RURAL ROAD

ENVIRONMENTAL MANAGEMENT STANDARD

(ENVIRONMENTAL CODES OF PRACTICE)

JUNE 2006

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

DPR – detailed project report
ECOP – Environmental Codes of Practice
IA – implementing agency
IEE – initial environmental examination
IRC – Indian Roads Congress
MOEF – Ministry of Environment and Forests
PIC – project implementation consultant
PIU – program implementation unit
ROW – right-of-way
SPCB – State Pollution Control Board
TSC – technical support consultant

Chapter One

INTRODUCTION

I. BACKGROUND

1. Rural road projects aim to improve rural connectivity, which in turn will improve economic and social welfare of rural communities. Improved pavements will invite private and public transport operators to provide transport services connecting remote and rural areas. This condition will lead to improved access of rural communities to markets, jobs, and education and health services.

2. For all the positive impacts, rural road projects, which are usually small in terms of physical intervention scale, could also generate some adverse direct and indirect environmental impacts. The direct environmental impacts are usually due to activities that are directly related to construction and rehabilitation activities, while indirect environmental impacts are usually related to the operation of improved roads. Such indirect environmental impacts include cumulative impacts due to improved access of certain geographic areas. For example, rural road could facilitate the exploitation of mineral in the remote areas and therefore will contribute in economic development of this particular geographic area. However, without adequate enforcement of environmental regulation, an exploitation of mineral resources could generate adverse impacts.

3. This Rural Road Environmental Management Standard contains a set of environmental codes of practice (ECOP) that can be implemented to address the direct environmental impacts associated with rural road projects, but also to some extent, indirect environmental impacts.

II. OBJECTIVE

4. This document has been prepared to provide the guidelines in implementing and incorporating environmental management practices to minimize adverse environmental impacts associated with rural road projects under the Rural Roads Sector II Investment Program. It aims to establish environmental management standards and self-sufficiency among Implementing/Executing Agencies, Program Implementation Units (PIUs), their consultants and contractors in undertaking their various tasks and responsibilities for the rural road project. This document also serves as a guide on how to fill-up and complete the necessary environmental checklist form for follow-up rural road projects. The completed checklist and the standard Environmental Management Plan are to be included among the project contract documents. The environmental checklist form and standard EMP for Rural Roads are attached as appendixes.

5. This document is intended for use of the above parties in their day-to-day works in environmental management of the rural road project. However, it can also be a source of information for other units or entities involved with the project and a training material for existing and new project employees.

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Chapter Two

ENVIRONMENTAL CODES OF PRACTICE TO PREVENT AND MITIGATE ENVIRONMENTAL IMPACTS ASSOCIATED WITH RURAL ROAD PROJECT

I. PROJECT PREPARATION AND DESIGN STAGE

A. Undertaking "Transect Walk"

6. The "transect walk", as an integral part of the project activities, needs to be carried out at the project preparation stage. To obtain maximum benefits for preparing engineering design incorporating environmental and social concerns, the transect walk should be carried out as early as possible. The transect walk should also be used to gather environmental features of the project area to identify potential environmental impacts and proposed mitigation measures. To gather environmental features of the project area, Sections A, B and C of the environmental checklist form (Appendix 1) should be filled up as much as possible during the transect walk.

B. Consultation with Local Communities and Other Relevant Parties

7. While undertaking "transect walks", consultations with local communities along the proposed roads need to be carried out especially to incorporate environmental and social concerns into project design. Relevant local authorities such as the local revenue officers, forest officers, rangers, etc. should also be consulted. The results of consultation done for the project should also be recorded in the environmental checklist form.

8. It is understood that the selection of the rural road to be improved is based on the proposal from Gram Panchayat. Therefore, the consultation with the local communities, which will be led by the PIU or its consultants, should at least cover the following:

(i) Informing the local communities along the proposed road of the project features, especially: (a) how the road condition will change after the improvement (width, surface and other road standard features), (b) how the construction works will be carried out, and (c) what are the generic environmental impacts that will affect them during construction and operation;
(ii) Gathering their views about the project and their concerns to be incorporated into the project design to mitigate the impacts;
(iii) Gathering information from the local communities about the existing environmental problems: (a) whether the project road area is prone to landslide or flooding, (b) if the road project is located near forest areas, whether logging and harvesting of forest products are common activities and whether these activities are legal or permitted; and
(iv) Gathering local communities' views on the need for realignment of the proposed road, any practical mitigation measures of environmental problems, and potential involvement of local communities in the project activities.

