

20. Agricultural and Rural Road Sector

January 2002

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Abbreviations

ADB	Asian Development Bank
APP	Agricultural Perspective Plan
B/C	Benefit Cost Ratio
BC	Beginning of Curve
BM	Benchmark
CDO	Chief District Officer
DDC	District Development Committee
DFID	Department for International Development
DIARS	District Infrastructure and Agricultural Roads Section
DOLIDAR	Department of Local Infrastructure and Agricultural Roads
DOR	Department of Roads
DRUC	District Road Users' Committee
DTCO	District Treasury Comptroller's Office
DTM	Digital Terrain Model
DTMP	District Transport Master Plan
EC	End of Curve
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMAP	Environmental Management Action Plan
FAR	Financial Administration Regulation
GTZ	German Technical Cooperation
HMGN	His Majesty's Government of Nepal
ICIMOD	International Centre for Mountain Development
IDPM	Indicative District Perspective Plan
IEE	Initial Environmental Examination
ISA	Initial Social Assessment
JICA	Japan International Cooperation Agency
LDO	Local Development Officer
LRUC	Local Road Users' Committee
MC	Middle of Curve
MLD	Ministry of Local Development
MOPE	Ministry of Population and Environment
NGO	Non-governmental Organization
NPV	Net Present Value
O&M	Operation and Maintenance
PWD	Public Works Directives
SAP	Social Action Plan
SDC	Swiss Development Cooperation
SIA	Social Impact Assessment
UC	Users' Committee
VDC	Village Development Committee
WB	World Bank

20. Agricultural and Rural Roads Sector

20.1 Introduction to the Rural and Agricultural Sector

20.1.1 General

His Majesty's Government of Nepal plans to develop about 6,200 km of agricultural and rural roads during the next 20 years (1995-2015) as envisaged by the Agricultural Perspective Plan (APP) and this trend will continue for many years to come. With the enactment of the *Decentralization Act, 1993*, *Local Body Self-Governance Act, 1999* and corresponding regulations, the responsibility for the development and management of rural and agricultural roads has been devolved to local bodies (75 DDCs, 3912 VDCs and 58 Municipalities). These local bodies however need to be strengthened to make them capable of managing the anticipated numbers of rural and agricultural roads. To this end, a series of efforts is being made by the HMG/N with assistance from donor agencies.

20.1.2 Institutional Arrangement

The Ministry of Local Development (MLD), as the prime government agency for local development, is responsible for providing the policy and institutional back-up to the local bodies in their local development endeavours. The Ministry has formulated a National Strategy for Rural Infrastructure Development as a governing document. The Department of Local Infrastructure Development and Agricultural Roads (DOLIDAR) has been created to develop and facilitate guidelines for the local bodies, strengthen them and monitor their performance. DOLIDAR has developed a series of documents to provide a single uniform approach for the development of agricultural and rural roads. The rural and agricultural roads are markedly different from the strategic highways under the Department of Roads (DOR) in respect of institutions and community involvement.

20.1.3 Donor Involvement

Major donor agencies such as the World Bank, Asian Development Bank, DFID, SDC and GTZ are involved in many projects in collaboration with HMGN to develop, upgrade, rehabilitate and maintain rural and agricultural roads in more than 25 districts. Preparation of a district transport master plan (DTMP) is a prerequisite for participation of the districts in all donor-assisted programmes. For this reason, about 30 districts have developed DTMPs on their own or through assistance from donors and consultants. Other districts have initiated similar efforts for the implementation of rural and agricultural roads with HMGN assistance or with their own financial resources. Efforts are also underway to develop guidelines for the preparation of district infrastructure master plans comprising all sectors.

The respective local bodies are the focal points and key implementing agencies for the local level projects with support and facilitation from DOLIDAR and MLD. The following section describes specific guidelines for rural and agricultural road projects being implemented as central level projects (projects approved and funded by HMGN central allocation) under DOLIDAR and MLD. The guidelines may serve as a best practice guide for local bodies as well.

These guidelines are intended to address specific issues related to agricultural and rural roads that are not covered by either the generic part of these PWD or by the procedures that apply to conventional national highways and feeder roads.

20.2 National Strategy and Policy for Rural and Agricultural Roads

MLD has formulated a policy document, *National Strategy for Rural Infrastructure Development*, which serves as a guiding document to promote and facilitate the development of local infrastructures in the country. The salient features of the document, which are markedly different from the policies, which apply to strategic highways, are as follows:

- The strategy is based on the local bodies self-governance concept and on potential expectations of local bodies.

- It provides a uniform approach in programme planning, implementation and follow-up actions for rural infrastructure development.
- It encourages people's participation and commitment from the beneficiaries.
- It is intended to end an ad-hoc and prolonged implementation process and to resolve adverse quality problems.
- It provides standards for work norms and practices, appropriate technologies, financial and human resources, and basic physical facilities.
- It addresses maintenance and repair issues of existing facilities and proper utilization of built facilities, which are not receiving desired priority and are in unserviceable condition.

