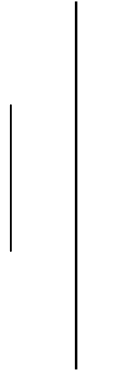


**Government of Nepal
Ministry of Local Infrastructure Development and Agricultural Roads
(DoLIDAR)
District Development Committee/District Technical Office
Kavre Palanchwok**

**Rural Reconstruction and Rehabilitation Sector
Development Program (RRRSDP)**



**Environmental Management Plan (EMP)
for
10km Road Section of Kamidanda-Taldhunga Road
Sub-Project, Kavre**



**Rural Reconstruction and Rehabilitation Sector Development Program
District Implementation Support Team
Dhulikhel, Kavre**

TABLE OF CONTENTS

ABBREVIATION.....	I
ENVIRONMENTAL MANAGEMENT PLAN.....	1
1. INSTITUTIONS AND THEIR ROLES	1
2. REPORTING AND DOCUMENTATION.....	2
3. ENVIRONMENTAL MANAGEMENT PLAN.....	2
4. MITIGATION COST	12
5. IMPLEMENTATION OF MITIGATION MEASURES	12
6. ENVIRONMENTAL MONITORING	13
6.1 MONITORING RESPONSIBILITY	13
6.2 TYPES OF MONITORING AND MONITORING PARAMETERS	14
7. PUBLIC CONSULTATION AND PUBLIC DISCLOSURE.....	17

LIST OF TABLES

TABLE 1: FRAMEWORK OF IMPLEMENTING ENVIRONMENTAL MANAGEMENT PLAN FOR 10KM ROAD SECTION OF KAMIDANDA-TALDHUNGA ROAD SUB-PROJECT	3
TABLE 2: COST ESTIMATE FOR ENVIRONMENTAL ENHANCEMENT AND MITIGATION MEASURES FOR 10KM ROAD SECTION OF KAMIDANDA-TALDHUNGA ROAD SUB-PROJECT	12
TABLE 3: ENVIRONMENTAL MONITORING COST	14
TABLE 4: FRAMEWORK FOR MONITORING ENVIRONMENTAL ISSUES	15

LIST OF FIGURES

FIGURE 1: ENVIRONMENTAL MANAGEMENT ORGANISATION STRUCTURE.....	2
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ABBREVIATION

AP	Affected Persons
CDO	Chief District Officer
CFUG	Community Forest Users Group
CISC	Central Implementation Support Consultant
DADO	District Agricultural Development Office
DDC	District Development Committee
DFO	District Forest Office
DIST	District Implementation Support Consultant
DPCC	District Project Coordination Committee
DPO	District Project Office
DoLIDAR	Department of Local Infrastructure Development and Agricultural Roads
DSCO	District Soil Conservation Office
DTO	District Technical Office
EMP	Environmental Management Plan
EMS	Environmental Management Section
IEE	Initial Environmental Examination
LEST	Livelihood Enhancement Skills Training
MLD	Ministry of Local Development
MOEST	Ministry of Environment, Science and Technology
MOFSC	Ministry of Forest and Soil Conservation
NGO	Non-Governmental Organizations
PCU	Project Coordination Unit
RBG	Road Building Groups
RoW	Right of Way
RRRSDP	Rural Reconstruction and Rehabilitation Sector Development Programme
VICCC	Village Infrastructure Construction Coordination Committee
VDC	Village Development Committee

ENVIRONMENTAL MANAGEMENT PLAN

The EMP is prepared to guide implementation of mitigation measures and monitoring requirements. It includes institution and their roles, environmental management activities, environmental management organizational structure and budget for mitigation measures.

1. INSTITUTIONS AND THEIR ROLES

The main responsibility for IEE and Environmental Management Plan (EMP) implementation is with DDC/DTO, Kavre Palanchok. During the implementation in the district, DIST team will assist DDC/DTO. The DDC/DTO will also receive necessary assistance from the CISC team for the implementation and monitoring of the EMP.

The Ministry of Local Development (MLD), District Development Committee/District Technical Office and the Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) are the institutions directly involved in the IEEs of RRRSDP funded sub-projects. The environmental management organizational structure is illustrated by **Figure 1**. The roles of these institutions are as following:

Ministry of Environment, Science and Technology (MoEST): This is the main institution mandated to formulate and implement environmental policies, plans and programmes at the national level. It is also charged with the responsibility for preparing and issuing environmental regulations and guidelines; development and enforcement of environmental standards; pollution control, commissioning environmental research and studies; and monitoring of programmes implemented by other agencies.