C. Establishment of Alignment

9. Generally, the selection of alignment for rural roads is based on the existing track or existing road. However, there can be cases where a new alignment is required to connect existing tracks or roads to improve access between one village and other villages. In other cases, realignment may also be

required to avoid inhabited areas, and protected areas, or to avoid high construction costs due to landslide, large river crossings or other difficult terrain. In addition to complying with the provisions of the Rural Roads Manual (IRC:SP:202002) in selecting and finalizing the alignment, the PIU, which will make decisions on the final alignment, should take into account the following:

(i) Inputs and concerns of the local communities gathered during the transect walk;
(ii) Conformity with natural topography for avoiding as much as possible excessive cuts and fills;
(iii) In case the proposed road project is in hilly and mountainous areas, the provisions of the Hill Road Manual (IRC:SP:481998) need to be adopted and the alignment should avoid loose rock areas, and areas prone to soil erosion or landslides. The most important alignment selection criteria for road in mountainous or hilly areas are: (a) to avoid unstable hill slopes, (b) to cross the ridges at the lowest elevation, (c) to minimize hairpin bends, (d) to avoid encroaching into wetland or water bodies, (e) to avoid encroaching in mature forest, and (f) to provide adequate cross drainage;
(iv) In case the proposed road project is in flood prone areas, attention should be given to the potential natural cross drainage and drainage structures, and therefore, adequate culverts and/or bridges need to be provided as per IRC:SP:20-2002;
(v) In case the proposed road project is located or passes through forest areas, efforts have to be emphasized on minimizing encroachment into forest areas and tree cutting by establishing an alignment with widening, if needed, only on one roadside.
(vi) The road alignment should as much as possible avoid passing through water bodies.

D. Finalizing Environmental Checklist

10. After the finalization of alignment, the PIU or its consultant needs to complete the environmental checklist by filling-up Sections D, E and F. The completed checklist will form part of the detailed project reports (DPRs). The checklist along with the standard environmental management plan (Appendix 2) will then be provided to the contractor to serve as the road project's initial environmental examination (IEE) and environment management plan. The checklist for this purpose should have the following information:

(i) potential impacts and mitigation measures by indicating which mitigation measures need to be implemented for each road project;
(ii) outcome of public consultation such as environmental issues raised, suggestions received and whether these get incorporated in the design of the road project, and
(iii) environmental clearances required for the proposed road project.

E. Obtaining Necessary Environmental Clearances

11. The subprojects under ADB loans will not involve any roads located within national parks and wildlife sanctuary or other designated environmentally sensitive areas. Therefore, there is no need to obtain environmental clearance from the Ministry of Environment and Forests (MOEF). However, the project roads may involve:

(i) road alignments within the reserve forest that require a diversion of forest land, for which the PIU or its consultant needs to obtain a forest clearance from the relevant State Forest Department;

(ii) the use of ground water for construction, for which the contractor may need to obtain a permit to establish a well from the Irrigation Department at the state level;
(iii) construction work involving the operation of hot mix plants, and activities that generate noise and pollution, for which the contractor may need to obtain an environmental clearance from the State Pollution Control Board (SPCB) prior to undertaking civil works;
(iv) expansion of road width or establishment of missing link involving blasting operation, for which the contractor may need to obtain a permit under the Indian Explosives Act; and
(v) construction materials especially from quarries that should be obtained by adhering to the Mines Act, the contractor has to ensure that its construction materials are obtained from legal quarrying activities.

F. Incorporating Environmental Management Requirement in the Bidding Document

12. In preparing the bidding document, the PIU has to ensure that:

(i) the environmental checklist and the standard environmental management plan, which includes information about the environmental impacts and proposed mitigation measures, are attached as an appendixes to the bidding document; and
(ii) the bidding document covers: (a) the requirement for the contractor to implement all mitigation measures to minimize environmental impacts during the construction stage, (b) the liability of the contractor for all environmental impacts associated with the construction stage, and (c) the requirement for the contractor to submit a plan on how to restore construction camps after the construction work is completed.