The key objective of the National Strategy is "the development of basic rural infrastructure country-wide in a planned and sustainable manner by adopting labour-based, local resource-oriented, environment-friendly techniques and in accordance with the HMGN decentralized and participatory approach".

20.3 Existing Standards/Guidelines/Approaches/Legislation

The following reference documents are available for the development of rural and agricultural roads:

Table 20.1 Reference Documents for Rural and Agricultural Roads

Subject	Description of Documents
Policy	<i>National Strategy for Rural Infrastructure Development</i> <i>Approach for the Development of Agricultural and Rural Roads</i>
Legislation	<i>Local Self-Governance Act, 2055</i> <i>Local Self-Governance Regulation, 2056</i> <i>Local Body (Financial Administration) Regulation, 2056</i> <i>Financial Procedures Act, 2055</i> <i>Financial Administration Regulation, 2057</i>
Standards and Specifications	<i>Work Norms for Rural and Agricultural Roads</i> <i>Technical Specifications for Rural and Agricultural Roads</i> <i>Environmental Guidelines for Small Rural Infrastructure Projects, IUCN</i>
Planning	<i>Approach for the Development of Agricultural and Rural Roads for the Preparation of District Transport Master Plan (DTMP)</i> <i>National Plan for Rural Road Maintenance (NPRRM), 2056</i>
Design and Construction	<i>Rural Water Supply and Sanitation Support Programme, Implementation Guidelines</i> <i>PLRP Work Report on Involvement of Local Road Coordination Committees in Road Rehabilitation and Maintenance</i> <i>PLRP Work Report on Collaboration with NGOs in Future Road Maintenance Works</i> <i>PLRP Report on Maintenance Concept for District Roads</i> <i>PLRP Experience Report on Labour-Based Technology and Equipment</i>
Computer Software	CREDO/ORDM Software for Road Design, IRAD System SW_Road and SW_DTM Software for Road Design, Softwel System etc.
Maps / Reports	Topographical Maps, Finnida (Scale 1:25,000) Land Use Maps (Scale 1:50,000) District Transport Master Plans, Maps and Reports

20.4 Key Processes for Entire Project Cycle

The key processes for planning, implementation, operation and maintenance recommended for rural and agricultural roads are presented in the flow chart in Figure 20.1. The planning, implementation and post-implementation activities are presented in separate vertical columns for clarity. Planning of centrally funded rural and agricultural roads follows the same bottom-up process as roads projects implemented by local bodies; however, they require the approval of the sector ministry before proceeding for programming, budgeting and implementation.

