- Stockpiles will not be surcharged or otherwise loaded
- Multiple handling will be kept to a minimum to ensure that no compaction will occur.
- Divert runoff around stockpiles unavoidably located in drainage paths using a perimeter bank uphill.
- The stockpiles shall be covered with gunny bags or tarpaulin immediately in case they are not stored for periods longer than 1 month

7.4 Post Construction Stage

The topsoil shall be re-laid on the former extraction area, using the borrow earth to maintain/ameliorate the fertility of crop lands. The finishing of re-layering the topsoil shall be done in ways being satisfactory to the respective farmer.

The area to be covered with vegetation shall be prepared to the required levels and slope as detailed in the Detail Design Report and/or in the EMP. The stockpiled material shall be spread evenly to a depth of 5-15 cm to the designed slopes and watering the same as required. The growth of the vegetation shall be monitored at frequent intervals and, as necessary, compensatory or corrective plantation/seeding be carried out up to the required level of vegetation re-growth.

All temporary arrangements made for stockpile preservation and erosion control are to be removed after reusing the stockpile material.

8. Slope Stability and Erosion Control

Stability of slopes is a major concern in hill areas, in locations with high rainfall and elevated seismicity. In cases of high embankment, water retention at the embankment base initially causes toe failure and subsequently failure of the whole embankment. Soil erosion is consequent to high runoff on hill slopes. High wind velocities cause erosion of embankments made up of cohesion-less sandy soils. Embankments made up of silty and sandy soils get eroded in the absence of vegetative cover, particularly when the slopes are steeper than 2°.

The scope of good practices to minimize adverse effects due to slope instability and soil erosion needs to address the following potential negative environmental impacts: (i) damage to adjacent land and land-uses; (ii) erosion of fertile topsoil layers; (iii) silting of ponds and lakes disturbing aquatic habitats and fisheries; (iv) contamination of surface water bodies, and; (v) reduction in road formation width due to erosion of shoulders/berms.

Table A2-9 highlights the key activities that need to be addressed during the project stage.

Table A2-9: Key Activities during Various Project Stages

Stages	Key Activities
Project Planning & Design Stage	Slope Consideration
	Erosion Consideration
During Construction	Erosion Control Measures
Post Construction	Slope Stabilization

8.1 Project Planning and Design Stage

During the detailed project preparation phase, the following investigations shall be carried out prior to finalization of alignment.

- (a) Topographical;
- (b) Hydrological;
- (c) Geo-technical; and
- (d) Geological Investigation (in case of hill roads).

The alignment selection should be such that (i) steep as well as heavy cuts are avoided; (ii) flora and fauna of the area are not disturbed, and; (iii) the natural drainage pattern is not obstructed.

For high embankments, geo-technical investigations (determination of C, density etc.) of the available material need to be done to check its suitability as fill material. In case of cross drainage structures, measures for preventing siltation and scouring shall be undertaken as outlined in Ch. 11 of this Annex, "Drainage and Flood Prevention"

The following guidelines shall be followed while using cohesion-less soils for embankment construction.

- The alignment should follow the natural ground level to the extent possible and the embankment shall be restricted to minimum to achieve ruling grades.
- Slope of the embankment should be 3 (H : 1(V) or flatter.
- The corners of the embankment should be rounded for the better aerodynamic performance

8.2 Pre-construction stage

Interceptor ditches are constructed in hilly areas to protect the road bench and hillside slope from erosion due to heavy rainfall and runoff. Interceptor ditches are very effective in the areas of high intensity rainfall and where the slopes are exposed. These are the structures designed to intercept and carry surface runoff away from potential areas of surface erosion. **Figure A2-8** shows typical installation of interceptor ditch structure as well as ditch lining types.

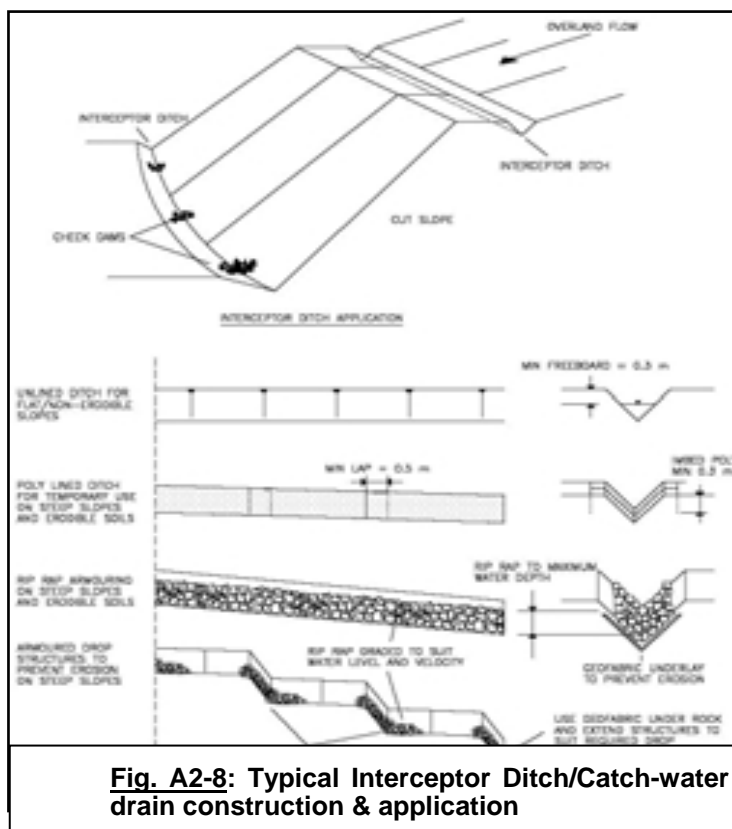


Fig. A2-8: Typical Interceptor Ditch/Catch-water drain construction & application

8.3 Construction Stage

Slope stabilization techniques and erosion control measures as mentioned below are to be undertaken in hill areas.

Re-vegetation: On side slopes in hills, immediately after cutting is completed and debris is removed, vegetative growth has to be initiated by planting fast growing species of grass. This would prevent high velocities of runoff and resultant gully formation as well as pounding of water on the road bench. Box 8-1 gives detailed specifications for provision of vegetation cover.

Box 8-1: Detailed Specifications for Vegetative Cover for Slope-Soil Protection

The vegetative cover should be planted in the region where the soil has the capacity to support the plantation and at locations where meteorological conditions favors vegetative growth.

Site Preparation:

- To prevent the seeds from being washed away subsequent to sowing, the area should be protected with surface roughening and diversions.
- Soil samples should be taken from the site and analyzed for fertilizer and lime requirements.

Seed Application:

- The seed should be sown uniformly as soon as preparation of the seedbed has been completed.
- No seed should be sown during windy weather, or when the ground surface is wet, or when not tillable.

Maintenance:

During first six weeks, the planting should be inspected, to check if the growth is uniform and dense. Appropriate moisture levels shall be maintained. There may be requirement of watering the plantings regularly during the dry seasons. Fertilizers and pest control applications may also be needed from time to time.

(For more details, refer to 'Roadside Bio-Engineering Reference Manual, 2056, MPPW/DoR; and 'Roadside Bio-Engineering Site Handbook, 2056, MPPW/DoR, 1999 and other Bio-Engineering related documents publ. by DoR.

Bally Benching: To control the erosion on slopes as well as for arresting the shallow movement of top mantle slide mass at the construction location, the Contractor should provide Bally Benching. This method is also very effective in preventing gully erosion. Typical arrangements with detailed specifications are shown in **Figure A2-9**.

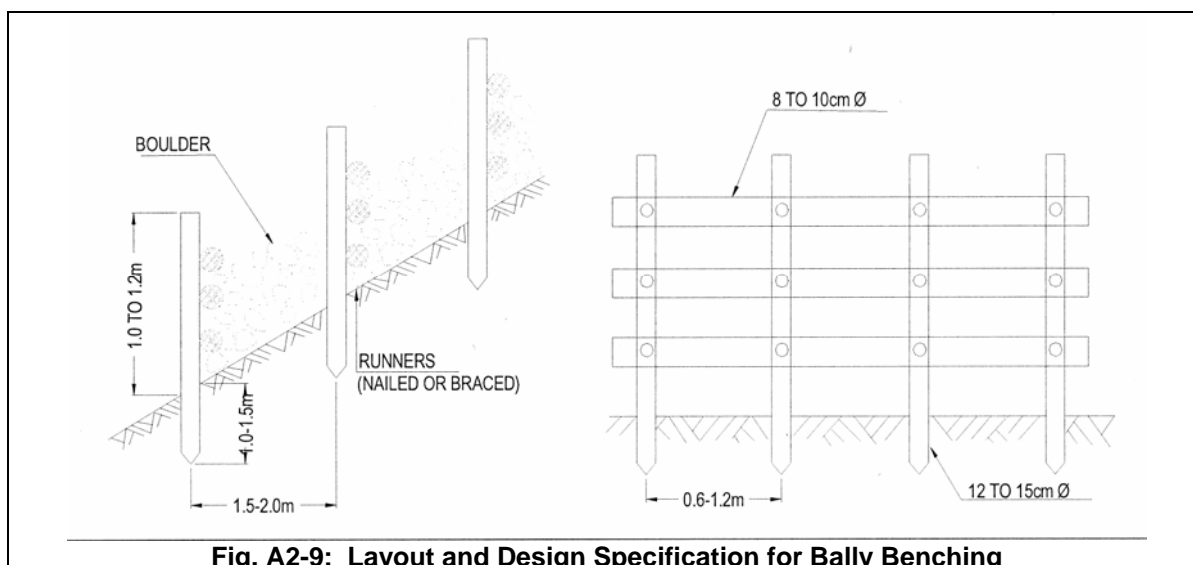


Fig. A2-9: Layout and Design Specification for Bally Benching

Check dams: Sheet and channel erosion on hill slopes gentler than 1(V):12(H) can be prevented effectively through construction of check dams. Details are provided in **Box 8-2**.

Box 8-2: Check Dams

A check dam is a small dam constructed in a drainage way to mitigate sheet and channel erosion by restricting the flow velocity. On steeper slopes $> 1:12$ (H:V), check dams are ineffective. Basic design criteria for check dams are:

- Check dams are usually constructed of riprap, logs, sandbags, and/or straw bales.
- The maximum check dam height should be 0.6 m.
- The centre of the check dam should be a minimum of 25 cm lower than the ends to act as a spillway for runoff, as illustrated in Figure 8.3
- Overflow areas should be stabilized to resist erosion.
- Stone check dams should use 7.5 cm or larger stone with side slopes of 2:1 (H:V) or flatter and should be keyed into the sides and bottom of the channel for a minimum depth of 0.6 m. The drainage area for a stone check dam should not exceed 0.2 km².
- Multiple check dams should be spaced so that the bottom elevation of the upper dam is the same as the top elevation of the next dam downstream, as illustrated below.