Ministry of Local Development (MLD): As the concerned line ministry, it is responsible for review and final approval of ToRs and study reports of IEEs, and for managing environmental monitoring. MLD has established an Environmental Management Section (EMS) which is mandated with the overall environmental responsibility of the Ministry.

Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR): It is the executing department of the RRRSDP under MLD and responsible for various project implementation activities including environmental management. It is responsible for providing back-up support to DDC in carrying out its tasks and advising MLD as necessary.

Rural Reconstruction and Rehabilitation Sector Development Project–Project Coordination Unit (RRRSDP-PCU): It is the technical unit which is responsible to assist in project implementation in the districts.

Central Implementation Support Consultant (CISC): It is responsible for assisting RRRSDP implementation in the central and districts.

District Administration Office, Kavre Palanchok: According to Explosive Material Act, 2018 and Explosive Material Rules, 2020, Chief District Officer is responsible for granting permission for the use of explosives with necessary investigation.

District Development Committee/District Technical Office, Kavre: As project implementer at district level, DDC/DTO Kavre are responsible for screening and ToR preparation, commissioning IEE studies and carrying out mitigating works along with monitoring of EMP.

District Project Office (DPO): It is the part of project team in the district which assists DDC/DTO for the implementation of the programme.

District Implementation Support Team (DIST): With technical, environmental, resettlement and social staff, it supports in the implementation of the project activities in the district.

District Project Coordination Committee (DPCC): It is a sub-committee of the DDC for the implementation of the road construction and operation activities within the district.

Village Infrastructure Construction Coordination Committee (VICCC): It coordinates infrastructures issues among beneficiaries and institutions at VDC level.

Road Building Groups/Contractors: Responsible for reconstruction and rehabilitation activities of road sub-project.

2. REPORTING AND DOCUMENTATION

As part of EMP, reports should be produced at regular time intervals depending upon type and size of project by the EMP team or unit. Three monthly reports will be prepared and submitted to the DDC/DTO and DDC/DTO will send to the PCU and DoLIDAR.

The Contract will need to state that the DDC/DTO must approve the road building groups/contractor's arrangements for environmental protection, health and safety, waste management and other environmentally related actions identified during the detailed design phase and these must be written into the Contract Document as conditions of contract.

The DIST will inform the DDC/DTO in case of non-compliance and of any other environmental issue that requires immediate attention. The contract will detail the remedies for non-compliance by the RBG/Contractor.

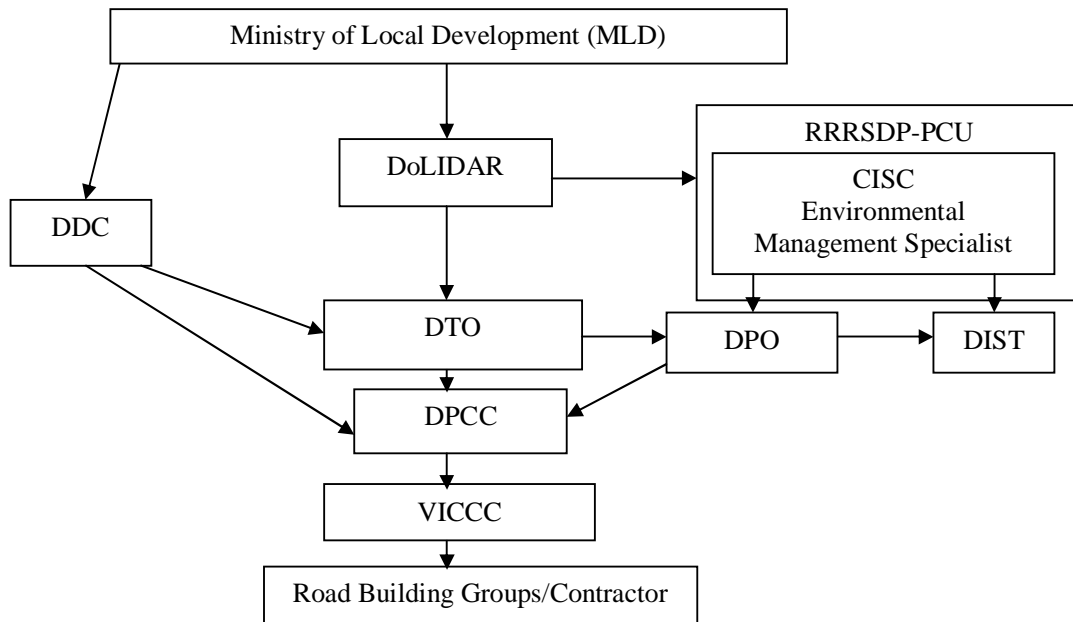


Figure 1: Environmental Management Organisation Structure

3. ENVIRONMENTAL MANAGEMENT PLAN

The DDC/DTO with project support will be responsible for the implementation of mitigation measures and of the monitoring plan. Overall implementation of the EMP will become proponent's responsibility. Framework for implementing environmental management plan is shown by **Table 1**.