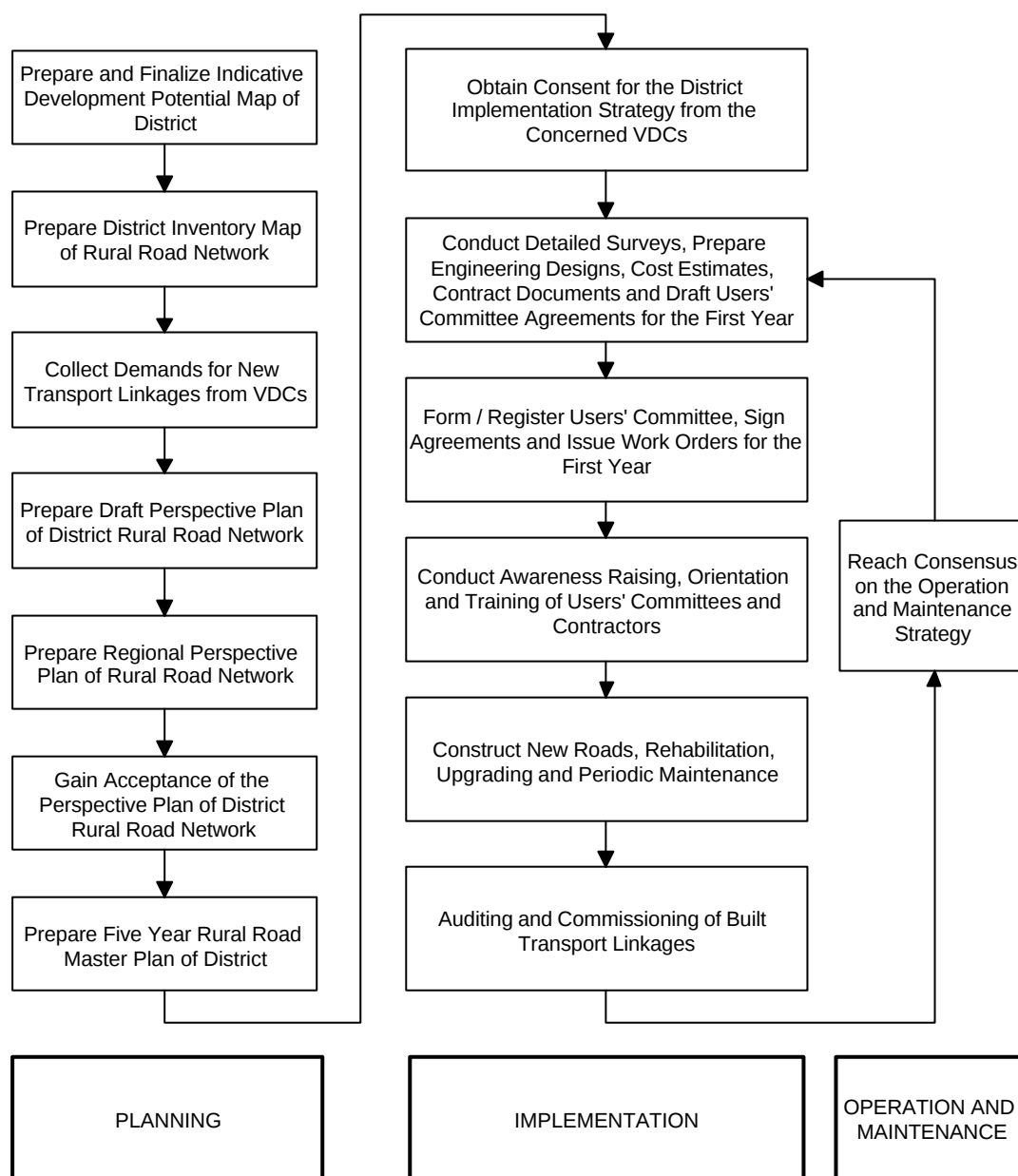
20.5 Planning

20.5.1 Perspective Plans and Master Planning

The main focus during the planning stage is to prepare District Transport Master Plan (DTMP) in each district. The DDC may employ its own staff or hire consultants to prepare the DTMP. These steps should be followed:

- Prepare and finalise an indicative development potential map of the district.
- Prepare a district inventory map of the rural road network.
- Collect all the demands for new transport linkages from the VDC.
- Prepare a draft perspective plan of the district rural road network.
- Synchronise the draft perspective plans of the adjoining districts and prepare a regional perspective plan of the rural road network.
- Gain acceptance of the perspective plan of district rural road network by DDC, District Council, DOLIDAR / MLD, and NPC.
- Prepare a first five-year rural road master plan of the district i.e. DTMP.

Figure 20.1 Entire Process for Rural and Agricultural Roads



20.5.2 Reconnaissance / Pre-feasibility Study

The following procedures should be followed to carry out a reconnaissance study or pre-feasibility study of rural roads:

- Review the existing DTMP report and determine the priority of the proposed road link.
- Review proposed design standards and specifications and decide upon the appropriate standards and specifications to be adopted.
- Mark all possible route alignments on 1:25,000 or 1:50,000 scale topographical sheets.
- To facilitate marking of alignments CAD-based road design software (such as IRAD and Softwel etc.) may be used.
- Carry out a reconnaissance survey along all the candidate alignments.
- Utilise the knowledge of local people through consultation on alignments.
- Finalise candidate alignments based on the above information and judgement.
- The merits and demerits of the candidate alignments will be included in a reconnaissance study/pre-feasibility report along with approximate comparative cost estimate of the alternative candidate alignments and recommendation for further course of action.

20.5.3 Feasibility Study

The following procedure should be followed for the feasibility study of rural roads:

Preliminary Engineering

A preliminary engineering design is required to establish the technical feasibility of a particular alternative. The following guidelines are suggested:

- Prepare a plan of each of the alternatives showing all key structures and links to other roads.
- Develop typical cross-sections to enable a quick estimate of running metre quantities. (Software may facilitate preparation of cross-sections).
- Prepare horizontal and vertical alignments of each of the alignments to show conformity with road design standards.
- Develop typical sections of structures in appropriate scale.
- Carry out key engineering calculations to demonstrate the suitability of the adopted dimensions.

Preliminary Cost Estimate

Preliminary cost estimates should be prepared based on the following principles:

- Compute the quantities of the civil works on the basis of the schematic plan, profiles and typical sections. (CAD software facilitates quick and accurate measurement of cross-section areas).
- Carry out a rate analysis for the civil engineering items following the unified norms and official prices of construction materials, labour and equipment hiring rates. (Reference DOLIDAR).
- Verify the rates of civil engineering items through comparison with the mean rates of prevailing contract prices of the last 5 years.
- For linear structures, the running metre quantities may be used where such data are available
- Operation and maintenance cost may be estimated @ 2% of the construction cost per year.

Economic and Financial Analyses

Many feasibility studies of rural roads are based on an assessment of various social factors and do not include economic and financial analysis. However, if an economic and financial analysis is required, the following guidelines should be followed:

- All cost and benefits will be shadow priced for economic analysis.
- Non-economic factors such as land use, schools, health facilities etc. should also be appropriately considered.
- The construction cost, O&M cost, safety cost etc. will be distributed over the construction and operating life to generate a cost stream.
- The benefits from the projects will be computed following the norms of productivity of various benefits and will be spread over the operating life of the project to generate benefit stream.
- Net present value of both cost and benefit streams will be computed.
- The benefit cost ratio and economic internal rates of return will be computed from the cost and benefit streams.
- A simplified format for carrying out the economic analysis is given in Table 20.2.