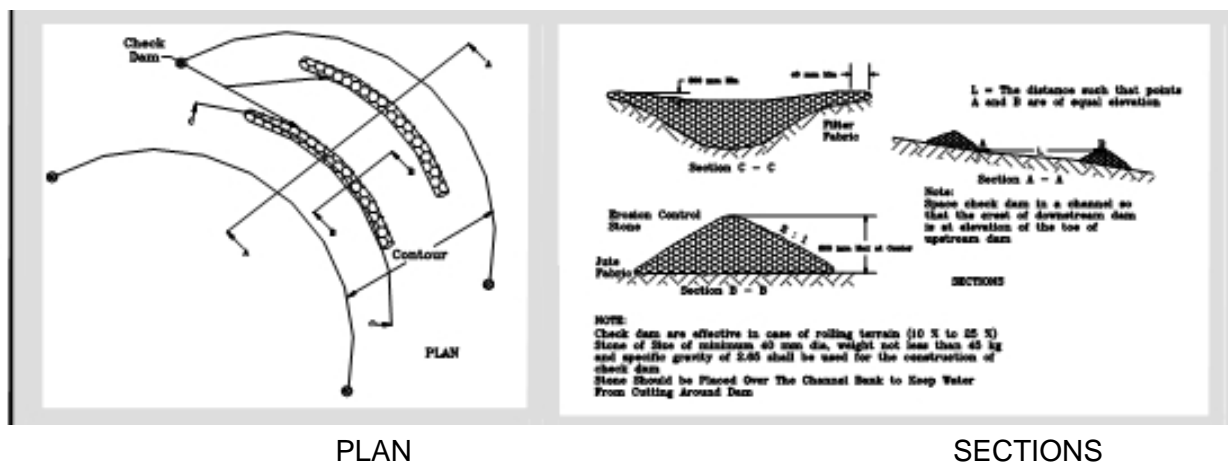


Fig. A2-10: Check Dam Specification

Soil erosion shall be controlled on high embankments by the following techniques:

- **Brush Barrier** (for details refer Ch. 7, "Topsoil Salvage, storage and replacement" and Section 3 of Road Side Bio-engineering Site Handbook, DoR, 1999)
- **Silt Fencing** (detailed specifications and drawings are provided in **Box 8-3**)

Box 8-3: Detailed Specifications For Silt Fencing

Description:

Silt fencing is as temporary sediment barrier made of woven, synthetic filtration fabric supported by steel or wood post. The purpose of the silt fence is to prevent sediment carried by sheet flow from leaving the site and entering to natural drainage or any other water body located near the construction site. Silt fencing encourages the sheet flow and reduces the potential for development of rills and gullies. Care should be taken that silt fences are not installed across streams, ditches, waterways or other concentrated flow areas. All silt fencing should be installed along the contour, never up or down a slope. Where all the sheet flow run off is to be stored behind the silt fence, maximum slope length should not exceed as shown in **Table A2-10**

Table A2-10: Criteria For Silt Fence Placement

Land Slope (%)	Maximum Slope Length (Above the fence in m)
<2	30.0
2 to 5	22.5
5 to 10	15.0
10 to 20	7.5
>20*	4.5

* In areas where slope is greater than 20%, a flat area length of 3.0 m between the toe of the slope and the fence should be provided.

Construction Specification:

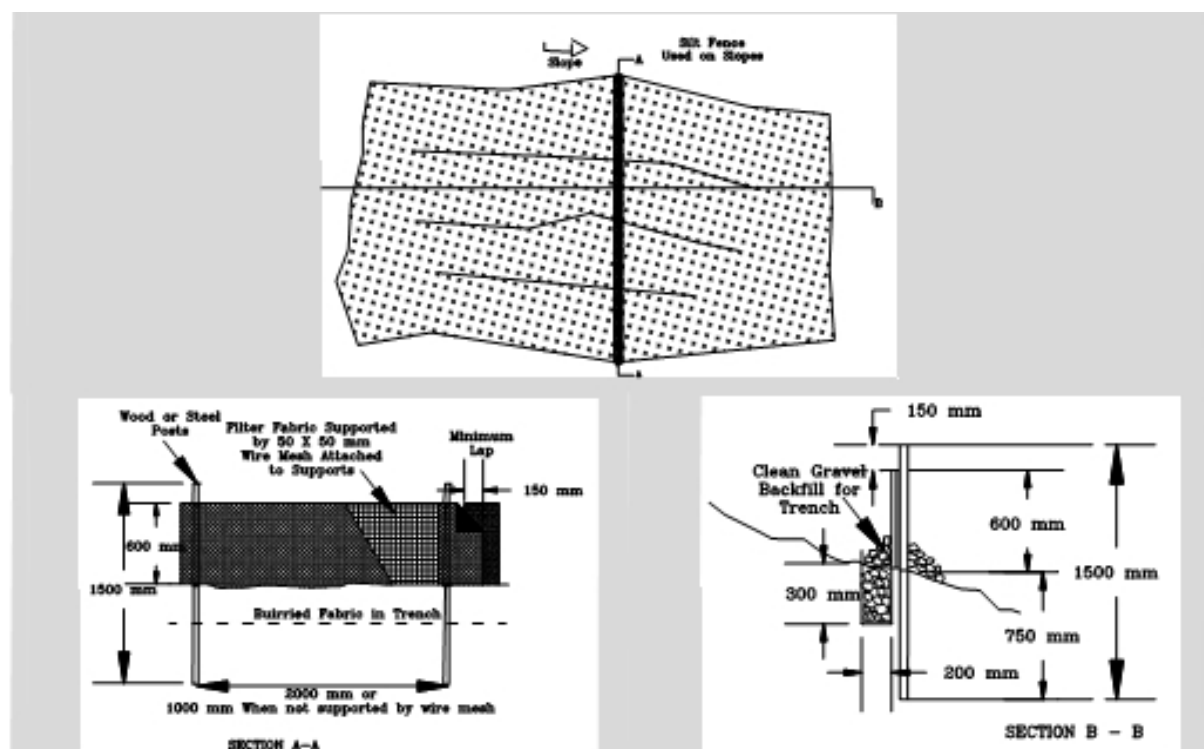
Silt fencing (Refer **Figure A2-11** for Cross-section) consists of 1.0 m wide filter fabric and should be placed on the contour. Incase runoff flow or velocities are very high or where slope exceed vertical height of 3.0 m, silt fencing should be wire reinforced. The contractor should purchase silt fencing in a continuous roll to the length of the barrier to avoid the use of joint. Incase of joints, filter cloth should be spliced together only at supporting post, with minimum 15 cm overlap and securely sealed. The pile is driven to the depth of 300 mm into the ground by pressing from the top. The frame will be installed at the edge of stockpiles and at the water bodies along which construction is in progress.

Inspection:

The Project Management/The Engineer will inspect location as well as efficiency of silt fencing. The inspection should be done after every 15 days and incase of storm water, within 24 hours after the end of rain.

Maintenance:

- The contractor should remove sediments, once they have accumulated to about half the original height of the fence.
- Filter fabric should be replaced whenever it has deteriorated to such an extent that the efficacy of the fabric is reduced.
- The silt fence should remain in place until disturbed areas have been permanently stabilized. All the sediments accumulated should be properly disposed of before the fence is removed.
- The operation of removing and disposing have to be monitored by the Project Management or Engineer.



SECTIONS

Figure A2-11: Cross-section of Silt Fencing

(For detail, refer to 'Roadside Bio-Engineering Reference Manual, 2056, MPPW/DoR; and 'Roadside Bio-Engineering Site Handbook, 2056, MPPW/DoR, 1999 and other Bio-Engineering related documents published by DoR

- In regions of intensive rainfall, locations of steep slopes, regions of high soil erosion potential and regions of short growing seasons, erosion control matting should be provided. Detailed specifications and drawings are provided in **Box 8-4**.

BOX 8-4: Erosion Control Matting**Description:**

The design specifications as well as location should be finalized during the Project Preparation Phase. During the execution period in post-construction stage, Project management must ensure that all the guidelines are to be followed as per specification during the site preparation and installation of erosion control matting. Following are the steps need to be followed for placing erosion control matting:

Site Preparation:

- The areas should be fertilized and seeded.
- A smooth surface free of depression that allows water to collect or flow under matting is required.
- The soil should be left with loose surface after seeding.
- The material should be steel wire formed into "U" shape and should be 15 cm to 25 cm long.

Installation:

- Filter fabric made of biodegradable material (e.g. Jute) should be placed approximately horizontally on the slope less than 2:1
- Prior to netting, a 10 cm anchor trench should be dug at the top and toe of the slope with the top trench placed 30 cm back from the crown, or a berm over which the fabric can be carried.
- For horizontal application, work must proceed from the bottom towards the top of the slope with a 10 cm overlap. After cutting material should be folded less than 7.5 cm to 10 cm at the end, stapled and covered.
- Staples should be placed at a spacing of 22.5 cm to 30 cm apart in the trenches along the horizontal lap joints.

(For detail, refer 'Roadside Bio-Engineering Reference Manual, 2056, MPPW/DoR; and 'Roadside Bio-Engineering Site Handbook, 2056, MPPW/DoR, 1999 and other Bio-Engineering related documents published by DoR.)

8.4 Post Construction Stage

All the exposed slopes shall preferably be covered with vegetation using suitable and endemic grasses, brushes etc. Meticulous care needs to be employed to select exclusively locally available species possessing the properties of (i) good growth; (ii) dense ground cover; and (iii) deep rooting system to facilitate slope stabilization (e.g. *Vetiver* grasses).

In case of steep and barren slope, in order to retain the seedling to the ground, asphalt mulch treatment, shall be given. Seedling are covered with asphalt emulsion and spread into a thin layer. The asphalt film gradually disintegrates and a carpet of green vegetation and deep-rooted species of grass and clovers, takes its place.³

Anchoring shall be carried out (*as per IRC: SP: 48-1998, Chapter 11*) in case of rocks.

Regular inspection of check dams and repositioning/replacement of dislodged or stolen stones need to be carried out.

Repair and maintenance of eroded side drain inverts is to be done in order to arrest retrogression of levels in side drains. Slopes of high embankment can give a fertile base for growth of vegetative cover / sodding.

In arid areas, in order to avoid the deposition of sand over or near the road surface, shrubs are to be planted at an appropriate distance from the formation. The shrubs should not be abutting the road and the distance for carrying out plantation shall be determined based on prevalent wind speeds as well as quantity of sand being carried amongst various other factors. There should be a clear gap between the roadway and shrubs to allow the wind to pickup its velocity and carry along with it any sand that is deposited.

9. Roadside Plantation

Apart from improving aesthetics and the ecological properties of the area, additional roadside trees potentially provide fuel wood, act as noise barriers, provide visual screen for sensitive areas and also generate revenue by sale of its produce. However certain precaution must be taken in design of avenue or cluster plantation so that the trees do not have an adverse impact on road maintenance and/or on safety of the road users. This code of practice elaborates on the approach towards planting trees along roads. Emphasis has been laid on a greater involvement of communities in planting and maintenance of roadside trees. The activities requiring addressal during the project stages are:

Table A2-11: Key Roadside Planting Activities during different Project Stages

Stages	Activities
Project Planning & Design Stage	Minimizing tree felling
	Plantation Strategies
	Tree Plantation
Post Construction Stage	Maintenance of trees

³ For details, reference should be made to 'Roadside Bio-Engineering Reference Manual, 2056, MPPW/DoR; and 'Roadside Bio-Engineering Site Handbook, 2056, MPPW/DoR, 1999 and other Bio-Engineering related documents published by DoR.