II. SITE PREPARATION AND CONSTRUCTION STAGE

A. Site Preparation

13. The PIU will have the following responsibilities:

(i) making required ROW available on a timely basis;
(ii) compensation for forest land and felling trees based on the forest clearance; and
(iii) compensation for utilities such as power distribution lines, pipe water supply, irrigation land, etc. based on agreements with other relevant parties or government agencies.

14. The contractor should submit within the time specified in the contract document a program showing the general methods, arrangements, order, and timing for all the activities under the civil works contract.

B. Establishment of Temporary Camps

15. The establishment of temporary construction camps is usually to provide for accommodation for the contractors' workers, as well as to store equipment and construction materials. Improper establishment of construction camps will generate environmental impacts due to inappropriate sewage and disposal of garbage, spills from construction equipment operations, and conflicts related to the use of facilities (e.g. water pumps) of local communities by the contractor. To minimize these potential impacts, the contractor is recommended to undertake the following:

(i) Identify a suitable site for the construction camp in consultation with the PIU, and finalize agreements on establishment of the camp in consultation with land owners, if it is on private lands, and the Gram Panchayat if it is on Government lands.

(ii) Include provisions in the agreements to cover the needs to establish facilities that will be used during construction period and rehabilitation or restoration after the completion of construction.

(iii) Select the location of the camp site avoiding: (a) irrigated agriculture land, (b) land located in a village within the forest area, (c) area within 100 m of water bodies, (d) proximity to primary health center, temple, market and school, and (e) area with dense vegetation.

(iv) Locate the campsite preferably in: (a) waste land, and (b) with adequate access to the existing roads.

(v) In every camp site, provide for: (a) suitable facilities for washing and cooking, (b) adequate sanitary facilities (latrine and urinal) where both male and female workers can conveniently use these facilities, (c) adequate amount and quality of water supply from ground water or unprotected water bodies by obtaining necessary permits from relevant authorities, and (d) good arrangements for waste disposal to avoid pollution problems.

(vi) For a storage site of construction materials, adhere to the following: (a) storage for lubricant, petrol, and oil substances should have solid flooring or sand flooring to avoid water contamination; (b) storage for cement should be dump-proof, (c) if the project requires to use “fly ash”, the contractor should make a proper working schedule to avoid the needs for storage sites for fly ash, and (d) storage of blasting materials should strictly follow the requirement to store “explosive” materials.

(vii) Make proper arrangements for fire fighting and first aid facilities.

(viii) Make proper arrangements to restore construction camps after completion of construction activities.

(ix) Submit to the PIU: (a) agreements on rent arrangement, (b) lay out of construction camps and detailed information related to facilities that will be provided in each camp, and (c) detailed plans to restore the camps after completion of construction works.

C. Mobilization of Construction Equipment

16. Mobilization of construction equipment could generate environmental impacts related to gaseous emissions, dust, noise, and oil spill. In addition, mobilization of heavy machinery could cause compaction of soil. To minimize these problems, the contractor should (i) locate the parking site for heavy equipment near an existing road, (ii) avoid establishment of temporary access roads for mobilizing construction equipment, and (iii) select convenient time for moving the construction equipment to the parking area to avoid disturbance to school, primary health center, and market activities.

D. Land Clearing

17. Land clearing will involve clearing of brushwood, tree removal, demolition of utilities, demolition of building (if any), topsoil stripping, diversion and re-chanelling of watercourses (nallah, irrigation canal). To avoid adverse impacts due to land clearing, it is recommended that the contractor undertake the following mitigation measures:

(i) Where the road passes through forest areas, efforts have to be made to minimize encroachment into forest areas and cutting trees by limiting widening only on

one roadside, and consult with local forest officers prior to removing any ground cover including trees.

(ii) Limit removal of ground cover, trees, or shrubs only to the area needed for permanent works.

(iii) For locations with soil erosion problems, limit the exposed surface area in terms of coverage area as well as duration by scheduling the construction work immediately after completing land clearing, if not covered with soil, with mulch.

(iv) Allow no chemical substances (e.g. herbicide) to be used for land clearing.

(v) Prepare a plan to handle waste from land clearing adhering to the following principles: (a) wastes should not be disposed in nearby water bodies, (b) wastes should not be disposed in the down slope of the roadsides, (c) wastes should not be disposed in the forest areas, and (d) wastes should not be left unmanaged on the road sides.