Table 20.2 Simplified Format for Economic and Financial Analysis

Base Year:

Project Period:

Construction Period:

Discount Rate:

Shadow Pricing Factors:

Year	Construction and O & M Cost	Benefit from Project	Economic Cost	Economic Benefit	Net Economic Benefit																				
	1	2	3	4	5 = 4 - 3																				
2001																									
2002																									
.																									
.																									
2015																									
Net Present Value (NPV)																									
			B/C Ratio =		EIRR =																				
Summary of Results <table border="1"> <thead> <tr> <th>Discount Rate</th> <th>B/C Ratio</th> <th>EIRR</th> <th>NPV</th> </tr> </thead> <tbody> <tr> <td>8</td> <td></td> <td></td> <td></td> </tr> <tr> <td>10</td> <td></td> <td></td> <td></td> </tr> <tr> <td>12</td> <td></td> <td></td> <td></td> </tr> <tr> <td>14</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>						Discount Rate	B/C Ratio	EIRR	NPV	8				10				12				14			
Discount Rate	B/C Ratio	EIRR	NPV																						
8																									
10																									
12																									
14																									
Conclusion: Project is economically highly feasible feasible not feasible																									
Recommendation: Project is recommended for pending detailed design upgrading																									
feasibility environmental assessment social assessment Institutional Studies.																									

Identification of Institutional Strengthening and Training Requirement

Apart from the technical and economic feasibility, the feasibility study should also assess institutional and training requirements. The following steps should be followed:

- Identify the agency, which will be responsible for the final engineering, construction and operation and maintenance of the completed road.
- Assess the existing organisational structure, staffing and technical resources.
- Assess the capacity of the organisation to manage the additional responsibility of the proposed project and identify additional staffing and other resources to implement the project and maintain the completed road.
- Assess the training needs of the existing staff and users' committees to cope with the added responsibility.
- Identify available in-house or external training to enhance the skill and knowledge of the staff.
- Prepare an institutional strengthening and training plan with cost estimates.

It is important that the timing of the institutional strengthening and training should be compatible with the implementation of the project to best achieve the project outputs.

Implementation Modalities

The feasibility study shall address implementation modalities. The following points should be considered:

- Assess whether the project can be taken up by the existing regular HMGN agency or if it requires strengthening.
- If institutional strengthening is found necessary, develop an overall project organisation for the implementation period.
- Clearly identify each project staff / agency / committee involved and define their roles and responsibilities.
- Identify the requirement for reporting at each level elaborating on frequency and contents of reports.
- Identify the requirement for monitoring and evaluation of project implementation progress, as well as evaluation of project benefits and impacts.
- Implementation modalities shall identify the following specific items:
 - o Guidelines to be followed
 - o Method of procurement of consultant
 - o Method of procurement of goods and works
 - o Standard conditions of contract
 - o Particular conditions of contract
 - o Any concessions applicable to procurement of works and goods.
 - o In case of involvement of Users' Committees, corresponding contracting modalities.

Funding Modalities

The feasibility study shall address funding modalities. The following guidelines are suggested:

- In regular HMGN projects, the procedures for budgeting, sanctioning, expending, bookkeeping, internal and final auditing will be as specified by the FAR.
- In donor-assisted projects, the matching funds will be expended according to the FAR while the foreign loan will be expended according the donor disbursement procedures.
- The final audit by the Auditor General's Office shall be considered as an independent financial audit even for donor funded projects.

Feasibility Report

The feasibility report will describe the findings of the feasibility level activities and make specific recommendations for further actions (detailed design and construction or rejection). The optimum alignment for further studies will be recommended considering engineering, economy, environmental and social issues on the basis of selection criteria agreed by the agency which will be responsible for the road. The report will clearly identify the appropriate construction approach of the rural and agricultural roads.

20.5.4 Social and Environmental Assessments

For the planning, design, construction and maintenance of the rural and agricultural roads, the social and environmental assessments will not be independently assessed. The assessments will be integrated to the key processes in all project cycles. The following guidelines are suggested:

Table 20.3 Social and Environmental Assessment for Rural and Agricultural Roads

Project Cycle	Key Processes	Social and Environmental Activities
Planning	Prepare Indicative Development Potential Map	• Collect social and environmental information from line agencies and key informants. • Plot the sensitive areas on the District Indicative Development Potential Map. • Describe environmentally sensitive areas. • Prepare a District Map of Environment Sensitive Areas. • Indicate socially vulnerable groups affected by the project.
	Preparation of Draft Perspective Plan of District Rural Road Network	• Consider environmental factors while selecting routes and types of requested transport linkages. • Obtain further information from line agencies. • Assess social acceptability of the alignment.
	Preparation of Regional Perspective Plan of Rural Road Network	• Use the District Map of Environment Sensitive Areas. • Incorporate regional environmental considerations. • Use other sources of information about environment and social aspects from regional and national sources. • Update the District Map of Environment Sensitive Areas. • Update the description of social aspects at regional level.
	Preparation of District Transport Master Plan	• Adjust the priorities of transport linkages based on identified environmental implications. • Adjust the sequence of transport linkage development based on social priorities.