9.1 Project Planning and Design Stage

During alignment finalization, due consideration shall be given to minimize the loss of existing tree cover, encroachment of forest areas and protected areas (see Ch. 1, “Project Preparation”). Tree felling, if unavoidable, shall be done only after compensatory plantation of at least twenty five saplings of determined size for every tree cut is done as per policy and site-specific prescriptions of the Department of Forest. This shall be carried out by the Project Management.

Plant trees along roads where there is ...

- Availability of land for planting
- Availability of water
- Willingness of local beneficiaries to nurture the saplings

A roadside landscape plan shall be prepared by the Project Management as part of the Detailed Design Report in its environmental management plan, and finalized in consultation with the Department of Forest, if needed. It should be ensured that plantation is carried out only in areas where water can be made available during dry seasons and the plant can be protected during the initial stages of their growth. The species shall be identified in consultation with officials of forest department, giving due importance to local flora. It is recommended to plant mixed species in case of both avenue or cluster plantation. The saplings for plantation can be supplied by the Forest Department or managed by Project Management from local nurseries or nurseries of the District Road Office. Costs for providing saplings shall be borne by the road construction funds.

It is highly recommended to carry out public consultations that will identify opportunities and roles of local communities (particularly disadvantaged persons, low castes, women) or local bodies in maintaining and managing the trees to be planted in the project. A MoU can be signed between the VDCs, affected communities and Forest Department with respect to maintenance schedules and replacement of withered or damaged trees, and empowering the affected communities to be entitled to any revenue generated out of these trees. It shall be the responsibility of the VDC through the affected communities or, as applicable, through Community Forest User Groups (CFUGs) to work out institutional mechanisms for managing and maintenance of the roadside plantation schemes.

Normally, the EMP of the EIA or IEE suggests a plantation strategy relating to species selection, planting time, tending and monitoring survival. Development of cluster plantations might be encouraged in the public barren lands, at locations desired by the community. The location for plantation can be in RoW, which will also act as noise and dust barrier. If desired by local communities, arrangements shall be made in which local people can use fruit and fodder from the trees.

Do not plant trees...

- Within the line of sight around junctions
- On the inside of curves
- Within 5 m of the proposed centre line

The choice of species will be based on the preferences of the community and the technical advice of the forestry extension service. Fruit bearing or fodder indigenous species requiring less maintenance shall be chosen to ensure a higher survival rate. Exotic species bearing the risk of becoming invasive shall not be considered. The species of trees to be planted should be decided in consultation with the Forest Department for the particular region. Reference should also be made to the “Road Side Bio-engineering Site Manual” and Reference Manuals published by DoR. Should a Contractor utilize non-approved plant

species he shall made responsible for immediate and complete destroying of such species, under supervision of a local forestry representative.

The Project Management shall identify suitable nursery locations in consultation with the District Forest Office.

9.2 Post-Construction Stage

Planting of saplings from the nurseries as per landscape plan and the subsequent maintenance of the trees planted shall be carried out by the contractor or committee of local communities formed and funded by the project for the first five years. Planting shall be undertaken immediately after rainy season or initial weeks of spring. The activities to be taken up as part of maintenance shall include (i) cutting/lopping branches up to a height of 2.5 m above ground level to ensure visibility (ii) Removal of dead wood from the roadway and storing away from roads, and (iii) Weed cutting from shoulders and keeping the shoulders free from any growth of vegetation. In addition, the committee is to ensure a healthy survival rate by planting replacement saplings in cases where the survival rate is less than 80%.

Watering of trees during the initial period of two to three years shall be the responsibility of the committee or the agency designated by it. Final payment, if any, shall be on the basis of the number of trees surviving at the end of five years of initial plantation. The shoulders of the road shall be kept clear of weeds or any undesirable undergrowth, which may hinder free flow of traffic.

It needs to be ensured that the branches of the trees do not obstruct clear view of the informatory and caution signs.

Deciduous trees shed leaves every season. It is necessary to keep the roadway clear of such debris. Some gaps should be left even in avenue plantation to ensure that the carriageway dries up early after an occasional shower.

10. Drainage and Flood Prevention

Good drainage is of paramount importance for a functional road. Inadequate and faulty drainage arrangements result in obstruction to natural drainage pattern. The problem is further aggravated in the low-lying areas and flood plains receiving high intensity rainfall, which can lead to the instability of embankment, damage to pavement, sinking of foundation, soil erosion, safety hazards and disruption in traffic. Provision of cross-drainage and longitudinal drainage increases the life of the road and consequently reduces water logging and related environmental impacts.

On the other side construction or upgrading of CD structures and longitudinal drains is likely to increase sediments, scour the banks, change water level and flow, and also affect the ecology of the surrounding area in many ways.

This code shall address the environmental concerns related to drainage aspects during different stages of the project execution:

Table A2-12: Key Activities regarding Drainage during different Project Stages

Stages	Activities
Project Planning & Design Stage	Hydrological Investigation
	Geometric Design
	Consultations with downstream and upstream users
Construction Stage	Sediment control measures
Post Construction Stage	Inspection and Maintenance

10.1 Project Planning and Design

Drainage shall be broadly taken up as (i) Cross-Drainage, and (ii) Longitudinal Drainage both surface & sub-surface drainage. The alignment shall be routed such that minimum drainage crossings are encountered. Also the geometric design criteria as per Nepal Road Standard 2027 BS (first revision 2045 BS), and Design Standards for Feeder Road, 1997 published by DoR, for effective surface drainage should be ensured.

All drains crossing along the alignment shall be identified on site and marked on map while undertaking transect walk. Basic information on the width of channel, frequency of traffic holdup and flow would provide inputs into screening of alternate alignments as well as fixing the alignment. Consultations with the community shall provide information on the Highest Flood Level (HFL) in the area.

In areas of high and medium intensity rainfall (>400 mm/year), flood prone areas and hilly areas detailed hydrological studies will need to be conducted. Some reference materials for this could be Guideline Manual for Design of Bridges, DoR 2006. Similarly, other reference material may include;

IRC: SP-13: 1973 “Guidelines for the Design of Small Bridges & Culverts” and IRC: SP33:1989 “Guidelines on Supplemental Measures for Design, Detailing & Durability of Important Bridge Structures”.

The design of cross-drainage structures shall be based on the inputs from the hydrological studies.

Design of Cross Drainage (CD) structure shall observe, among others:

- Normal alignment of the road is followed even if it results in a skew construction of culverts and stream bank protection are incorporated;
- Afflux generated is limited to 30 cm in plains with flat land slopes;
- Designs to ensure that fish passage is not interrupted either in upstream or downstream direction;
- Adequate scour protection measures for stream bank, roadway fill as head walls, wing walls and aprons are in most circumstances indispensable;
- Reinforced road bed (of concrete or rock) for protection against overflow in case of low water crossing (fords/causeways);
- The design of CD structure should have stairs leading to the bed of the drainage channel, for regular inspection of the sub-structure.
- Longitudinal drains are to be designed to drain runoff from highest anticipated rainfall as per rainfall data for the past 20 years or 50 years as per hydrological analysis in high rainfall areas (annual rainfall > 1000 mm) and hill areas.

- Outfall of the roadside drains shall be into the nearby stream or culvert. The outfall should be at such a level that there would be no backflow into the roadside drain. Wherein pond/low lying areas exist in the vicinity, the flow may be diverted into them after removal of sediment for possible ground water recharge.
- In case no natural stream is found appropriate for roadside drain outfall, water-harvesting structures shall be constructed to collect the runoff. The location shall be determined based on the size of the structure (which in turn depends on the discharge anticipated) and willingness of the landowner who would be utilizing the collected water. These shall be determined by the Project Management in consultation with the landowner during project preparation stage.
- Roadside ditches in high rainfall areas (annual rainfall > 1000mm) and hill areas, shall be lined to protect from runoff of high velocities.

The schedule of construction of CD structures should be confined to dry months to avoid contamination of water bodies and disturbance of aquatic life.

In case of high embankment (>1.0m) or bridge approaches, lined channels shall be provided to drain the surface runoff, prevent erosion from the slopes and avoid damage to shoulders and berms. Detailed specifications can be referred to Guideline Manual for Design of Bridges, DoR, 2006. Additional reference material can also include IRC:SP-20:2002.

11.1 Pre-Construction Stage

Following measures are to be undertaken by the contractor prior to the commencement of CD/Bridge construction:

- The contractor should inform the concerned departments about the scheduling of work. This shall form part of the overall scheduling of the civil works to be approved by Project Management.
- The downstream as well as upstream users (e.g. irrigation farmers, fisher folk) shall be informed one month in advance, and alerted for potential impacts;
- The contractor shall schedule the activities based on the nature of flow in the stream;
- Erosion and sediment control devices are to be installed prior to the start of the civil works.
- Interceptor drains to be dug prior to slope cutting to avoid high runoff from slopes entering construction sites in case of hill roads
- Runoff from temporary drains and interceptor drains need to be carefully directed into natural drains in hill roads
- In case of upgrading existing CD Structures, temporary route / traffic control shall be made for the safe passage of the traffic, depending upon the nature of the stream
- All the safety/warning signs are to be installed by the contractor before start of construction

In case of utilization of water from the stream, for the construction of the CD structures, the contractor has to take the consent from the concerned department (refer also to the previous Chapter "Water for Construction")

10.2 Construction Phase

Drainage structures at construction site shall be provided at the earliest to ensure proper compaction at the bridge approach and at the junction of bridge span and bridge approach.

In hill areas sub-surface drains, if required, shall be provided immediately after cutting the slopes.

Velocity of runoff to be controlled to avoid formation of rills/gullies as per the code guidelines provided in Ch. 8 "Slope Stability & Erosion Control."

While working on drainage channels, sediment control measures shall be provided. Silt fencing (as per the detailed specifications given in Ch. 8, "Slope Stability & Erosion Control") shall be provided across the stream that carries sediment.

The sediments collected behind the bunds shall be removed and after drying, can either be reused or disposed off as per Ch. 12, "Waste Management and Site Redevelopment."

Safety devices and flood warning signs to be erected while working over streams and canals.

The HFL should be marked as per hydrological data on all drainage structures.

10.3 Post Construction

Inspection and cleaning of drain shall be done regularly to remove any debris or vegetative growth that may interrupt the flow.

The HFL should be, as necessary, re-marked as per hydrological data on all drainage structures.

Temporary structure constructed during construction shall be removed before handing over to ensure free flow through the channels.

The piers and abutments should be examined for excessive scour and make good the same if required.

In case of causeways, the following aspects shall be taken into consideration:

- Dislocation of stones in stone set pavements, scouring of filler material due to eddy currents.
- Floating debris block the vents. In case of large amount of floating material, debris arrestor shall be provided in upstream side.
- Damage to guide stones, information board shall be inspected and replaced accordingly.

The schedule of Inspection shall be drawn up for checking cracks, settlements and unusual backpressures. It must be ensured that all the rectification shall be undertaken as and when required. Following are broadly the items to be checked:

- Settlement of piers/abutments & settlement of approach slabs have to be checked
- Cracks in CD structures or RCC slabs;
- Drainage from shoulders to be ensured;
- Ditches & drains to be kept clean of debris or vegetation growth;
- Repairs to parapet of culverts whenever required are to be undertaken.