TABLE 1: FRAMEWORK OF IMPLEMENTING ENVIRONMENTAL MANAGEMENT PLAN FOR 10KM ROAD SECTION OF KAMIDANDA-TALDHUNGA ROAD SUB-PROJECT

Project Activity	Potential Environmental Impacts	Proposed Benefit Augmentation/Mitigation Measures	Institutional Responsibilities	Period	Verification Method
Benefit Augmentation Measures					
Construction of road	Employment opportunity and increase in income level	<ul style="list-style-type: none"> Members from target minorities and the disadvantaged groups will have proportional representation in RBGs. At least 50% women participation as workers and women as RBG leaders will be ensured 	DPO/DIST	Construction	Records, Discussion
	Enhancement of technical skill	<ul style="list-style-type: none"> Training in road construction, soft engineering structures and bioengineering works for members of RBGs. 	DDC/DPO/DIST	Construction	Records, Discussion
Operation phase (plying of vehicles)	Increase in land value	<ul style="list-style-type: none"> Promotion of land development activities and check encroachment within RoW 	DDC/VDC	Operation	Records, Discussion
	Improvement in accessibility, saving of time and transportation cost	<ul style="list-style-type: none"> Improve agricultural support services for the farmers 	DDC/DADO/local farmers	Operation	Records And Discussion
	Increase in productivity	<ul style="list-style-type: none"> Improve agricultural support services for the farmers 	DDC/DADO/NGO/local farmers	Operation	Observation, records
	Enhancement of social services	<ul style="list-style-type: none"> Support promotion of community development activities and development and linkage of social infrastructure services 	DDC/DPO/DIST	Construction and operation	Records, Discussion
Adverse Impact Mitigation Measures					
Physical Environment					
Construction of road (Earthwork excavation and disposal)	<ul style="list-style-type: none"> Gullying and erosion Slope failure and mass wasting Disruption of natural drainage pattern, causing scouring, erosion and landslide Water pollution and 	<ul style="list-style-type: none"> Safe disposal of spoils Proper selection of disposal sites Controlled use of blasting materials Minimize the use of construction equipment 	DDC/DTO/DSCO/RBG/Contractor	Construction	Observation

Project Activity	Potential Environmental Impacts	Proposed Benefit Augmentation/Mitigation Measures	Institutional Responsibilities	Period	Verification Method
	degradation of water quality				
Controlled blasting	<ul style="list-style-type: none"> Misuse of explosives and its improper handling may cause various type of adverse impacts 	<ul style="list-style-type: none"> Permission shall be obtained from the Chief District Officer in accordance with Explosive Material Act, 2018 and Explosive Material Rule, 2020 relating to procurement, storage, application and transportation of explosives. Blasting Plan will be prepared containing blasting type, design and method of blasting as per recommendation of manufacturers and government rule and regulations. 	CDO/DDC/DTO/ DIST/ Contractor	Construction	Observation
	<ul style="list-style-type: none"> Explosion hazard (loss of private as well as public properties and possible damage to vegetation, crops, and water resources 	<ul style="list-style-type: none"> People of the vicinity area will be informed about the blasting time and its possible hazard. Each public organization and individuals having structure in proximity to the site of the work will be notified in advance (with sufficient time) for using the explosives so that the organization and individuals could take necessary step. Danger zone will be created and ensured that all personnel, vehicles and livestock are cleared from the zone before and during the blast. In the settlement area, necessary steps (it might be evacuation in the area) will be taken to avoid damage to the property from the flying rock. Danger red flag will be displayed prominently in all direction during the blasting. The flag will be kept 200m far from the blasting site in radial direction. Not more than 10 charges will be prepared and fired at a time. The site in charge will blow a siren for cautioning the local people. 	DDC/DTO/ DIST/ Contractor	Construction	Observation