20.5.5 Engineering Design

The engineering survey and design of rural and agricultural roads may be carried out following three approaches:

- Green road approach
- Conventional centreline approach

- Conventional baseline approach

The salient features and applicability of the approaches are summarized in Table 20.4.

Table 20.4 Survey and Design Methods of Rural and Agricultural Roads

Design Approach	Salient Features	Applicability of Methods
Green Road Approach	• Survey and design in two stages • Stage 1 survey focuses on vertical gradient • Stage 2 survey focuses on centreline fixing in field. • Only tentative quantities are obtained after stage 1 survey. • Detailed design and quantity estimates are made only after stage 2 survey.	• Rural and agricultural roads in hilly and mountainous terrain.
Centreline Approach	• Survey, design and quantity estimate are made in a single stage. • Intersection points and centreline of the proposed road are pegged in the field considering the horizontal curve parameters. • Plans, profiles and cross sections are referred to the centreline set in field.	• District roads • Urban roads • Rural and Agricultural roads in Terai region
Baseline Approach	• Survey, design and quantities estimates are made in single stage. • Only topographical survey to map contours is conducted in field with a base line in the proposed road corridor. • Horizontal and vertical road alignments are designed on the basis of DTM prepared from topographic survey data. • Road centreline (and intersection points if needed) should be set out in field after completion of design.	• National highways • Feeder roads • Rural and agricultural roads with difficult terrain where centreline survey is not possible

For the detailed design of rural and agricultural roads, the following procedure should be followed:

Desk Study

The desk study during detailed design of rural and agricultural roads will consist of the following activities:

- Review the existing DTMP, pre-feasibility study, feasibility study and priority of the road linkage.
- Finalise design standards and specifications.
- Utilise the knowledge of local people in taking account of social and environmental constraints.
- Elaborate on the detailed survey, investigations, analysis and design methodology proposed.

- Prepare a desk study report highlighting findings from the desk study exercise.

Field Surveys

Where the green road approach is followed, the field survey for rural and agricultural roads will be carried out in two stages: stage 1 survey along proposed alignment and stage 2 survey along the track constructed during first phase of green road construction. Where the conventional road construction approach is followed the two stages are merged into one single field survey programme.

Mountain specific investigation and design guidelines such as those prescribed by the Mountain Risk Engineering Handbook (ICIMOD, 1991) shall be referred in mountainous terrain while developing designs matching the slope stability and level of service.

For the survey of Terai roads conventional centreline approach will be followed. Due care will be exercised while determining the embankment height, cross drainage and possible settlement problems.

Stage 1 Survey

- Mark the centreline of the road using an Abney's level or compass or theodolite whatever is available or convenient, wherein the vertical control is established. Fix centreline pegs at 25 m intervals or less where required. Survey accurate levels of the centreline pegs using a levelling instrument and establish benchmarks at 500 m intervals.
- Survey cross-sections by stepping method using a tape and ranging pole along the centreline points.
- Record the details of the centreline pegs on a strip map with references from prominent stations in order to facilitate relocation of missing centreline pegs. A minimum of 4 reference points shall be provided per km.
- On inaccessible stretches, carry out a detailed topographical survey using a theodolite to create a contoured map (scale 1:1000) for drawing the horizontal alignment.
- Carry out a detailed survey using a theodolite to create a map (scale 1:1000) at locations of cross drains, gullies etc. where major cross drainage structures will be constructed.
- Survey land use and plant availability for bioengineering along the proposed road corridor.
- Hazardous sections along the alignment shall be identified and an assessment of risk shall be carried out at critical stretches.

Stage 2 Survey

The survey shall commence only after a track of 1.25 m width is constructed along the proposed road alignment. The survey during stage 2 will consist of the following activities:

- Fix horizontal intersection points and traverse survey using a theodolite.
- Design horizontal curves using calculators and fix and set key parameters of curve using tape and ranging pole (tangent length, curve length, apex distance) at field.
- Set centreline pegging @ 15 m intervals in general and additionally at beginning, middle and end of horizontal curves, and at unstable slopes in mountainous terrain.
- Profile survey along centreline pegs using a levelling instrument and fix benchmarks (BM) @ 500 m intervals (closed levelling) along with description cards for all BMs.
- Cross-section survey at centreline pegs using tape and ranging pole up to the right of way. Additional cross sections up to top and bottom of unstable slope shall be taken at the unstable areas in the mountainous regions.

- Establish monuments for every fifth intersection point (IP) with concrete pegs (0.6x0.1x0.1 m) along with references at field and description cards for every fifth IP.
- Confirm all other works of the stage 1 survey.