11. Protection of Aquatic Resources

Water bodies may be impacted when the road construction is adjacent to it or the water body is affected by change of drainage pattern due to construction of embankment. The following activities are likely to have an adverse impact on the aquatic ecology of the area:

- Earth moving
- Removal of vegetation
- Vehicle/Machine operation and maintenance
- Handling and laying of asphalt and
- Waste disposal from construction camps

Impacts on water bodies impairs ...

- Catchment area of the water body
- Drainage system
- Flood level and water logging
- Flora and fauna dependant on the water body
- Ground water recharging
- Animal husbandry as water bodies are used by animals
- Water quality &
- Runoff (increase/decrease)

To give adequate protection for aquatic resources, including safeguarding the interests of stakeholders using these resources, there are a number of measures that need to be explored during different stages of a road construction project (**Tab. A2-13**).

Table A2-13: Key Aspects for Protecting Water Bodies in Road Construction Activities

Stages	Activities
Project Planning Design	Proper Road Alignment
	Mitigation design in consultation with communities
Construction Stage	Erosion control and embankment protection measures

11.1 Project Planning and Design Stage

All efforts are to be taken to avoid the alignments passing adjacent or close to water bodies. Where possible, it should be realigned away from the water-body without cutting its embankment, decreasing the storage area or impairing the catchment area. Adequate drainage arrangements should be provided. Stream bank characteristics and hydrology of the area are to be studied before finalizing the alignment, the profile and cross drainage structures.

Complete filling of water body with soil should not be contemplated in the project. The Detail Design Report and its cost estimates have to accommodate costs of rehabilitation (to be estimated as lump sum at Detail Design Report stage) of water-bodies impacted by the project. Water-body rehabilitation shall be as per the Rehabilitation Plan prepared by the Contractor which should have approval of the Project Management/The Engineer*.

Details of the tasks to be performed as per the sequence of activities during the project planning and design are as follows:

- i) Transect walk should indicate the location of ponds in relation to the existing alignment if it is not already marked on the topographic map. The details to be captured during transect walk are:

* per definition: Engineer according to FIDIC

- Approximate size and depth of the water body in meters ‘m’
 - Designated use of the water body (domestic, drinking, irrigation, fisheries, industry)
 - Visual inspection of the quality of the pond water, occurrence of natural impacts (e.g. algae blooms, seaweed proliferation, fish mortalities, foul smell, mosquitoes, garbage).
- ii) Consultations with the people regarding alternate routes that were devised to avoid the fishponds. If alternate routes are not available, consent of the villagers is to be sought for properly compensating for the pond losses.
 - iii) Final design is to be prepared indicating the pond location in the alignment drawings
 - iv) If impacting the pond, the extent of impact is to be clearly indicated on a separate detailed drawing of the pond. The drawing should aid the contractor in setting up exact lines for cutting the pond.
 - v) All necessary measures for mitigation of impacts and precautionary measures while working close to the water body are to be incorporated into the Detail Design Report and cost estimates. The measures to be incorporated shall be as per this code guideline.

11.2 Pre-Construction Stage

The IEE/EIA must assess the likely impacts on the water body and make mitigation provisions that need to be followed meticulously by the Contractor. These measures must also clearly be explained and illustrated in the detailed work plan. In accord to these provisions, the Contractor shall prepare a Rehabilitation Plan for rectifying the likely impact to be caused and approval of Project Management shall be sought prior to commencement of work. The Rehabilitation Plan should include:

Working near Water Bodies - Precautions
<ul style="list-style-type: none"> • Avoid locating roads on pond embankment • Collect road runoff before entering the water bodies • Runoff to be filtered of sediments before letting into water bodies • Avoid debris disposal into water bodies • Avoid disposal of oil/grease/other contaminants into water bodies

- Locations of erosion protection works and silt fencing (as per Ch. 8, “Slope Stability & Erosion Control”, Box 8.3) to prevent sediment laden runoff entering the water body;
- Location of side drains (temporary or otherwise) to collect runoff from the embankment before entering the water body;
- Work program in relation to the anticipated season of flooding/overflowing of the water body, Obstructions likely to cause temporary flooding and information to seek clearance to remove the obstruction;
- Drawings in Rehabilitation Plan should indicate the landscape details along with species to be planted in the surrounding environs of the water body.

The rehabilitation of water body should be with the objective of restoring it to its original state or to a better state with necessary enhancement of its environs. Rehabilitation Plan shall include:

- Reconstruction and stabilization of embankment in case it is impacted
- If storage area is lost, then the water body is to be deepened to regain an equivalent volume

- As applicable and desired by the community, provide for landscape enhancement of the water body (e.g. resting /picnic places along shores of ponds/lakes).
- Cost of rehabilitation

Concurrence of the community has to be sought on the Rehabilitation Plan prepared by the Contractor. Concerns of the community have to be incorporated into the plan before submitting it for approval of the Project Management.

The Project Management shall scrutinize the Rehabilitation Plan, verify the implementation on site and finally approve the plan. The Rehabilitation Plan should be implemented by the Contractor immediately after completion of construction at the stretch near the water body.

When there is interruption to regular activities of villagers near water body due to construction or rehabilitation work, following are the Contractor's responsibilities:

- Restriction on use of water, if any, should be intimated to the community in advance
- Alternate access to the water body is to be provided in case there is interruption to use of existing access. The access provided should be convenient for use of all the existing users whether community or cattle:
- If the water body affected is a drinking water source for a habitation, alternate sources of water are to be provided to the users during the period for which its use is affected.

11.3 Construction Stage

- It should be ensured by the contractor that the runoff entering the water body is free from sediments.
- Silt fencing and/or brush barrier shall be installed in the drainage channels for collecting the sediments before letting them into the water body (see Ch. 8, "Slope Stability and Erosion Control", Box 8.3).
- Silt/sediment should be collected and stockpiled for possible reuse as surfacing of slopes where they have to be re-vegetated.

Cutting of embankment reduces the water retention capacity and also weakens it, hence:

- The contractor should ensure that the decrease in water retention should not lead to flooding of the construction site and surroundings causing submergence and interruption to construction activities.
- Any perceived risks of embankment failure and consequent loss/damage to the property shall be assessed and the contractor should undertake necessary precautions as provision of toe protection, erosion protection, sealing of cracks in embankments. Failure to do so and consequences arising out of embankment failure shall be the responsibility of the contractor. The Project Management shall monitor regularly whether safe construction practices near water bodies are being followed.
- Alternate drain inlets and outlets shall be provided in the event of closure of existing drainage channels of the water body.
- Movement of machinery and workforce shall be restricted around the water body, and no waste from construction camps or sites shall be disposed in or adjacent (as rule of thumbs, <200 m) to the aquatic system.

11.4 Post - Construction Stage

With the completion of construction, the Project Management has to ensure implementation of rehabilitation plan for the water body, as indicated by the Contractor.

The boundaries of the water body – particularly wetland habitats - have to be left undisturbed and tidy with the completion of construction.

If unavoidable, drainage channels of adequate capacity shall be provided for the water body being impacted by storm waters.

12. Waste Management and Rehabilitation of Construction Sites

This Code of Practice describes procedures for handling, reuse and disposal of waste materials during road construction activities. The waste materials generated can be classified into construction Waste; and domestic waste. The key activities during project stages where management of wastes is required are presented in **Table A2-14**:

Table A2-14: Key Aspects for Proper Waste Management in Road Construction Activities

Stages	Activities
Project Planning & Design	Identification of type/source of waste
Pre-construction	Identification of disposal sites
Construction Stage	Re-use of wastes, as applicable
Post-Construction Stage	Decommissioning

12.1 Project Planning and Design Stage

As part of Detailed Design Report preparation, Project Management shall carry out the following actions:

- Finalize the road design and alignment to minimize waste generation through balancing of cut and fill operations and minimizing excess cuts requiring disposal.
- Identify the type of wastes as well as sources of waste during construction and suggest options for possible re-use.
- Provide guidelines to the contractor for locating waste disposal sites for non-toxic wastes. Incorporate supervision and approval mechanisms to ensure that no illicit dumping of hazardous materials will occur, with potential deleterious environmental consequences.
- Identify existing and environmentally safe landfill sites for approved disposal of toxic materials.
- In case no existing landfill sites are available, identify landfill sites as well as decommissioning of these sites should be undertaken. Towards this, identify the clearance requirements.
- Include in the bid document, a clause stating that all provisions of Environmental Codes

Practices to avoid - waste disposal ...

- Tipping of waste into stream channels, water bodies, forests and vegetated slopes
- Non-cleaning of wastes after day's work
- Leaching of wastes
- Littering in construction camps / sites
- Storing wastes on private land

of Practice shall be applicable to the locations of disposal of wastes. These shall include all provisions outlined in Ch. 7 “Topsoil Salvage, Storage and Replacement”, Ch. 8, “Slope Stability and Erosion Control” and Ch. 11, “Drainage and Flood Prevention”.

12.2 Pre-construction Stage

During construction, the contractor shall identify all activities that have the potential to generate waste (type, quantities and environmental harmfulness) and work out measures for the same in the construction schedule to be submitted to the Project Management. A sequential listing of the activities during road construction and the nature of wastes together with the possible options for re-use are specified in **Table A2-15**.

For the disposal of excess cut and unsuitable (non-toxic) materials, the contractor shall identify the location for disposal in consultation with the community / VDC/ Municipality as appropriate. Any toxic material shall be disposed in existing landfill sites that comply with legislative requirements. Prior to disposal of wastes onto private/community land, it shall be the responsibility of the Contractor to obtain a **No-objection Certificate (NOC)** from the land owner/community. The format for NOC shall be included in the bid documents and in the works contracts. The NOC shall be submitted to the Project Management prior to commencement of disposal.

12.3 Construction Stage

The contractor shall either reuse or dispose the waste generated during construction depending upon the nature of waste, as specified in **Table A2-15**. The reuse of waste shall be carried out by the contractor only after carrying out the specific tests and ascertaining the quality of the waste materials used, and getting the same approved by the Project Management/The Engineer. Wastes that were not reused shall be disposed off safely by the contractor. The contractor shall adopt the following precautions while reusing wastes for construction:

- In case of bituminous wastes, dumping will be carried out over a 60 mm thick layer of rammed clay so as to eliminate any chances of leaching.
- In case of filling of low-lying areas with wastes, it needs to be ensured that the level matches with the surrounding areas. In this case, care should be taken that these low lying areas are not used for rainwater storage
- In case oil and grease are trapped for reuse in a lined pit, care shall be taken to ensure that the pit should be located at the lowest end of the site.
- The Contractor shall regularly educate his workforce location of disposal site as well as the specific requirement for the management of these sites.

The waste management practices adopted by the Contractor, including the management of wastes at construction camps etc shall be controlled on a regular schedule by the Project Management /The Engineer during the progress of construction. Mechanisms must be in place to ensure due and immediate corrective measures once the existing waste management practices are not up to the satisfaction of the supervising engineer.