E. Dismantling the Existing Road and Other Structures Along the Roadside

18. In rehabilitating existing roads, in some cases the top layer of the existing roads as well as some cross drainage structures, bridges and culverts may need to be removed. This dismantling work could cause inconvenience to people living nearby and it could also lead to sedimentation in water bodies. To minimize potential environmental problems, the contractor should undertake the following:

(i) Limit dismantling of cross drainage structures and culverts only to remove portion that needs to be rehabilitated, so as not to damage the remaining useable portion of structures and other surrounding properties and not to increase sedimentation in water bodies.

(ii) Prepare a proper plan for disposing of spoiled materials or wastes from dismantled cross drainage structures or culverts: the top layer of the existing roads should not be disposed in the following places: (a) near or into any water bodies, (b) forest areas, (c) down slope of roadsides, and (d) left unmanaged in the roadsides.

(iii) Reuse spoiled materials from dismantling of existing roads as substitute for gravel or mix with other materials for road foundations.

F. Cut and Fill

19. To prepare a road embankment, removal and placement of earth to construct a road embankment can generate serious environmental impacts on ground water, increase soil erosion, impair drainage and increase the risk of flooding and landslide. To avoid these problems, the contractor should undertake the following measures:

(i) Balance as much as possible cuts and fills to reduce the amount of unused materials.

(ii) In steep terrain or mountainous areas, the excess materials from cuts should not be pushed to the edge of the road or disposed in the down slope of the roads.

(iii) Provide immediately slope stabilization in the form of concrete wall, rock fill, vegetative slope protection, or combined methods in any road embankment with upper and down slope steeper than 30%.

(iv) Where the ground water level is relatively shallow, excavation should be done carefully to avoid cutting aquifers that could disturb the supply of water to nearby wells and should not obstruct natural drainage pattern.

(v) Limit the movement of construction machinery only within the ROW and avoid using agriculture land for parking or moving construction machinery.

(vi) Where ponds or lakes are located on the roadsides, earthwork for improvement or preparation of road embankment should be done in such a manner to avoid any spillage of excess materials into these ponds or lakes.

(vii) Carry out construction work carefully to avoid spillage of earthwork and stonework that could impede the flow of rivers, streams, nallah, water canals, and existing irrigation and drainage system.

(viii) Carry out construction work carefully to avoid sedimentation of excess materials from cuts and fills by intercepting and slowing water run-off.

(ix) Preserve topsoil and use it for roadside tree planting.

(x) Steep slope and heavy cuts should be avoided and the natural ground and embankment level as much as possible should be restricted to achieve ruling grade.

(xi) Prepare detailed plans for disposing of the excess materials from cuts and fills in close consultation with local communities and authorities especially to find a way to use the excess materials.

G. Supply of Construction Materials

20. Quarries and borrow sites are important sources of construction materials. These facilities can have substantial environmental impacts on soils, water, and natural environment. The impacts range from erosion and siltation to air quality and noise impacts during their use, as well as permanent visual and aesthetic intrusion if rehabilitation is neglected. To avoid these impacts, the following measures need to be done:

(i) The PIU or its consultant should provide a list of licensed quarries operating within the project areas.

(ii) Only if the licensed quarries are not available in the vicinity of the project, the contractor with prior consent of the PIU can open a new quarry by obtaining a quarry license in accordance with the Mines and Mineral Act 1977.

(iii) The contractor should identify borrow area locations in accordance with the Recommended Practice for Borrow pits for Road Embankments Constructed by Manual Operation (IRC:10-1961) and arrange for borrowing the area with land owners or Gram Panchayat.

(iv) The PIU will approve the use of the borrow area after checking the location to ensure that (a) the borrow area is not located in irrigated agriculture land, grazing land, protected areas, water bodies, stream and seepages areas, wetlands, or area supporting rare flora/fauna and not within 0.8 km of settlements, and in ecologically stable land, (b) agreement on land rental with land owners and Gram Panchayat has been made, (c) comply with IRC requirements, and (d) the proposed utilization/reclamation plan is workable or practicable, which includes: management of topsoil for using in reclamation within 30 days, digging soil to a depth not more than 30 cm, buffer zone is 3 m wide, the reclamation plan will include planting vegetative cover with survival rate 75%.

(v) Transportation of materials from borrows and quarry areas should be done by using special vehicles to avoid spillage along the road and they should be covered.