Detailed Engineering Design

The following activities shall be conducted during design of rural and agricultural roads:

- Refine the horizontal alignment of the road centreline within the surveyed strip and respecting controlling points from investigations.
- Fully define the locations of centreline pegs at regular intervals, beginning of curve (BC), middle of curve (MC) and end of curve (EC) with respect to intersection points surveyed in the field.
- Design the vertical alignment to obtain an optimum balance of cut and fill and to ensure avoidance of unstable areas or minimization of excavation in unstable areas in mountain slope.
- Fully define the locations of key points of vertical alignment such as beginning of curve, middle of curve, end of curve, highest and lowest points with respect to the designed points of vertical intersection.
- Provide vertical curve setting data.
- Design cross sections to ensure minimum cost and minimum changes to the natural profile. Approaches suggested in the MRE Handbook shall be followed.
- Fully define cross-section parameters such as extra widening, passing zones, layby strips, super-elevation, camber and pavement transition etc.
- In case of green road approach, the cross sections should indicate different stages of work in drawings and in quantity estimates.

Environmental Protection

The following considerations for environmental protection shall be included. While designing horizontal and vertical alignment the following attempts should be made to:

- Foresee damage to the environment and suggest remedial measures.
- Minimise the disturbed width due to earthwork providing retaining structures or by adopting narrow drains, while ensuring that the costs are not too high.
- Adopt mountain specific design approaches suggested by the MRE Handbook.
- Recommend the green road approach of road construction.

After finalising the alignment:

- Carry out an initial environmental examination (IEE) following the Environmental Protection Act and corresponding regulations.
- Identify physical, biological and socio-cultural impacts due to road construction.
- Conceive mitigation measures to be implemented.
- Formulate an environmental management plan to be implemented during construction and post-construction period.
- Draw up special specifications to be included in the construction contract through contractor or users' committee.

Engineering Drawings

The following working drawings using AutoCAD software shall be prepared for implementation of the works:

- General alignment plan of road in 1:25,000 scale (Finnida maps).
- Profile at H1:1000 and V1:200 (for hills) or V1:100 (for plains) scale indicating existing ground situations, proposed designs and indicating lengths and type of drains.
- Cross-sections incorporating structures at 1:200 scale at all centreline pegs with existing ground situations, proposed designs and data such as existing ground level, proposed ground level, area of cut, area of fill, soil type and drain type etc.
- Detailed working drawings and setting out data for locations surveyed using a theodolite.
- Typical working drawings for all other stretches.
- Earthwork quantity shall be prepared on spreadsheet computer program based on cross-sections.

Cost Estimate

- The earthwork quantities shall be broken down into normal earthwork, gully cutting, foundation and drains and structures and shall be classified into ordinary soil, boulder / gravel mixed soil, highly weathered rock, highly jointed rock, massive soft rock, massive medium rock and massive hard rock.
- Quantities of other construction items will be calculated and tabulated in a schedule of structures showing chainage.
- The bill of quantities will be broken down by VDC where necessary.
- The rates for materials and labourers will be taken from the District as determined by the Rate Fixation Committee.
- The work norms and technical specifications will be as per DOLIDAR guidelines.
- The quantities including stabilization works shall be separately grouped under unstable (high hazard) sections in case of unstable slopes.

Reporting

The following reports should be prepared:

- Inception report highlighting the findings of the desk study
- Draft report including all findings from the detailed design
- Final report incorporating comments from the client agency.

20.6 Implementation Activities (Construction)

The general guidelines during implementation activities shall be as per DoLIDAR *Approach for Rural and Agricultural Roads*. The implementation of rural and agricultural roads is substantially different from the conventional road construction approach in the sense that a labour-based, local resource-oriented and participatory approach should be followed to ensure sustainability of the completed infrastructure. The following key processes are involved:

- Consent from the VDCs.
- Detailed engineering activities
- Formation the users' committees
- Awareness campaign

- Construction management
- Auditing and commissioning
- Social and environmental integration

20.6.1 Consent from the VDCs.

- DDC planning and technical units should collaborate while deciding the implementation strategy.
- Modify the model implementation strategy as necessary to take account of the local situation.
- Obtain the written consent of all the VDCs after close interaction with them.

20.6.2 Detailed Engineering Activities

- The methodology suggested for engineering design shall be followed for various categories of roads in mountainous and plain areas.
- Engineering, socio-economic and environmental survey shall comply with the *Technical Specification for Agricultural and Rural Roads*.
- Engineering designs and cost estimates shall comply with the *Work Norms for Agricultural and Rural Roads*.
- For local body projects, programming, budgeting and resource planning shall comply with pertinent local body acts and regulations.
- For centrally funded projects at the district level, programming, budgeting and implementation shall follow the guidelines described in PWD II.

20.6.3 Formation of Users' Committees

- Road users' committees shall be formed and registered at the district as well as VDC levels.
- The DDC shall enter agreement with district level users' committee while the technical unit enter agreement with VDC level users' committees.
- The technical unit shall determine the works which require highly skilled manpower and equipment and which should be awarded to local contractors (Class D) through appropriate procurement process.
- The bidding and contract documents for users' committees and small contracts as specified in PWD part III shall be followed.