12.3 Post-Construction Stage

After decommissioning of construction sites, the Contractor shall hand over the site after clearing the site of all debris/wastes to the Project Management who is obliged to verify. In case of disposal of wastes on private land, certificate of Completion of Reclamation is to be obtained by the Contractor from the landowner that “the land is restored to his satisfaction”. The same is to be submitted to the Project Management before final payment is claimed.

13. Construction Plants and Equipment Management

During execution of the project, construction equipments, machinery and plants potentially have various adverse impacts on the environment. The impact can be due to emissions, dust, noise and oil spills that concern the safety and health of the workers, surrounding settlements and environment as a whole. This code of practice describes the activities during the project stages where pollution control measures are required. **Table A2-16** highlights the key activities that need to be addressed during the project and also the significance of impacts in the project region.

Table A2-16: Key Aspects for Plants and Machinery Management

Stages	Activities
Project Planning & Design	Equipment Selection
Construction Stage	Development of Work Safety and Health Regulations
	Awareness of Safety-Health among Workers, emphasis on risk perception and accident prevention, and First Aid
	Safety Device & Cautionary Signs
	Waste Disposal Management
Post-Construction Stage	Restoration of Plant Site/Haul Roads Decommissioning

13.1 Project Planning and Design Stage

Selection criteria for setting up a plant area and parking lot for equipment and vehicles shall be done as per siting criteria for construction camp specified in Ch.3, “Construction Camps and Site Operation”. Apart from these guidelines, the ‘Public Workers Directives’ and forthcoming ‘Procurement Act’ of Government of Nepal shall be adhered to during the preparation of bidding document.

13.2 Pre-construction Stage

The Contractor must **educate the workers** to undertake safety precaution while working at the plant / site as well as in the around heavy equipments as per the Ch.14, “Occupational Health & Safety”.

Before setting up the crusher, hot-mix plant and generator, the Contractor shall acquire “No Objection Certificate (NOC)” from the Project Management/The Engineer. The EMP shall give sufficient indications as where the **siting of such equipment** is allowable or not permissive, depending on parameters like settlement vicinity, ecological sensitive areas,

water bodies, cultural assets and others identified during the public consultation process.

The Contractor shall ensure all vehicles must possess a **Pollution Under Control (PUC) Certificate**, from designated authority by the DoR, which and shall be renewed regularly. The Contractor must also ensure that all machinery, equipments, and vehicles shall comply with the existing HMGN noise and emission norms of Government of Nepal.

The Project Management must ensure that the Contractor shall submit a copy of the NOC and PUC Certificates before the start of work.

13.3 Construction Stage

The Contractor shall undertake measures as per **Table A2-17** to minimize the dust generation, emissions, noise, oil spills, residual waste and accidents at the plant site as well as during transportation of material to construction site.

Table A2-17: Precautionary Measures at Plant Sites

Concern	Causes	Measures
Dust Generation	Vehicle Movement	<ul style="list-style-type: none"> Water sprinkling Fine Materials shall be Transported in Bags or Covered by Tarpaulin during Transportation Tail board shall be properly closed and sealed
	Crushes	<ul style="list-style-type: none"> Water sprinkling
	Concrete-Mix Plant	<ul style="list-style-type: none"> Educate the workers for following good practices while material handling
Emissions	Hot-Mix Plant	<ul style="list-style-type: none"> Site selection as pre-identified in the IEE/EIA Site selection as per Clause 6.5.2, Section 6.5, IRC's Manual for Construction & Supervision of Bitumen Work Regular maintenance of dust Collector as per manufacture's recommendation
	Vehicles	<ul style="list-style-type: none"> Regular maintenance as per manufacturer's recommendation
	Generators	<ul style="list-style-type: none"> Exhaust vent of long length
Noise	Heavy Load Vehicles	<ul style="list-style-type: none"> Exhaust silencer, Regular maintenance as per manufacture schedule
	Crushers	<ul style="list-style-type: none"> Site selection as pre-identified in the IEE/EIA Siting as per guideline Ch. 12, "Construction Camps and Site Redevelopment"
	Generators	<ul style="list-style-type: none"> Shall be kept in closed room and regular maintenance as per manufacture's recommendation
Oil spills	Storage and Handling	<ul style="list-style-type: none"> Good practice and fire fighting equipment/training Prepare a contingency Plan for emergency situations In accord with guideline Ch. 12,, "Waste Management and Site Redevelopment"
Residual waste	Dust Collector / Pits	<ul style="list-style-type: none"> In accord with guideline Ch. 12, "Waste Management and Site Redevelopment"
Batteries	Acids Burning	<ul style="list-style-type: none"> Safe / locked storage rooms to prevent accidents and misuse
Concrete waste	Concrete-Mix Plant	<ul style="list-style-type: none"> In accord with guideline Ch. 12,, "Waste Management and Site Redevelopment"

Bitumen and bitumen mix	Hot-Mix plant	• - do -
Stone chips	Crushers	• - do -
Safety	Range of Equipment	• No worker shall be present in the vicinity of the equipments
	Movable Parts of Equipments	• Caution Signs, • Regular awareness training among workers
	Plan Area/Site	• Caution Sign, Safety Equipments, Regulations
	Accidents/Health	• First Aid Box, Periodic Medical Check up, Insurances
	Break down of vehicles	• Arrangement for towing equipment to the workshop

During site clearance, all cut and grubbed materials shall be kept at a secured location so that it does not raise any safety concerns. During excavation, water sprinkling shall be done to minimize dust generation.

Frequent water sprinkling shall be done on the haul roads to minimize dust generation. Incase of loose soils, compaction shall be done prior to water sprinkling.

Safety Measures during Bitumen Works...

- The Contractor shall ensure that bitumen storing, handling as well as mixing shall be done at hot-mix plant or designated areas³ to prevent contamination of soil and ground water.
- Use of fuel wood for heating bitumen shall be discouraged. When heating is required, bitumen heaters shall be used, fueled by either kerosene, diesel or gas.
- No bituminous materials shall be discharged into side drains.
- Nearby tree, vegetation and private property shall be protected during bitumen spraying work.
- Skilled labor shall be used while hand placing the pre-mixed bitumen material. The hand placing of pre-mixed bituminous material shall be done only in following circumstances:
 - For laying profile corrective courses of irregular shape and varying thickness
 - In confined spaces where it is impracticable for a paver to operate, and
 - For filling potholes
- The Contractor shall provide safety equipments i.e. gumboots and gloves to the workers while handling bitumen.
- While applying Tack Coat, spraying of bitumen shall be done in the wind direction. The labor shall wear jacket while spraying the bitumen.
- Bitumen shall not be applied during strong winds and rainy periods, or if rain is likely.
- All the bituminous work shall be done as per IRC's Manual for Construction and Supervision of Bituminous Works.

Cautionary and informatory sign shall be provided at all locations and times, specifying the type of operation in progress.

The contractor must ensure that there is minimum generation of dust and waste while unloading the materials from trucks.

Batteries and battery acids need to be stored in locked compounds and storerooms to prevent theft and misuse.

Bitumen drums shall be stored in designated locations and not scattered along the road.

The construction waste generated shall be disposed as per guideline Ch.12, "Waste Management and Site Redevelopment".

Table A2-15: Types of Construction-Generated Wastes and Scope of Re-uses

Activity	Types of waste	Scope for possible reuse	Disposal of Waste
Construction Wastes			
Site Clearance and Grubbing	Vegetative cover and top soil	Vegetating Embankment Slopes	
	Unsuitable material in embankment foundation	Embankment Fill	Low lying areas Land fill sites
Earthworks			
Overburden of borrow areas	Vegetative cover and soil	Vegetating Embankment Slopes	
Overburden of Quarries	Vegetative cover and soil	Vegetating Embankment Slopes	
	Granular material	Embankment Fill, Pitching	
Embankment construction	Soil and Granular material	Embankment Fill	
Construction of earthen drains	Soil	Embankment Fill	
Concrete Structures			
Storage of materials	Dust, cement, sand,	Constructing temporary structures, embankment Fill	
	Metal scrap	Re-sale	Scrap yard
Residual wastes	Organic matter	Manure, Re-vegetation	
	Cement, sand	Constructing temporary structure, embankment fill	
	Metal scrap	Diversion sign, Guard rail	
Oil and Hazardous Fluids			
Construction machinery-maintenance and refueling	Oil and Grease	Incineration, Cooking, Illumination	
Bituminous works			
Storage	Bitumen	Low Grade Bitumen Mix	
Mixing and handling	Bitumen	Low Grade Bitumen Mix	
	Bitumen Mix	Sub-base, Paving access ,cross roads	
Rejected bituminous mix	Bitumen Mix	Sub-base, Paving access, cross roads	
Domestic Wastes			
Construction camps	Organic waste,	Bio-decomposition, Manure	
	Plastic and metal scrap	Re-sale, as applicable	Scrap yard
	Domestic effluent	Irrigation, fertilizing fields	
Reconstruction works			
Dismantling of existing pavement	Bitumen mix, granular material	Sub-base	
	Concrete	Road sub-base, reuse in concrete, fill material and as rip rap on roads	
	Guard rail sign post, guard stones	Reuse for same	
Dismantling of cross drainage structure	Granular material and bricks	Constructing temporary structure, embankment fill	
	Metal scrap	Diversion sign, Guard Rail	
	Pipes	Culvert	
Decommissioning of sites			
Dismantling of temporary structures	Granular material and bricks	Constructing temporary structure, embankment fill	
Hill Roads			
Hill cutting	Vegetative cover	Vegetating embankment slopes	
	Soil and granular material	Embankment Fill	
Clearance of slides	Vegetative cover	Vegetating embankment slopes	
	Soil and granular material	Embankment Fill	
Maintenance Operations			
De-silting of side drains	Organic matter and soil	Re-vegetation	

All equipments, which are required to move forward and backward, shall be equipped with alarm for backward movement. It shall be ensured that the workers shall remain away from such working areas at active times.

The Project Management shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.

13.4 Post-construction Stage

The Project Management shall ensure that all haul roads are restored to their original state.

In case any inner village road is damaged while transporting the procured material the contractor must restore the road(s) to the original condition.

The Project Management must ensure that the decommissioning of plant shall be done in environmentally sound fashion and the workshop area closed and brought to its original state.

14. Occupational Health and Work Safety

The health and safety of both the general public and the workers must be of prime concern for all parties involved in with road construction activities as there are major hazards associated with this type of

In specific, **health concerns** include

(a) for the General Public:

- Improper scheduling of construction activities especially near settlements and cultural areas, where local customs would cause temporary gatherings of the public
- Undesired interactions between workers and host community has the potential to spread and increase communicable diseases, if no stringent public awareness and health campaigns are carried out (at both ends, i.e. among the labor forces and the local communities). This problem has particularly to be addressed by all project-responsible staff when there are vulnerable groups (women, children, low casts) at stake, and where outside/migrant laborers constitute a tangible portion of the work forces. Community awareness programs, such as HIV/AIDS prevention, are best undertaken by (contracted) NGOs and health organizations with proven experience in the subject and familiar with the local conditions.
- Unhygienic conditions due to water logging, either by improper decommissioning of Construction Camps and parking lots, or improper disposal of construction wastes, leading to the breeding of vectors that are likely to impact the health of the general public
- Creation of stagnant water ponds / waterlogged areas near construction sites and labor camps have the potential to increase public health risks, as such locations will serve as breeding ground for water-borne disease vectors (e.g. malaria, dengue, intestinal worms).
- Unauthorized use of local natural resources by work forces on items like medicinal plants, non-timber forest products, fire wood, hunting species, fish etc. may lead to

resource depletion, inducing secondary side-effects like malnutrition that may harm public health.