H. Supply of Water for Construction

21. In almost all construction activities such as preparation of embankment sub-grade, granular sub-base, and water bound macadam but not in bituminous work, significant amount of water is required. Therefore, the contractor should undertake the following:

(i) Identify potential water sources for construction.
(ii) Make arrangements with local communities and Gram Panchayat if sharing water resources is needed.
(iii) Obtain permits from the Irrigation Department or Geological Department if a new well needs to be opened.

22. In this context, the PIU or its consultant needs to monitor the utilization of water by the contractor and ensure that there will be no conflict with local communities.

I. Fly ash for Road Construction

23. The Government of India through MOEF notification, SO 1164(E) on 5 November 2002, requires that all road construction works located within a radius of 100 km from coal or lignite based thermal power plants have to use “fly ash” as part of materials for construction of embankment. Detailed design specifications for the use of fly ash are provided in IRC:SP:20-2002 and the general requirements for the materials for embankment are provided in the Guidelines for Use of Fly-ash in Road Embankments (IRC:SP:58-2001). In this context, the following needs to be done:

(i) The contractor has to examine which part of its project requires use of fly ash and obtain the fly ash from nearby thermal power plants; and
(ii) The PIU has to ensure that the contractor uses fly ash for embankment construction by following the IRC:SP:20-2002. The contractor needs to make a written report, in case the fly ash could not be used for a road project due to special specifications required for the road even if it is located within 100 km of a thermal power plant.

J. Traffic Disruption

24. Construction work along the existing road could cause disturbance to movement of traffic. The contractor should provide a clear sign along the working areas and provide rerouting road alternatives if necessary

K. Road surfacing Works

25. The embankment and bitumen works may generate environmental impacts that cause inconvenience to living environment such as dust, noise and pollution from asphalt plants. To minimize these environmental impacts, the following mitigation measures need to be implemented:

(i) To minimize noise impacts, the contractor should do the following: (a) obtain a clearance certificate from the State Pollution Board for its machinery that will be used during the construction, (b) consult with school principals to obtain a convenient time, if work generating noise is required near schools, (c) work only from 6 AM to 6 PM, and (d) limit the use of horn in the residential areas.
(ii) To minimize dust impacts, the contractor should undertake the following measures: (a) transportation of construction materials should be done by using trucks with cover, (b) limiting dust by sprinkling water

continuously, and (c) avoiding, crushing plant in the residential areas.

(iii) To minimize air pollution, the contractor should locate the asphalt mix plants at least 500 m away from residential areas and obtain the environmental clearance certificate for operating an asphalt plant from the SPCB.

(iv) The contractor should train all its workers to comply with the conditions of the environmental clearance certificate from the SPCB.

(v) To avoid flooding and water contamination, proper side drainage should be placed in the residential areas.

(vi) As much as possible, the contractor should not cut trees along the project roads.

III. POST CONSTRUCTION AND OPERATION STAGE

26. Environmental impacts during the post construction stage are mostly related to rehabilitation and restoration works. The PIU has to ensure that the contractor properly closes the construction camps, rehabilitates the quarry area, and reclaims the borrow areas.

Chapter Three

ENVIRONMENTAL MONITORING PLAN FOR RURAL ROAD PROJECT

I. MONITORING DIRECT ENVIRONMENTAL IMPACTS

27. There are two important monitoring programs to be implemented to address direct environmental impacts associated with rural road projects. The first is monitoring of the implementation of impact mitigation measures. The second is monitoring of environmental quality such as water quality and noise levels.

28. The PIU and the IA are responsible for undertaking environmental monitoring throughout the project implementation, especially monitoring of the implementation of mitigation measures that will be carried out in two-step monitoring. Each step of environmental monitoring will be done through several site inspections.

(i) During project preparation and construction, PIU will need to monitor the implementation of mitigation measures at least in the following aspects:

(a) Finalization of road alignment to ensure that all required measures have been incorporated into final road design and alignment
(b) Establishment of construction camps and storage areas
(c) Site preparation works
(d) Construction works

(ii) During the period when construction works are almost complete and right after the completion of construction work,

monitoring in this stage is to ensure that required mitigation measures are implemented in the following activities:

(a) Closure and reclamation of quarry and borrow areas
(b) Closure and rehabilitation of construction camps
(c) Closure and rehabilitation of hot-mix (asphalt) and crushing plants

29. Monitoring of environmental quality will be carried out during the construction and operation stage. This monitoring work will be outsourced. Environmental parameters to be monitored are the parameters stated in the environmental conditions of the environmental clearance issued by the SPCB. The IA should allocate funding and resources to undertake this monitoring activity.