Project Activity	Potential Environmental Impacts	Proposed Benefit Augmentation/Mitigation Measures	Institutional Responsibilities	Period	Verification Method
		<ul style="list-style-type: none"> • Provide adequate compensation to land and property damaged by the by the blasting 			
	<ul style="list-style-type: none"> • Misfire and Fire hazard 	<ul style="list-style-type: none"> • Sufficient time will be allowed to account for the delayed blast. • The blaster will inspect all the charges and determine the missed charge. If misfire had been found to the defective detonator or gelatin or dynamite, the whole quantity in the box from which defective article was taken must be sent to the authority as directed by the Engineer for inspection to ascertain whether all or part of the remaining materials in the box are also defective. 	DDC/DTO/ DIST Contractor	Construction	Observation
	<ul style="list-style-type: none"> • Geological hazard (cracking of rocks, triggering erosion and landslide etc.) 	<ul style="list-style-type: none"> • The blasting site shall be restored after the completion of blasting, and left in stable condition without steep slopes. 	DDC/DTO/ DIST/ Contractor	Construction	Observation
	<ul style="list-style-type: none"> • Water and noise pollution 	<ul style="list-style-type: none"> • Clear off the possible blockage of natural water channels due to spoils. • Blasting will be conducted only in daylight hours especially at the mid time or lunch hour or at the close of the work as directed by the site engineer 	DDC/DTO/DIST Contractor	Construction	Observation
	<ul style="list-style-type: none"> • Occupational health and safety 	<ul style="list-style-type: none"> • Follow the necessary safety measures for storage, transportation, handling and application of explosives as per guidelines of the manufacturer. • The workers will be provided with helmets, masks, muffles depending on the nature of the construction work. • Workers will be provided with first aid and health facilities. 	DDC/DTO/DIST Contractor	Construction	Observation

Project Activity	Potential Environmental Impacts	Proposed Benefit Augmentation/Mitigation Measures	Institutional Responsibilities	Period	Verification Method
		<ul style="list-style-type: none"> • Accidental insurance for workers will be done. 			
Construction of road	Change in land use <ul style="list-style-type: none"> • Loss in agricultural land • Loss of vegetation 	<ul style="list-style-type: none"> • Compensatory plantation in community forest and improving agricultural extension services. • Re-vegetation of worksite and material storage yard after completion of road construction. • The spoil sites shall be stabilized with bio-engineering technologies • A separate resettlement plan has been prepared to deal with land acquisition and compensation issues 	DFO/CFUG/ DDC/DPO/DIST	Construction	Records, observation
Quarrying operation	Major portion of boulders and stones will be available from the hard rock blasting. However, aggregates (sand, gravels) are required only in minimal quantities for some civil works like building of side drains, culverts. Quarry sites for these materials will be largely on local streams, which is adequate to meet the requirement. The potential adverse impacts of quarrying are accelerated erosion, landslides, disturbance in natural drainage patterns.	<ul style="list-style-type: none"> • Unstable sites, erosion prone area, settlements, fertile farm land will be avoided for quarrying operation • After the extraction is completed, the quarry sites will be rehabilitated to suit the local landscape. 			
Construction of road	Slope Instability and Erosion	<ul style="list-style-type: none"> • Heavy machineries will not be used so that the chance of slope instability and erosion decreases. • Ensuring minimum cut slope and re-vegetation of cut and fill slope or exposed areas as soon as 	DDC/DSCO/RB G/Contractors	Construction	Observation

Project Activity	Potential Environmental Impacts	Proposed Benefit Augmentation/Mitigation Measures	Institutional Responsibilities	Period	Verification Method
		<p>possible by using native plant species.</p> <ul style="list-style-type: none"> • Adoption of bio-engineering techniques and no construction work during rainy season. • Environmental awareness raising activities will be conducted on how to protect instable slope 			
Drainage and cross drainage works at various chainage	Concentrated water from the road outlet causes erosion and landslide eventually affecting the stability of the road itself.	<ul style="list-style-type: none"> • Avoid blockage or diversion of natural channels due to construction of road and disposal of spoils. • Provide adequate numbers of side/cross drainage structures and no diversion of water away from natural water course. • Avoid drain water discharge into farmland or risky locations 	DDC/DPO/DIST	Construction	Observation
Construction of road	Air, Noise and Water Pollution (dust emission, water quality deterioration due to disposal of excavated materials and waste by workers)	<ul style="list-style-type: none"> • No heavy equipments will be used during construction minimizing dust emissions • Uses of ear muffles and face masks shall be maintained. • Avoid the disposal of excavated materials in the water bodies. 	DDC/DPO/DIST	Construction	Observation, records
Biological Environment					
Construction of road	<p>Loss of Forest resources (clearing of large number of regeneration including plants of seedlings, saplings, poles and tree size. The proposed road will clear 1,230 number of plants of different species of various sizes in community forest</p> <ul style="list-style-type: none"> • Removal of vegetation for construction of labor camps 	<ul style="list-style-type: none"> • When alignment passes through forest area, site clearance for construction shall be limited to the minimum width. No tree or vegetation shall be cut unless absolutely necessary • Worksite material storage yards shall be re-vegetated after the completion of road construction • Community forest users group (CFUG) will be facilitated to revise their operational plan for incorporating the felling of the trees. • Supporting compensatory plantation to the CFUGs. 	DDC/DPO/CFUG/DFO	Construction	Observation, records