- Over-use of drinking water resources by work forces may equally have negative implications on the public health.
- Migrant workers, especially when under drug and alcohol influence, may cause social conflicts which can result in physical clashes with the general public and the workers, putting local health facilities under constraints.

(b) for the Work Staff:

- Absence of proper sanitary facility likely to act as a breeding ground for vectors raising health concerns among workers.
- Low quality drinking water as well as inappropriate storage of drinking water likely to cause water borne diseases among workers.
- Migrant workers may act as vectors for sexually transmitted diseases such as HIV/AIDS.
- Migrant workers may become vectors for other endemic diseases.

In specific, **safety concerns** include

(a) for the General Public:

- Improper scheduling of construction activities especially near the settlements and sensitive areas
- Parking of equipments and vehicles at the end of the day likely to cause accidents to the general public especially during night hours.
- Transportation of uncovered loose material or spillage of material increases the chances of accidents to road users and surrounding settlements.
- Notice prior to blasting
- Children hanging on trucks and vehicles being at particular risks for fatal accidents.

(b) for the Work Staff:

- Improper handling of materials like bitumen, oil and other flammable/hazardous material at construction sites, likely to cause safety concerns to the workers.
- Lack of safety measures such as fences, adequate lockers, alarm, awareness and safety equipment may result in accidents,
- Lack of specific precautionary measures, especially at work sites with or around heavy machinery / equipments near rivers, steep slopes, equally bears many accident risks, partly with fatal consequences.

This code of practice describes how to address the above mentioned risks into account and offers practicable and proven measures to mitigate the potential impacts. **Table A2-18** highlights the key health & safety activities that need to be addressed during the different project stages.

Table A2-18: Key aspects for health and safety measures to be observed during different project stages

Stages	Activities
Project Planning & Design	Collection / elaboration of Health & Safety Regulations
Pre-construction Stage	Safety & traffic control measures in construction schedule to be included in the Works Contracts
Construction Stage	Regular training of work forces in Work Safety and Health Regulations
	Awareness of safety & health aspects among workers, with emphasis on control of HIV/AIDS and related issues
	Safety Device & Cautionary Signs
	Training of workers on public safety issues
Post-Construction Stage	Provision of proper signagees

14.1 Project Planning and Design Stage

To address health and safety concerns, the Detailed Design Report shall contain selection criteria for setting up:

- Construction Camps (see Ch.3, "Construction Camps and Site Operation")
- Borrow Areas (see Ch.4, "Gravel Extraction and Borrow Area") and
- In case of opening new quarry areas (see Ch. 5, "Quarry Development, Operation and Rehabilitation")

To address the safety concerns to road user during operational phase, the Detailed Design Report shall contain the following:

- Selection and location of regulatory as well as informatory signs, depending upon the geometry of the road
- In case of hill roads, provision of passing places and parapet wall shall be included in road design.

The planning exercise and identification of potential impacts (screening process during IEE/EIA) shall also identify potential risks for vulnerable groups and/or occurrence of social conflicts and incidence/risks of HIV/AIDS. In such cases, it is mandatory to make at this early stage all provisions to put an environmental and health awareness campaign in place before the influx of labor camps may bring about an aggravation of the already existing social and public health problems. An essential step to address such risks is the identification of adequate NGOs who can then conduct awareness programs for conscientization of the affected communities and groups.

14.2 Pre-construction Stage

In order to incorporate public health and safety concerns, the Project Management and the Contractor shall disseminate the following information to the community:

- Location of construction camps, borrow areas and new quarry areas.
- Extent of work
- Time of construction
- Diversions, if any

- Precaution measures in sensitive areas
- Involvement of local and foreign labors in the road construction
- Health issues - water stagnation, exposure to dust, communicable disease, drugs, alcohol, potential sources of social and public health conflicts
- Mechanism for grievance resolution.

The Contractor must educate the workers to undertake the health and safety precautions. The contractor shall educate the workers regarding:

- Personal safety measures and location of safety devices.
- Friendly and cooperative interaction with the host community
- Protection of environment with respect to:
 - Trampling of vegetation and cutting of trees for cooking
 - Restriction of activities in forest areas and also on hunting
 - Water bodies and catch fisheries/aquaculture protection
 - Storage and handling of materials
 - Disposal of construction waste

14.3 Construction Stage

During the progress of work, following are the safety requirements that need to be undertaken by the contractor at the construction site:

- Personal safety equipments (such as footwear and gloves)
- All measures as per bidding document shall be strictly followed
- Additional provisions need to be undertaken for safety at site:
 - Adequate lighting arrangement
 - Adequate drainage system to avoid any stagnation of water
 - Lined surface with slope 1:40 (V:H) and provision of lined pit at the bottom, at the storage and handling area of bitumen and oil, incl. the location of generator (grease trap).
 - Facilities for administering first aid, including training rooms

Minimum Requirements for First Aid (example)

- First Aid Kit, distinctly marked with Red Cross on white back ground and shall contain minimum of the following or similar items:
 - 6 small-sterilized dressings
 - 3 medium and large sterilized dressings
 - 1 (30 ml.) bottles containing 2% alcoholic solution of iodine
 - 1(30 ml) bottle containing salvolatile
 - 1 snakebite lancet
 - 1 pair sterilized scissors
 - 1 copy of first-aid leaflet
 - 100 tablets of aspirin
 - Ointment for burns
 - A suitable surgical antiseptic solution
- Adequate arrangement shall be made for immediate recoupment of the equipments, whenever necessary.
- A trained personnel in charge of first aid treatment to be readily available during working hours at construction site
- Suitable transport to the nearest approachable hospital should be made available.

The following measures need to be adopted by the contractor to address public safety concerns:

- The contractor shall schedule the construction activities taking into consideration factors such as:
 - Sowing of crops
 - Harvesting
 - Local constraints such as festivals etc.

- Availability of local labor (should be preference, as per specifications) during particular periods
- All precautionary signs as per DoR standard and traffic control devices (such as barricades, etc) shall be placed as soon as construction activity get started and shall remain in place till the activities get completed.
- As necessary, traffic deviations and accident-prone spots need to be manned by all times during construction activities with control personnel that take particular care to prevent children from accessing dangerous construction sites.
- Following case specific measures need to be followed during the progress of the activity:
 - In case of blasting, the Contractor must follow The Explosives Act of GoN. In case of construction activity adjoining the water bodies, measures shall be taken as per guidelines in Ch. 11, "Water Bodies". If construction of road is within a settlement, the contractor must ensure there shall not be any unauthorized parking as well as storage of material, adjacent to road. Approved chemicals should be sprayed to prevent breeding of mosquitoes and other disease-causing organisms, at all existing or likely water logging areas.

The Project management shall carry out periodic inspections in order to ensure that all the measures are being undertaken as per this specific set of Code of Practice.

The contractor must give utmost precautionary care to exclude and control the spread of sexually transmitted diseases, by imposing strict rules and providing regular awareness training among all work staff.

14.4 Post-construction Stage

During this stage a major concern is on road user safety. Following are the measures that need to be undertaken by the DoR divisional Office/District Office to ensure safer roads:

- Inspection and maintenance of installed regulatory and informatory signs.
- Ensure that the location of signage does not obstruct the visibility
- In case of hill roads, maintenance of parapet wall as well as of overtaking zones.

The DoR Divisional office/District Office must ensure that during the maintenance operation of road, road materials are stored at a location such that they shall not create any risk to road users.

The construction site shall be cleaned of all debris, scrap materials and machinery on completion of construction for the safety of public and road users, as per Ch.3, "Construction Camps and Site Operation" and Ch.13, "Waste Management and Site Rehabilitation".

The environmental and social audit needs also to determine whether the preventive campaigns to control sexually transmitted diseases, alcohol / drug abuse and trafficking are under proper control, or if further corrective measures are needed covering a given road section.

15. Roads Crossing Forests and Sensitive Wildlife Habitats

This code of practice envisages measures to be undertaken during planning, design, construction and operation and maintenance stages of the Road passing through natural habitats. These measures shall be undertaken in addition to the measures laid down in the other guideline sections of this Annex.

As per the World Bank OP 4.04 and similar directives provided by other donor agencies like ADB, DFID and JICA, the conservation and enhancement of natural habitats is essential for long-term sustainable development.

Natural Habitats refers to...

- National Park
- Reserve Forest
- Sanctuaries
- Notified Wetlands
- Fisheries and Aquatic Habitats
- Karst landforms, including caves

15.1 Project Planning and Design

To minimize the adverse impact on the ecology of the natural habitats, selection of alignment should be as per the principal guideline outlined in Ch. 1, "Project Planning & Design".

An officer of at least the rank of a forest ranger shall be deputed for detailed inventory of ecological features along the Road. The inventory shall be carried out after the ranger travels along the proposed alignment during the transect walk while the nature and type of impacts on natural habitats due to road construction are identified.

Ecological Features...	Adverse Impacts...
<ul style="list-style-type: none"> • Area and integer function of natural habitat • Habitat requirements for territorial species • Type and number of endangered species of flora and fauna • Water bodies and aquatic life • Breeding ground and seasons • Seasonal and spatial requirements of migratory bird species • Terrestrial animal crossing pathways 	<ul style="list-style-type: none"> • Fragmentation of forest land and habitats • Cutting of trees vital for certain species and populations • Disturbance, withering, trampling of vegetation • Contamination of water due to various forms of water uses and/or influx of pollutants from adjacent surface and groundwater sources • Loss or disturbance of breeding grounds • Interruption of animal crossings due to construction and operation of a road

Impacts on natural habitats shall be minimized to the extent required. Minimization shall be through precautionary measures or through appropriate mitigation measures. Recommended measures and good practices for constructing roads passing through forests and other sensitive natural habitats include:

- Constricting the road width to minimize the extent of diversion of forest land and cutting of trees.
- Drainage Structures shall be designed in accordance with guidelines given in Ch.10.
- Rumble strips shall be provided at every kilometer along the length of the natural habitat and invariably at the start and end of the natural habitat.

- Signage (viz. speed limit, animal crossing, switch of headlight etc) shall be provided as per DoR Standard for road sign.
- If signage proves to be insufficient, physical speed breakers have to be included in the road design in sections with high incidents of traffic accidents with wildlife (e.g. in dense forest sections).
- In case of sensitive ecological road sections the EMP of the IEE/EIA Study shall identify specific measures for the stretch passing through such habitats.

In addition to the above measures, specific impacts identified on site shall be mitigated as per the recommendation of the forest department / officer in charge of the identified natural habitat. In case the proposed alignment falls within a certain surface water flow, a flush causeway shall be constructed without impacting the natural drainage system. The length of the causeway shall be as per the existing water spread. In no circumstances a water body within the natural habitat shall be cut across or filled for the purpose of laying the road.

15.2 Pre-construction Stage

No Construction Camps, Stockyards, Concrete Batching or Hot Mix Plants shall be located within the natural habitat or within 500m from its boundary.