20.6.4 Awareness Campaign

The awareness programmes are crucial for successful implementation of the rural and agricultural roads projects due to the fact that users' committees and local contractors are not familiar with their roles and responsibilities. The following activities are necessary:

- Conduct awareness campaigns to road users / beneficiaries.
- Provide orientation to local leaders and users on implementation procedures and project information such as cost estimate, construction work plan, wages, payment procedures etc.
- Provide training to district level and VDC level users' committee members on labour mobilisation, construction skill development, record keeping, financial management and equipment / tools handling.
- Conduct on-the-job trainings to local contractors and skilled craftsmen on labour mobilisation, construction planning and management, financial management and equipment / tools utilisation.
- Develop a construction work plan with users' committees and local contractors.

- Train DDC technical staff on implementation procedures, construction management and planning, quality control, final testing and payment procedures.

20.6.5 Construction Management

Construction management includes the following activities:

- Set out of road alignment and structures and demarcation of road stretches and structures requiring rehabilitation, upgrading or periodic maintenance.
- Procure supply of materials, tools and equipment.
- Estimate labour requirement and prepare labour deployment schedule to be followed.
- Construct works following guidelines specified by Technical Specifications for Agricultural and Rural Roads.
- Maintain standard quality control procedures. May request Third Party Technical Auditors from the Technical Audit Agency of HMGN to conduct random sample third party audit.
- Provide extensive construction supervision
- Identify and implement special construction requirements
- Certify measurement and pay certificates to local contractors or recommendation for release of instalments to the users' committees.

20.6.6 Auditing and Commissioning

After completion of construction the following auditing and commissioning activities shall be carried out:

- Financial audit of the project account by the DTCO.
- Public audit of the completed works in terms of safety and utility by the chairperson of the users' committee
- Prepare and approve the project completion report including any relevant technical and financial information for future reference.

20.6.7 Monitoring and Evaluation

The DRUC and LRUC are responsible to monitor and evaluate the construction works to ensure smooth implementation. The DRUC shall monitor the works in quarterly basis while the LRUC shall monitor it every two months. The decisions of the review meetings will be circulated to all related parties. The committees may inspect the financial transactions of the project. The DIARS shall be responsible to prepare monthly, four monthly and annual review reports. The Consultant shall advise and assist DIARS in preparation of monitoring reports. The Consultant will develop formats to monitor positive and negative impacts resulting from the project implementation in accordance with the EMAP and SAP. Actual monitoring will be the responsibility of the DIARS.

20.6.8 Social and Environmental Integration

Social and environmental aspects are vital during the project implementation processes. The key processes are presented in Table 20.5.

Table 20.5 Social and Environmental Integration During Implementation

Project Cycle	Key Processes	Social and Environmental Activities
Implementation	Obtaining consent of VDCs	• Prepare environmental brief of transport linkages. • Environmental screening and scoping of transport linkages. • Determine need for IEE or EIA. • Determine need for ISA or SIA.
	Detailed survey and design	• Conduct IEE or ISA as per prevailing regulations. • Develop project specific EMAP and SAP.
	Formation of Users' Committees	• Review EIA or IEE reports • Review EMAP and SAP report. • Obtain approval of MOPE for EIA. • Use EMAP and SAP recommended from IEE or ISA.
	Construction phase	• Establish consensus between parties involved. • Conduct Third Party Technical Audit as needed. • Follow agreed EMAP and SAP.
Operation and Maintenance	Consensus building for operation and maintenance	• Use EMAP and SAP recommended by the IEE or ISA study. • Discuss among concerned parties on their respective responsibilities. • Follow agreed plan.

20.7 Post-Implementation Activities: Operation and Maintenance

Post-implementation activities shall be carried out as per *DOLIDAR Approach for Rural and Agricultural Roads*. The principal activities of the technical unit during post-implementation period are:

- Modify the model operation and maintenance strategy as found necessary for the needs of the project.
- Obtain consent from all the VDCs, UCs and DDC regarding their specific responsibilities.
- Implement the adopted strategy by the respective parties; technical unit to monitor and inspect.

20.8 Overall Management Responsibility

For the convenience of the various agencies involved an overall responsibility matrix for all stages of the project is presented in Table 20.6.