Project Activity	Potential Environmental Impacts	Proposed Benefit Augmentation/Mitigation Measures	Institutional Responsibilities	Period	Verification Method
	<ul style="list-style-type: none"> • Destruction of vegetation by the debris fallen from the road alignment • Loss of forest from accidental and/or intentional forest fire 	<ul style="list-style-type: none"> • Workers' awareness shall be raised about cooking and other kind of fire works in the forest as there may be fire in the forest which can burn the forest trees destroying the valuable forest resource • Workers shall be briefed regularly about the importance and rules and regulation of CFUG and DFO and in order to make them comply with. 			
	<ul style="list-style-type: none"> • Disturb in home range of wildlife • Increase in illegal trafficking and poaching 	<ul style="list-style-type: none"> • The construction activities near forest area will be appropriately managed so that there will be least disturbance to the wildlife and birds. • Restriction to work during night time • Restriction to wildlife harassment by the workers • Coordination with DFO and CFUGs to control the activities like illegal hunting and poaching of wild lives. 	DDC/DPO/CFUG/DFO	Construction	Observation, records
Socio-Economic and Cultural Environment					
Construction of road	Loss of Agricultural Land	<ul style="list-style-type: none"> • Improvement of agricultural extension services 	DDC/DADO/NGO/Local farmers	Construction	Records, observation
	Impact on drinking water supply pipelines between Ch. 23+125 and 23+164 due to road construction	<ul style="list-style-type: none"> • Restoration of disturbed infrastructures to the condition before disturbance or improve where appropriate in coordination with local drinking water supply users' committee. • Avoid contamination of water resources systems during construction 	DDC/DPO/DIST	Construction	Records, observation, meeting
	Property loss and damage	<ul style="list-style-type: none"> • A separate Resettlement Plan has been 	DDC/DPO/DIST	Construction	Records,

Project Activity	Potential Environmental Impacts	Proposed Benefit Augmentation/Mitigation Measures	Institutional Responsibilities	Period	Verification Method
		prepared to address land and property acquisition as well as compensation issues.			observation, meeting
	Occupational health, safety and sanitation: The potential impacts to health are respiratory and eye diseases due to the exposure on dust, risk of accident during works. The lack of proper sanitary measures and increase in waste and water pollution can lead to an outbreak of epidemics, diseases as jaundice, typhoid etc.	<ul style="list-style-type: none"> • The workers will be provided with helmets, masks, muffles depending on the nature of the construction work. • Drinking water facility and temporary pit latrine will be established at construction sites to control open defecation and pollution of water bodies by the workers. • Workers will be provided with first aid and health facilities. • First aid training will be provided to field staffs like sub-engineer, social mobilizers and supervisors. • Insurance for workers for accidents. 	DDC/DPO/DIST/ VICCC/ Contractors	Construction	Observation, records
Physical Environment					
Operation phase of (plying of vehicles)	Slope Instability: The slope along the road alignment and nearby areas may be destabilized due to human activities in the road neighborhood such as quarrying for stones or soil, animal grazing. This will cause the damage to road section, disruption of transportation and other social impact in near by area	<ul style="list-style-type: none"> • Correction of maintenance of the slope protection measures and drainage works • Minor landslides and mass wasting will be immediately cleared and slope restored with appropriate technology (bio-engineering) • Soil conservation will be promoted in the Right of Way and vulnerable areas beyond the road alignment 	DDC/DPO/ DSCO/DIST	Operation	records and observation
	Air, noise and water pollution due to the movements of vehicles and	<ul style="list-style-type: none"> • Community and road user awareness program will be organized to enhance public awareness near the settlements. 	DDC/DPO/DIST	Operation	Observation, records