Contractor in consultation with forest ranger or any other concerned authority shall prepare a schedule of construction within the natural habitat. Due consideration shall be given to the time of migration, time of crossing, breeding habits and any other special phenomena taking place in the area for the concerned flora or fauna.

15.3 Construction Stage

Procurement of any kind of construction material (as quarry or borrow material) from within the natural habitat shall be strictly prohibited. No water resources within the natural habitat shall be tapped for road construction.

Use of mechanized equipment shall be kept at minimum while working in forests and/or ecological sensitive habitats. The Contractor must ensure that there will be no parking of vehicles, machine and equipment within such ecological zones.

The disposal of construction waste and spoil within the natural habitat shall be strictly prohibited and as far as possible re-use shall be undertaken as per **Table A2-15** presented in Ch. 12, "Waste Management and Site Redevelopment".

15.4 Post Construction Stage

The road passing through the natural habitat shall be declared as a silence zone.

Compensatory tree plantation in the ratio of 1:25 within the available Right of Way shall be done in accordance with Ch.9 "Tree Plantation".

The Project Management must ensure maintenance of drainage structure undertaken as per Ch. 10, "Drainage and Flood Prevention."

16. Protection of Cultural Properties

Cultural properties located close to the road are likely to be impacted by road construction, therefore these assets should be duly avoided while determining and finalizing a road alignment. **Table A2-19** highlights the key activities that need to be addressed in this regard during different stages of the project and also the significance of the impacts in the project regions.

Table A2-19: Key Activities to protect cultural properties

Stage	Activities
Project Planning & Design	Identification of cultural properties and their significance while consulting local stakeholders and, as applicable, the Dept. of Archaeology
	Avoidance/mitigation measures
Construction	Precautionary measures
Post-construction	Restoration of impacted cultural properties

16.1 Project Planning and Design Stage

Measures for mitigation of impacts on cultural properties during project preparation should observe the following steps:

- Identification of locally significant cultural properties, in close consultation with local communities and religious leaders;
- Assessment of likely impacts on each cultural property due to project implementation, taking into due account the perception of the consulted stakeholders;
- Develop, together with the local representatives, possible measures for avoidance or mitigation of the anticipated impacts.

In case the impact is not avoidable, identification of alternative routes or possibility of relocation of the culture property shall be assessed in consultation with the local public, based on the economic feasibility.

In case of world heritage sites or place of high socio-cultural importance, no relocation would be taken up and alignment shall be shifted away from the cultural property to avoid any impacts. Re-alignment for avoiding impacts on such site is mandatory.

In case of (agreed/feasible) relocation, relocated site should be suggested by the local people and the size of

Information to be collected on cultural properties...

- Location
- Direction (North/ South/East/West) with respect to the planned road
- Distance of the structure from existing centerline of the road
- Type of property: temple/mosque/shrine/palace, religious pond, stone water spout etc
- Plan of the structure
- Importance of the structure - historical/social/archeological
- Ownership of the property
- Probable loss to the property
- Specific periods/durations in which large congregations as festivals/mela take place causing hindrance to vehicular movement
- Choice of community, issue of relocation

relocated structure should at least be equal to the original structure. The original architecture and structure setting should be maintained to the extent possible.

A detailed design of the relocated structure and its site plan along with the necessary BoQ are to be presented in the Detail Design Report.

The relocation and other avoidance measures should be carried out before the start of the road work.

It must be ensured by the Project Management that the BoQ and rates for the relocation works are incorporated into the contract document.

16.2 Construction Stage

Major impacts on the properties during this stage are mainly due to movement of construction machinery as well as due to construction activity in the vicinity of the cultural property. The following precautionary measures are recommendable:

- Provision of temporary barricades to isolate the boundaries of the cultural property from the construction site as approved by the Engineer to avoid impacts;
- Restrict movement of heavy machinery near the structure;
- Avoid disposal or tipping of earth near the structure;
- Access to these properties shall be kept clear from dirt and grit.

During earth excavation, if any property is unearthed and seems to be culturally significant or likely to have archeological significance, the same shall immediately be intimated to the Engineer. Work shall be suspended until further orders from Project Management. The Department of Archeology shall then be informed without delay of the chance find and the Engineer shall carry out a joint inspection with officials from the Department who shall suggest appropriate actions the Contractor has to comply with. This will also include information on the probable date for resuming works.

The Project Management must ensure that the contractor implements all precautionary measures as suggested in the Contract Specifications relating to preservation of cultural assets.

16.3 Post Construction Stage

Immediately after completion of construction, the Contractor will affect clearance of the precincts of cultural properties.

In case access to any of the cultural properties is severed during construction it needs to be restored at the Contractor's cost. Restoring is subject to approval of either the VDC or the Department of Archaeology. The Project Management shall certify the approved restoration actions before final payment is made.

17. Remedial Measures against Rural Road Accidents

In 1997, the DoR prepared a series of guidelines that address practical recommendations for identifying and treating road accident sites. It is suggested that road engineers, planners and contractors will explore the following technical solutions and good practices to diminish the toll of road accidents in the country's rural roads.

None of the remedial measures suggested below from **Table A2-20** should be implemented without in-depth analysis. When considering remedial measures it must be emphasized that it is important to study the accident data, identifying the dominant accident types, identifying the causal factors, and selecting remedial measures which are likely to be effective in remedying the deficiencies that have been found. While doing so, planners need also to assess beforehand the following questions:

- (i) *Is the remedy likely to be long-lasting?* – for example, some speed-reduction measures have an immediate effect but this wears off as drivers get used to them;
- (ii) *Is the specific remedy cost-effective?* - some measures may be effective without being cost-effective;
- (iii) *Will the proposed measure result in an excessive increase in other types of accidents?* - for example, in some circumstances the introduction of traffic signals can result in an increase in nose -to -tail accidents;
- (iv) *Will it have unacceptable environmental or social effects?* - road humps for example can cause traffic noise nuisance as vehicles brake, and may result in traffic diverting onto other less suitable roads
- (v) *Will the measure be unpopular with road users?* - if so, the engineer might come under strong pressure to remove it, unless there is prove to the local community that it is effective in preventing accidents
- (vi) *Will the corrective provision need to be heavily enforced by the Road Police or will it require considerable publicity and education?* -if so, consider whether this is really achievable.

Table A2-20: Remedial Measures for Rural Accident Situations

Accident Type	Possible Remedy
Single vehicle loss of control (usually recorded as overturn)	<ul style="list-style-type: none"> • improved delineation (centre and edge line markings, delineator posts, chevron signs, reflective studs if a night -time problem) • safety barrier (especially if there is a big drop) –containment parapet on bridges • bar markings on the road (especially on the approach to a very sharp bend) • warning signs (if they already exist, consider increasing their size, or making them reflective, or positioning them better) • seal the shoulder (if unsealed) • impose speed limit • improve skid resistance • re-align bend and/or improve super-elevation
Head on collisions	<ul style="list-style-type: none"> • Improved delineation (as above) • if collisions happen while overtaking consider prohibiting this using a continuous centre line and possibly "No Overtaking" regulatory sign • if collisions happen at narrow sections (e.g. bridges, culverts) ensure that these are clearly signed (warning signs, hazard markers, bar markings, rumble strips, etc) • if collisions frequently happen while a parked vehicle is being overtaken consider banning parking and/or providing a parking area or lay- by
Pedestrian Accidents	<ul style="list-style-type: none"> • traffic calming measures within villages and at the entrances (place name signs, gateways, rumble strips, build-outs) (make it very clear to drivers that they are going through a village) • impose speed limits • warning signs ("Children", or "Pedestrians in Road") • provide footways (on bridges and elsewhere) • provide pedestrian crossings (but only if they will be well-used)
Collision with roadside object	<ul style="list-style-type: none"> • Remove object if possible • Install hazard marker in front of object • use safety barrier to protect vehicle from object (e.g. in front of the end of a bridge parapet)
Collision with stopped or parked vehicle	<ul style="list-style-type: none"> • consider banning parking in this accident-prone zone • provide bus lay-by or off-road parking area
Accidents at junctions and access points	<ul style="list-style-type: none"> • better signing and marking (make the priorities clear) • channelization (splitter islands in minor road approach and protected lanes for vehicles turning right out of the major road) using paint ("ghost islands") or physical islands • remove any obstructions to visibility (e.g. trees, bushes, poles, walls etc) • provide service roads for frontage development thereby making it possible to greatly reduce the number of access points.
Accidents on gradients	<ul style="list-style-type: none"> • Safety barrier (if vehicles frequently run out of control) • Provide crawler (overtaking) lanes or shorter passing places

Accident Type	Possible Remedy
Junction Accidents	<i>There is a great variety of junction situations and not all the remedies listed below will apply to every one -moreover all remedial measures will need to be carefully designed to suit the specific circumstances -it is advisable to consult design manuals before making major alterations to junction layout</i>
Conflicts between traffic streams -at priority (T or cross-roads) junctions	<ul style="list-style-type: none"> • if traffic is very heavy -such as at many junctions in larger towns - consider installing a roundabout (if there is space) or traffic signals traffic signal installation needs to be done as part of a project covering a number of junctions) • improve the signing and marking (make the priorities clear) • channeling -show drivers the correct path to take by means of road markings (e.g. "ghost islands", lane markings, right-turn bays, lane arrows, etc) and physical islands • control and channel pedestrian crossing movements • modify the layout to encourage slower approach speeds (e.g. by reducing corner radii and providing splitter islands) • prohibit and discourage parking and stopping near the junction (e.g. by signs and pedestrian guardrail) -move bus stops away from the junction • improve traffic lighting • remove any obstructions to visibility on traffic lights • ban difficult turning movements (but only if the ban can be easily enforced and the alternative route is not too long or awkward) • consider reducing the number of conflicts by converting one or more roads to one-way traffic (but consider the area-wide implications) • improve skid resistance
Conflicts between traffic streams at roundabouts	<ul style="list-style-type: none"> • improve the signing and marking (make the priorities clear) • install splitter islands on the approaches • increase deflection {e.g. by increasing the diameter of the centre island or changing the approach geometry) • control and channel pedestrian crossing movements • prohibit and discourage parking and stopping near the junction (e.g. by signs and pedestrian guardrail) • move bus stops away • improve lighting • remove any obstructions to visibility • improve skid resistance
Pedestrian accidents at all types of junctions	<ul style="list-style-type: none"> • control and channel pedestrian crossing movements • provide pedestrian crossings • provide pedestrian refuges • prohibit and discourage parking and stopping near the junction (e.g. by signs and pedestrian guardrail) -move bus stops away • improve lighting • at signalized junctions consider introducing a pedestrian stage

Accident Type	Possible Remedy
Conflicts between traffic streams -at signalized junctions	<ul style="list-style-type: none"> • upgrade the signal equipment (brighter lights, stronger colors) • improve signal visibility (extra signals, better positioning, backing boards, etc) • improve the signing and marking (STOP lines, lanes and lane markings, turn arrows, advance warning signs) • check the timing (additional inter-green time may be need for clearance) • consider changes to the staging' (if there is a right-turning problem consider giving this traffic a separate stage or a priority overlap) • control and channel pedestrian crossing movements • prohibit and discourage parking and stopping near the junction (e.g. by signs and pedestrian guardrail) -move bus stops away improve lighting • remove any obstructions to visibility • improve skid resistance
Accidents not at Junctions	
Pedestrian accidents	<ul style="list-style-type: none"> • Provide pedestrian footways • provide pedestrian crossings (busy crossings may need to be signal-controlled) • provide pedestrian refuges • control and channel pedestrian crossing movements • install speed reducing road humps (residential areas) • install other traffic calming measures (gateways, build-outs. , chicanes, rumble areas, etc. , designed to encourage low speeds, and careful disciplined driving
Single vehicle – loss of control	<ul style="list-style-type: none"> • largely as for rural accident situations
Head-on collisions	<ul style="list-style-type: none"> • largely as for rural accident situations
Accidents involving two-wheelers and non-motorized vehicles	<ul style="list-style-type: none"> • consider increasing width of nearside lane or providing a special lane

Annex 3
Glossary of Technical Terms used in
the ESMF

ANNEX 3

GLOSSARY - Common Terms used in the ESMF

Baseline Study is the work done to collect and interpret information on the status and trends of the environment likely to be affected by the proposed development action.