Table 20.6 Management Responsibility for Implementation of Rural and Agricultural Roads

Project Cycle	District Development Committee (DDC)	District Infrastructure and Agricultural Roads Section (DIARS)	District / Local Road Users' Committees (DRUC / LRUC)	Consultant / Project Staff
Perspective and Master Plans	Provide fund for perspective and master plans Approve perspective plan of district road network Approve five-year DTMP	Appoint and manage consultant		Prepare IDPM Prepare inventory of road network Collect road demands Prepare perspective plan Match with other districts Prepare five-year DTMP
Pre-feasibility Study	Provide fund for pre-feasibility study	Appoint and manage consultant Assist consultant in data collection		Mark route alignment Conduct walkover survey Compare alternatives Prepare pre-feasibility report
Feasibility Study	Provide fund for feasibility study Approve project	Appoint and manage consultant Assist consultant in survey and data collection		Perform preliminary engineering Prepare cost estimate Carry out economic analysis Identify institutional and training need Conceive implementation modalities Identify funding modalities Prepare feasibility report
Social and Environmental Assessment	Provide fund for assessment Approve social and environmental assessments	Appoint and manage consultant Assist consultant in public consultation, data collection, national level seminar and public hearing		Carry out IEE and ISA Carry out EIA and SIA if required Formulate EMAP, SAP as needed Prepare IEE, ISA or EIA and SIA reports
Formation of Users' Committees	Call meeting and assist local bodies	Inform roles and responsibilities of UC members		Assist local bodies to collect data Assist in training activities
Registration of Users' Committees		Provide rules to UCs Assist in registration Clarify rules	Perform registration at CDO's office	Assist in registration Train UC members on constitution and rules
Agreement between DDC and UCs	Sign agreement by LDO	Provide agreement form Clarify on clauses of agreement	Sign agreement Abide by the agreement	Disseminate and clarify clauses of agreements to DDC, DRUC and LRUC
Procurement of Tools	Protect and reuse tools Maintain inventory of tools Monitor tools Ensure proper use	Procure tools and provide to UCs Apply fines against misused tools		Prepare list of needed tools Prepare specifications and bid documents Assist in bid evaluation Train on use of tools
Detailed Survey	Provide fund for detailed design	Assist in survey Coordinate DRUC and LRUC Monitor and report progress	Resolve disputes on alignment Assist in survey Assist to avail survey helpers	Prepare survey method Fix road alignment Conduct survey Prepare survey report

Project Cycle	District Development Committee (DDC)	District Infrastructure and Agricultural Roads Section (DIARS)	District / Local Road Users' Committees (DRUC / LRUC)	Consultant / Project Staff
Detailed Design		Assist design team in design		Prepare design criteria Prepare design Prepare drawings
Rate Analysis and Cost Estimate		Assist in cost estimate Provide district rates Approve cost estimate		Analyse rates Prepare cost estimate Prepare design report
Construction of Works		Provide tools to UCs Appoint supervisors and provide training Set out works Organize on-the-job training to labourers Procure tools Arrange contractor as needed Appoint and manage consultant	Monitor whether works are carried out as per specified procedures	Prepare training material and train supervisors and labour heads Assist in setting out of works Assist in procurement of tools
Measurement and Payment		Measure and pay for completed works Maintain record of transactions		Certify payment certificate Measure works Inspect tools
Construction Supervision Monitoring and Reporting	Conduct monthly review meeting	Supervise works Monitor use of tools Analyse reports Prepare monthly, four monthly and annual reports Review progress monthly and quarterly Encourage DRUC and LRUC to monitor and evaluate Maintain records of impacts	Field check of work progress Conduct UC meetings Send progress review report to DIARS Monitor and evaluate UC's management Inspect joint account	Supervise construction Advise DIARS for supervision Inspect quality control Assist DIARS in preparation of progress report Prepare monthly, four monthly and annual reports Assist DIARS in implementation of EMAP and SAP
Project Completion and Evaluation		Final testing and evaluation of works Prepare project completion report Establish final account and settle dues	Assist in final measurement and testing Settle advance Sign project completion report	Assist in measurement and tests Assist DIARS to prepare completion report Sign project completion report
Financial and Technical Audit		Conduct internal and annual financial audit Facilitate technical audit		Provide information to auditors
Post Implementation Activities	Make policy on maintenance of roads Assist DRUC in preparation of road maintenance action plan Assist in fixing and collection of vehicle taxes Provide fund to DRUC	Prepare and implement mid-term action plan for maintenance Train DRUC and LRUC for maintenance Assist consultant to prepare road maintenance guidelines	Prepare action plan for road maintenance Fixing vehicle tax and collection mechanism Recommend for distribution of fund Implement road maintenance through LRUC	Prepare road maintenance guidelines Train DRUC and LRUC in road maintenance Prepare cost estimate for mid-term maintenance action plan

20.9 Technical Manual Required

In order to implement the guidelines recommended in this PWD, a technical manual should be prepared by the concerned agency (DOLIDAR under superintendence of MLD). The manual should include detailed step-by-step procedure for rural and agricultural road planning, design, construction, operation and management. The manual should also address the responsibilities of the users' committees to regulate traffic management, axle load control issues and quality matters.

20.10 Donor Specific Requirements

The overall framework for the design, implementation and O&M of agricultural and rural roads is guided by the DOLIDAR approach. In donor-assisted projects, the conditions of the donor guidelines and loan /grant agreements will apply and corresponding donor guidelines may need to be followed. Donor projects may wish to introduce new approaches in certain aspects, which may represent further improvement of the DOLIDAR approach. The progress made by all donor projects should be monitored, and successful methods incorporated into the DOLIDAR approach.