II. MONITORING INDIRECT ENVIRONMENTAL IMPACTS AND ENVIRONMENTAL IMPACTS DUE TO INDUCED DEVELOPMENT OF RURAL ROADS

30. Development impacts of improved rural access through rural road projects will be seen in the form of cumulative environmental impacts. Increased access to remote areas could also increase access to ecologically sensitive areas, which in the long term may reduce the carrying capacity of the areas for ecological function. For example, if at present a rural community enjoys an abundance of some forest products, with improved access, in the long run, other communities from outside having better knowledge and more resources to utilize forest products may also exploit the same forest resources. Without adequate regulations and incentive programs to anticipate this competition, the carrying capacity of the resources will be easily exceeded. The cumulative direct environmental impacts associated with the improvement of rural roads could also reduce the function of the ecosystem. For example, the length of each rural road that covered by the improvement works maximum 10 km with an average of 2 km for each project. The environmental impacts of black toping of each section of the rural road project on infiltration of ground water will not be significance, but the total or cumulative impacts on water infiltration due to black toping of soil surface in certain regions could give a different picture of environmental impacts.

31. Both the Ministry and ADB are responsible to monitor environmental impacts due to induced development of rural roads.

APPENDIXES

RURAL ROADS: ENVIRONMENTAL CHECKLIST

Below is the Environmental Checklist for rural roads, which will be served as IEE. Read questions carefully before answering in the space provided. This Checklist will form part of the detailed project reports and will be attached as an appendix to project bidding document.

Road Name: _____
Block Name: _____
District Name: _____
Total Length of the Road: _____km

A. Climatic Conditions

Temperature	High: _____ Low:_____
Humidity	High: _____ Low:_____
Rainfall Rainy Season	_____ mm/year _____ to _____ (month) (month)

B. Location of the Road

Type of ecosystem	Yes	No	Explanation
Coastal area			Distance from coastline: _____km
Mangrove *(along roadside)*			(___) more than 50% (___) less than 20%
Hilly/ Mountainous area *(Explain the topography of the area and how many km of the road are located in the hilly area)*			Altitude: _____m

contd.

Type of ecosystem	Yes	No	Explanation
Forest area *(Explain whether the road passes through forest areas or located along the forest areas. What is length of the road that passes through or located along the forest areas and distance from road shoulder to the forest area)?*			Density/Vegetation Coverage:_____ Type of Vegetation:_____ _____ Legal Status of the Forest Area: _____ *(Reserved, National park, Sanctuaries, Unclassified, etc.)*
Lake/Swamp *(Explain the distance of the road shoulder from the edge of the lake)*			Size of the lake:_____ Status of the lake:_____ *(Protected or Unprotected)*
Inhabited area			
Agricultural land			
Barren land			
Flat area			

C. Description of the Road Environment

Parameter/Component	Yes	No	Explanation
Is the area along the project road prone to landslide problems?			
Is the area along the project road prone to flooding problems?			
Along the road and within 500 m of the road shoulder, is there any area with natural habitat?			(__) No Secondary Information Available and Local Community is not aware of this matter
Along the road and within 500 m of the road shoulder, is there any species of flora and fauna that is classified as endangered species?			(__) No Secondary Information Available and Local Community is not aware of this matter
Along the road and within 500 m of the road shoulder, is there any faunal breeding ground?			(__) No Secondary Information Available and Local Community is not aware of this matter
Along the road and within 500 m of the road shoulder, is there any bird migration area?			(__) No Secondary Information Available and Local Community is not aware of this matter

D. Impacts and Proposed Mitigation Measures (*Describe concisely the potential impacts and indicate the proposed mitigation measures by referring to the number of the Environmental Management Standard ECOP in the main text.)*

Potential Environmental Impacts *Will the Project cause…*	**Yes**	**No**	**MITIGATION MEASURES**
Encroachment on historical/cultural areas?			
Disfiguration of landscape by road embankments, cuts, fills, and quarries?			
Encroachment on precious ecology (e.g. sensitive or protected areas)?			
Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?			
Deterioration of surface water due to sanitary wastes from worker-based camps and chemicals used in construction?			