Project Activity	Potential Environmental Impacts	Proposed Benefit Augmentation/Mitigation Measures	Institutional Responsibilities	Period	Verification Method
	other activities. Disposal of gases and liquid pollutants from vehicles into water bodies may cause water pollution	<ul style="list-style-type: none"> Plantation will be done along the Right of Way (RoW) near the settlement 			
Biological Environment					
Plying of vehicles	The rate of forest resource depletion will be increased because of the inaccessible sites mainly in Sola Community forest area where forest resources are in good condition will become more accessible.	<ul style="list-style-type: none"> Encourage and support local CFUG and authorities in controlling illegal harvesting of forest resources. Awareness programmes shall be organized to educate local people on the conservation of forest. Appropriate sign boards will be erected informing drivers about potential areas for wildlife crossing Workers shall be briefed regularly about the importance and rules and regulation of DFO and in order to make them comply with. Awareness programmes shall be organized to educate local people on the conservation of forest. 	DDC/CFUG/DFO	Operation	Observation, records
	Increase in poaching and illegal trafficking:		DDC/CFUG/DFO	Operation	Observation
	Operation of road may increase in sudden accidents between wildlife and vehicles, ultimately results casualties and death of wild-fauna.		DDC/CFUG/DFO	Operation	Observation, records
Socio-Economic and Cultural Environment					
Operation phase	Change in social behavior: People may leave their family in their villages to dwell near the new spots for economic incentives. This will ultimately affect the traditional bonds, norms and functions of the family.	<ul style="list-style-type: none"> Facilitate awareness raising programmes to the communities about negative social behavior like gambling, excess use of alcohol 	DDC/DPO/VICCC	Operation	Observation, records
	Movement of vehicles in	<ul style="list-style-type: none"> Applying appropriate road safety measures 	DDC/DPO	Operation	Observation,

Project Activity	Potential Environmental Impacts	Proposed Benefit Augmentation/Mitigation Measures	Institutional Responsibilities	Period	Verification Method
	the road will invite accidents. Inadequate provisions of road safety measures like no provisions of signals and lack of enforcement of traffic rules during operation period may invite accidents.	<ul style="list-style-type: none"> • Required safety signs will be used along the road • Applying appropriate road safety measures with the help of 3-Es i.e. Engineering, Enforcement and Education. 			records

4. MITIGATION COST

The estimated cost for beneficial augmentation measures like awareness raising program, skill training, promotion of small scale industries, and income generation activities will be covered by the Community Empowerment Component and Livelihood Enhancement Skills Training (LEST) programme of the RRRSDP. Costs for income generation and awareness programme activities for Affected Persons (APs) are included in Resettlement Plan. The design and cost estimate for most of the suggested mitigation measures such as slope stabilization, quarry site management, spoil disposal, supply of face masks, helmets, muffles, accidental insurance, bioengineering measures, plantation, land slide rehabilitation, supporting CFUGs shall be incorporated in the design and cost estimates. Therefore, most of the mitigation measures suggested would be a part of road design and construction without additional cost. All proposed mitigation measures will be integrated in the project design so that these measures may automatically form part of the construction and operational phases of the project. The indicative cost for environmental enhancement and mitigation is presented in the **Table 2**.

TABLE 2: COST ESTIMATE FOR ENVIRONMENTAL ENHANCEMENT AND MITIGATION MEASURES FOR 10KM ROAD SECTION OF KAMIDANDA-TALDHUNGA ROAD SUB-PROJECT

SN	Measures		Estimated cost (NRs.)	Remarks
1	Benefit Augmentation Measures			Included in resettlement plan
1.1	Community Empowerment			Included in resettlement plan
1.2	Livelihood Enhancement Skills Training			Included in resettlement plan
2	Adverse Impact Mitigation Measures			Included in project cost
2.1	Rehabilitation of drinking water supply pipelines between Ch.23+125-23+164			
2.1.1	Dismantling, laying and jointing of 4" dia (GI) pipe at three places (120m length)		7,130.40	
2.1.2	Pipe procurement (120 length)		184,303.20	
	Sub-total		191,433.60	Included in resettlement plan
2.2	Occupational health and safety			
2.3	Compensatory plantation (plantation of 1,230 plants in community forest area)		59,333	Included in project cost estimated as per rate analysis norms of MoFSC
2.4	Landslide rehabilitation			Included in project cost
2.4.1	Ch.22+080-22+125	landslide rehabilitation with bioengineering	Included in 3 percent (bioengineering) cost i.e.11,41,016.63 of project cost	
2.4.2	Ch.25+180	Passive landslide		
2.5	Drainage and cross-drainage structure (dry stone causeway)			
2.5.1	Ch.22+821	Dry stone causeway	32,854.46	Included in project cost
2.5.2	Ch.23+029.29	Dry stone causeway	280,764.63	Included in project cost
2.5.3	Ch.23+830	Dry stone causeway	98655.25	Included in project cost
2.5.4	Ch.24+965	Dry stone causeway	153692.99	Included in project cost
2.5.5	27+077	Dry stone causeway	53548.02	Included in project cost
2.5.6	29+960	Dry stone causeway	1123.5.85	Included in project cost
2.5.7	30+450	Dry stone causeway	36026.48	Included in project cost
2.5.8	31+112	Dry stone causeway	36026.48	Included in project cost
	Sub-Total		691,568.31	