Biodiversity is the common description for biological diversity at different levels of life (e.g. habitat, populations, species, individual biota, organisms and micro-biological/cellular structures. In EIAs, biodiversity refers mainly to the wealth of ecosystems in the biosphere, of species within ecosystems, and of genetic information within populations.

Biosphere describes that part of the earth-atmosphere system which supports and is characterized by life, encompassing all terrestrial and aquatic ecosystems.

Biota is a collective term that denotes all the living organisms in a particular space.

Chain Impacts are impacts which are themselves a result of other impacts, as opposed to being caused directly by any particular event. Chain impacts are usually considered as part of a series of related impacts having a cascade an/or accumulating effects on the environment.

Compensation is the provision for enhancement, replacement, restoration, and restitution to recipients of unavoidable negative residual impacts. Often there is payment in funds or replacement. Funds may also be used to recreate lost habitat or other valued resources.

Compensation Plan is the portion of the Environmental Management plan that describes the compensation measures that will be undertaken and committed to if a project proceeds. It includes how much compensation will be paid to whom, by whom, and under what conditions.

Conservation is the preservation of natural resources so as to maintain supplies and quality levels sufficient to meet all present and anticipated needs.

Critical habitat is an area of land and/or water required for the survival of a plant or animal population. Critical habitats are also referred to as **ecologically sensitive areas**.

Cumulative Impact. refers to environmental impact(s) that result from actions being added to others of the past, present, and foreseeable future, caused by construction or related activities or natural events that are either repeated or occur in combination.

Direct or Indirect Impacts: Whereas most physical and hydrological impacts are direct; ecological and social impacts are commonly indirect or secondary in nature.

Ecosystem is an aquatic or terrestrial system or combination of systems that include some or all of the living and non-living components. Boundaries of an ecosystem are often specified for a particular application.

Encroachment relating to road projects refers to the temporary or permanent occupation of Government land (mostly RoW) by private individuals. It includes erection of buildings or other structures and the intrusion with crops and livestock.

Endemism refers to a condition in which species occur only in a single spatially-limited and distinct location, such as isolated islands, mountain valleys, caves, lakes and isolated forest lands (e.g. Sundarban). Endemic species are often highly specialized to the limited

environmental conditions in which they exist, and are thus vulnerable to changes introduced from outside.

Environment is the totality of the natural and human environments on which the project will exhibit influence, and includes

- (i) all biophysical components of the natural environment of land, water and air including all layers of the atmosphere, biological resources, and all inorganic and organic matter both living and dead;
- (ii) all socio-economic components of the human environment including, but not limited to, social, economic development, human resources, quality of life, administrative, cultural, historical, archeological, architectural, structures, sites and things, land and resource usage, and human health, nutrition and safety.

Environmental Assessment (EA) is the process for making environmentally sound decisions in to ensure that the concept of sustainable development is achieved in respect to projects and the plans leading to projects. It has four components:

- (i) early planning to avoid environmental impacts,
- (ii) identification of existing and expected environmental impacts → **EIA or IEE**
- (iii) Environmental Management Plan to determine residual environmental impacts and their management,
- (iv) Public participation.

Environmental Auditing is a systematic, documented and verifiable process designed to ascertain whether the → **EMS** helps the organization to meet the required standards of environmental performance, fulfill its legal obligations and achieve what has been planned for. Compliance performance techniques are important audit tools.

Environmental Enhancement is an intentional change which amplifies the anticipated positive impact of the project on one more environmental components.

Environmental Impact is, from the project's point of view, either

- (i) any change that the project may cause to an environmental component, or
- (ii) any change to the project that may be caused by the environment, which then may lead to altered environmental conditions

Environmental Impact caused by the actions of a project or interventions should be distinguished from the impact to resources or components caused by natural events such as floods, cyclones and earthquakes.

Environmental Impact Assessment (EIA) is the systematic study, assessment and reporting of the impacts of a proposed program, plan or project, including a plan for dealing with and control of negative impacts. The EIA Report provides quantified and qualified information on the expected impacts due to project interventions, and makes provision for mitigating these effects.

Environmental Management Action Plan (EMAP) is a plan to undertaken an array of follow-up activities which provide for the sound environmental management of a project so that adverse environmental impacts are minimized and mitigated; beneficial environmental effects are maximized and sustainable development is ensured. EMAPs are sometimes called **Environmental Protection Plan** and describes specific mitigation actions that will be undertaken during project pre-construction, construction, operation, rehabilitation and abandonment to lessen the effects of the project on the environment usually with specific instructions for personnel involved in project activities. The EMAP integrates existing legislation, codes of good engineering measures and makes provision for respective clauses to be incorporated in the contracts for executing the (road) project.

Environmental Management System (EMS) provides a structured and systematic approach to overall environmental management. It covers policy, procedures, stakeholders, responsibilities and audit mechanisms.

Environmental Standards (ES). An environmental standard is defined here as an environmental threshold establishing maximum or minimum limits for the criteria by which key parameters are measured.

Follow-up Activities constitute the set of specific actions described in the Environmental Management Plan for project implementation and compliance with contractual responsibilities.

GIS is the abbreviation for **G**eographic **I**nformation **S**ystem, a computer-based tool for mapping and analyzing conditions that occur on earth. This system offers a query and statistical analysis used for planning purposes and predicting outcomes from development projects.

GPS is the **G**lobal **P**osition **S**ystem using satellite-transmitted signals for exact positioning and reference of any location on a global coordinate grid.

Habitat is the descriptive division of the environment having a functional combination of physical (drainage, soil type, slope) and biological factors necessary for sustained animal, plant or human use and survival.

Impact Matrix is a cross-referencing square or rectangular array of rows (project activities) and columns (important environmental components) used for organizing and visualizing positive and negative environmental impacts of a project.

Indicator is an organism or a quantifiable physical or bio-chemical feature that, by its presence, absence or abundance, indicates a particular property of the surrounding environment.

Indigenous People describes collectively the members of those cultures that have historic, ancestral, spiritual and functional connection to the land on which and from which they live. In popular usage, indigenous peoples are distinguished from members of those cultures whose connection to the land on which they live is limited to the historical period. They often are highly vulnerable against cultural influences from outside.

Initial Environmental Examination (IEE) is the initial report for a proposed project prepared at pre-feasibility level for identifying and addressing the nature and scope of possible impacts.

Interested Parties (also called '**Stakeholders**') are all persons, groups and institutions having a justifiable concern and interest in the project and its impacts. It includes local people as well as elected representatives of the government, NGO's and project donors.

Intervention is the specific action caused by a project that creates an environmental impact.

Landscape refers the spatial organization of an environment on a broad scale, and how that organization shapes, and is shaped by, the activities which take place within it. In Environmental Assessment Studies, the term 'landscape' often refers to aesthetical values.

Magnitude is the degree of change in an important environmental component that results from a project activity.

Mitigation is any action taken to reduce unacceptable negative impacts, e.g. the elimination, reduction or control of the adverse environmental impacts resulting from the proposed project. It includes both design changes to the project and operational strategies (i.e. compensation). Mitigation measures are specified in the EMP.

Project is defined as;

- (i) a physical work such as construction, operation and rehabilitation works, abandonment or other programs in relation to that physical work, and
- (ii) a regional, pre-feasibility, feasibility, design or conceptual plan or study undertaken to ascertain the desirability of proceeding with physical works and associated activities such as road network development, transport sector development, etc.

Project Phase refers to the main categories of project activities expressed sequentially including: pre-construction, construction, operation and abandonment.

(Project) Proponent in respect to a project means the person, body, authority, government or donor that proposes the project, or who is responsible for the environmental assessment or implementation of the project.

Project Stage refers to the main stage of project planning including: pre-feasibility (regional study) and feasibility.

Public Involvement refers to the dialogue, encompassing consultation and communication, between a project proponent and the →stakeholders, ideally at all →stages of a project . It includes dissemination, solicitation, and presentation of information.

Residual Impacts. Residual impacts are those impacts that remain after application of mitigation measures and that cannot be overcome.

Resettlement Action Plan (RAP) is the action plan prepared as part of an EA to address the issues of involuntary resettlement, compensation and rehabilitation of people and communities affected by a road project.

Resilience describes how quickly a system or environmental variable returns to its natural state following cessation of a disturbance, in relation to the proposed → mitigation measure.

Screening is to determine beforehand the nature and extent of the EIA, i.e. to match the level of effort in the EIA to the expected magnitude of the anticipated impacts. In this process, project are classified into impact categories (A, B, C) following certain criteria set commonly by project funding institutions (e.g. *Operational Directives of World Bank*) and the legal framework (e.g. Environmental Conservation Act, Environmental Guidelines)

Scoping is a process whereby the important environmental components, project development issues, project alternatives and concerns of local communities are identified.

Significant Environmental Impact is an adverse residential environmental impact that is not justified in the circumstances.

Socio-economic refers to the human environment which includes social and economic components that are not termed biophysical.

Stakeholders includes all persons and groups having a justifiable concern and interest in the project and its impacts. Stakeholders include local people of different professions, representatives of the Government, overseas donor agencies, NGOs and local industries and small enterprises.

Sustainable Development is development is development that ensures preservation and enhancement of environmental quality, and sound sustainable use of natural resources thereby providing for economic growth which meets the needs of the present without compromising the ability of future generations to meet their own needs (adapted from the Brundtland Commission, 1987).

Synergistic Effects describe those effects which result from the combination and interaction of individual impacts. The effects are often greater than the sum of the individual contributing impacts.

Topography. A detailed description or representation of the features, both natural and artificial, of an area.

Trophic is an ecological term referring to the positioning of organisms in the **food chains** of their respective biological communities. The lowest level is commonly associated with the primary producers, which transform the sun' s energy into tissue that becomes food for higher trophic levels, and the highest level with large carnivores which normally have no predators.

Valuation is the assignment of monetary, importance, priority or other values to the estimated impacts. Monetary or economic valuation in EAs is often termed **evaluation**.

Annex 4

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¹ Not quoted herein are all legislation and policy documents of both the GoN and International Donors quoted in Chapter 3

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