5. IMPLEMENTATION OF MITIGATION MEASURES

The mitigation measures should be integrated into project design, conditions of contract and Bid of Quantity (BoQ). Using this approach, the mitigation measures will automatically become part of the

project construction and operation phase. By including mitigation measures in the conditions of contract or in specific items in the Bill of Quantities, monitoring and supervision of mitigation implementation could be covered under the normal engineering supervision provisions of the contract.

Project Design

The mitigation measures should be integrated in the design of the project itself. Such a step will enhance the mitigation measures in terms of specific mitigation design, cost estimation of the mitigation measure, and specific implementation criteria. The mitigation measure integration in the design phase will also help in strengthening the benefits and sustainability of the project.

Project Contract

The project contractor should be bound by the parameters identified in the environmental assessment pertaining to specific mitigation measures in the contract. The final acceptance of the completed works should not occur until the environmental clauses have been satisfactorily implemented.

Bill of Quantities

The tender instruction to bidders should explicitly mention the site-specific mitigation measures to be performed, the materials to be used, labor camp arrangements, and waste disposal areas, as well as other site specific environmental requirements.

Supervision and Monitoring

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

6. ENVIRONMENTAL MONITORING

The IEE prescribes the mitigation measures in order to minimize adverse impacts and to enhance beneficial impacts. Environmental monitoring plan is an important tool to ensure the implementation of mitigation measures for minimizing adverse impacts and maximizing the beneficial impacts. Environmental monitoring generates useful information and improves the quality of implementation of mitigation measures.

6.1 Monitoring Responsibility

Monitoring is an integral part of the project proponent so as to know the unlikely impacts and implement corrective measures. The proponent, DDC/DTO Kavre will develop in-built monitoring mechanism to show its additional commitment for environmental improvement and mitigate undesirable environmental changes, if any during construction and operational stage. DDC/DTO will be supported by District Implementation Team (DPO and DIST) in the district and Environmental Management Specialist from the CISC for environmental monitoring. There is a need to support these organizations to carry out environmental monitoring effectively. Therefore, environmental monitoring training will be conducted together with technical, social, resettlement and project performance monitoring and evaluation training.

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

DDC/DTO with RRRSDP/PCU support should make arrangements for sub-project level monitoring. It should constitute a monitoring team, which must be independent from the implementation team and should consist of relevant persons in the context of a sub-project being monitored, for example persons from the forest, agriculture, social and NGO sectors. The monitoring team will be constituted separately for each monitoring event. Project's district management team should be responsible for

forming the monitoring team, financing the monitoring works, providing logistics and other necessary support. Thus, it is recommended that an external team hired by DDC/DTO take responsibility for periodic monitoring of the environmental performance, in addition to the regular supervision and guidance provided by the DIST at the site. At least one monitoring in each construction season is necessary. The sub-project specific monitoring plan as given in **Table 4** shall be followed.

The sub-project level monitoring team should submit its report to RRRSDP district management, which should forward a copy to the RRRSDP-PCU. Total cost of environmental monitoring (field visits, observation, review of reports and report preparation) is estimated NRs. 455,000 as given in **Table 3**.

TABLE 3: ENVIRONMENTAL MONITORING COST

Manpower requirement	Duration (month)	Rate (NRs)	Amount (NRs)
Team Leader/Environmental Specialist	2	75,000	150,000
Engineer	1	60,000	60,000
Forester	1	60,000	60,000
Socio-economist	1	60,000	60,000
Support staff	1	25,000	25,000
Transportation cost		LS	50,000
Report preparation and sampling/lab test		LS	50,000
Total			455,000

6.2 Types of Monitoring and Monitoring Parameters

Monitoring is an on going component of the environmental assessment process and subsequent environmental management and mitigation activities. There are basically two types of environmental monitoring:

1. Compliance Monitoring - It verifies whether contract environmental clauses and the mitigation measures are properly implemented in the field.
2. Impact Monitoring - It confirms whether the environmental mitigation measures specified in the project design and contract are correctly formulated.

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

Pre-construction Stage

Monitoring at this stage of project is to:

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

Construction Stage

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

- Disposal of spoil and construction wastes and its consequences
- Disruption of natural water courses, drainage work and its consequences
- Slope protection measures

- Loss, stratification or degradation of forest vegetation
- Care, sensitivity or disruption of community infrastructures
- Loss or degradation or threat to private properties
- Care, sensitivity or disruption to cultural sites
- Quarrying and borrow pits

Operation Stage

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

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

Table 4. Environmental issues, methods, schedule, and responsible agency for environmental monitoring.

TABLE 4: FRAMEWORK FOR MONITORING ENVIRONMENTAL ISSUES

SN	Issues/Monitoring indicators	Procedure/Method	Schedule	Responsible agency
A. Pre Construction				
1	Integration of local people's environmental concerns	Review of study and design reports, discussion with local residents, representatives, and designers	During the study and design process and prior to approval	DDC with DIST support
2	Undertaking level of Environmental assessment	Review of screening and IEE documents	Prior to project approval	DDC with DIST support
3	Incorporation of mitigation measures and environmental codes of conduct into designs	Review detail design and drawings to ensure environmental monitoring provisions are included	During project approval	DDC with DIST support
B. During Construction phase				
4	Construction and location of drainage facilities	Site inspections at places where such drains are required	During construction	DIST
5	Care and safe storage of top soil for later use	Inspection of site clearance activities	Weekly during construction	DIST
6	Care for vegetation in the immediate vicinity	Inspection of site clearance activities	Weekly during construction	DIST, DFO, CFUG
7	Safeguarding of Community infrastructures	Site observation, discussion and seeking of feasible solutions	During and immediately after construction	DIST

SN	Issues/Monitoring indicators	Procedure/Method	Schedule	Responsible agency
8	Safe disposal of excavated materials and other construction wastes	Disposal site observation and disposal practice	Weekly	DIST
9	Impacts on agricultural land due to spoil, soil erosion, water logging etc	Site observation and discussion with local residents	Weekly	DIST
10	Proper reclamation of disposal sites	Observation of finished disposal sites	Before starting, in between, and after completion	DIST
11	Plantation of vegetation in the cut slope	Site observation	Periodically as per season	DIST, DFO, CFUG
12	Timely construction of other slope protection measures	Community based planting/slope maintenance programme	Immediately After construction	DIST
13	Quality of surface water	Use field kit / visual observation	Weekly or during construction near water body	DIST
14	Operation and closure of quarries and burrow pits	Site inspection, discussion with local residents	During quarry operation or weekly	DIST
C. Operation Period				
17	Encroachment/ degradation of forest	Field visit to forest, discussion with local people, CFUG, local forest authority	Half yearly	DDC, DTO, DFO
18	Inappropriate use of marginal lands	Discuss with local people, reference to prior mapping	Upon demand, Half yearly	DDC, DTO, DPCC
19	Surface flow Interruption and its consequences	Visit the area, mapping, Discussion with local people.	Upon demand, Half yearly	DDC, DTO, DPCC
20	Air pollution, vehicular emission, noise, traffic volume	Travel along the road, discussion with local people, pedestrians, passengers, transport operators	Upon demand, Half yearly	DDC, DTO, DPCC
21	Maintenance of road Check	maintenance record, inspection of road and road structures	Annually	DDC, DTO, DPCC
22	Condition of environmental mitigation measures used in the road	Inspection and discussion with maintenance workers	Annually	DDC, DTO, DPCC

7. PUBLIC CONSULTATION AND PUBLIC DISCLOSURE

During the preparation of EMP, local people were consulted about the impact of road construction and rehabilitation. Public consultation will also be conducted during construction and rehabilitation of the road for the implementation of the EMP. Moreover, during the controlled blasting, people of the vicinity area will be informed about the blasting time and its possible hazard. Each public organization and individuals having structure in proximity to the site of the work will be notified in advance (with sufficient time) for using the explosives so that the organization and individuals could take necessary step.

This EMP will be uploaded in the web sites of ADB, DoLIDAR and RRRSDP and also make available to interested parties through information center of DDC, Kavre Palanchok.