Contd.

Potential Environmental Impacts *Will the Project cause…*	**Yes**	**No**	**MITIGATION MEASURES**
Inconvenient environmental condition due to poor sanitation and solid waste disposal in construction camps and work sites?			
Inconvenient environmental condition due possible transmission of communicable diseases from workers to local populations?			
Deterioration of surface water quality due to silt runoff?			
Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?			
Noise and vibration due to blasting and other civil works?			
Inconvenience due to land slide or erosion?			

Contd.

Potential Environmental Impacts *Will the Project cause…*	**Yes**	**No**	**MITIGATION MEASURES**
Dislocation or involuntary resettlement of people?			
Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?			
Creation of temporary breeding habitats for mosquito vectors of disease?			
Accident risks associated with increased vehicular traffic leading to loss of life?			
Inconvenience due to transportation of construction materials?			

E. Public Consultation

Consultation Activities	**Yes**	**No**	**Remarks**
Consultation with local community was conducted before finalizing the alignment? (*Provide the issues raised by the community)*			
Any suggestion received in finalizing the alignment?			
If suggestions received, do they get incorporated into design?			

F. Permit/Clearance Required Prior to Commencing Civil Work

Type of permit/clearance	**Yes**	**No**	**Remarks** (*recommended time to apply for the permit/clearance)*
SPCB–Non objection Certificate			
Forest Department			
MOEF			
For water extraction			
For Quarry			
For Disposing Spoil Materials			
Others *(Describe in the remarks column)*			

Submitted by:
(DPR consultant)
Name and signature:_____
Position:_____Date:_____

Reviewed by:
(Staff from IA/PIU)
Name and signature:_____
Position:_____Date:_____

Note from the reviewer, if any:

STANDARD ENVIRONMENTAL MANAGEMENT PLAN FOR RURAL ROAD *

Project Activities	MITIGATION MEASURES	Location	Time Frame	Cost	Responsible for Implementation	Responsible for Monitoring
A. Pre Construction Phase						
Finalization of alignment	• Consult with local people to finalize the alignment especially to avoid landslide area, to decide location for culverts and other drainage structures. • Avoid excessive cut and fill and road should be aligned to follow natural topography. • In case of hilly/mountainous area, alignment selection should follow provisions of IRC: SP-48: 1998, "Hill Road Manual" and should refer to geological survey data to identify landslide prone area, and settlement/loose rock areas. • In flood prone region/areas, refer to hydrological data to finalize provision for culvert drainage structures especially for alignment that intersects/crosses ground and surface water flow. • Avoid the requirement of forestland for road construction. In case unavoidable, minimise it to extent possible by exploring alternative options. • In case, requirement of forestland is unavoidable, determine the legal status of forestland and initiate actions to seek permits for diversion of forestland for non forest uses (road construction). • Forest clearance is to be obtained in accordance with the provisions of State Forest Act and Ministry of Environment & Forests, Government of India and all conditions related with the clearance has to be implemented. • In case alignment has trees, which are known to be nesting/breeding places for migratory birds, contact the wildlife division of Department of Forest for seeking permits and details about non-breeding seasons. In any case, no tree shall be cut in such stretches and construction works are to be strictly scheduled for non-breeding/nesting season and all permit conditions are to be complied. • In case roads are near coastal areas/stretches, ensure adherence to all provisions of Coastal Regulation Act, notified by Ministry of Environment and Forests, Government of India. • Avoid or minimize tree felling, acquisition of agricultural land, shifting of shrines/temples, disturbance to community ponds, community resources, burial grounds, etc. to the extent possible through evolving alternate alignment options.	All through the alignment of proposed rural road	Prior to commencing any construction works	Part of Project Cost	PIU	TSC

*This is a Standard Environmental Management Plan for the construction of rural roads projects under the Rural Roads Sector II Investment Program. This standard EMP and the Environmental Checklist will be included among contract documents. The contractor must be aware of his responsibilities indicated in this EMP and must ensure that the necessary budget for applicable and appropriate mitigating measures is incorporated in the contractor's cost. The contractor should show also the indicative costs, if possible.

Land acquisition	• Land acquisition, compensation packages, resettlement and rehabilitation, poverty alleviation programs for affected people and all other related issues are addressed in Social Impacts and Resettlement & Rehabilitation report.	All through the alignment of proposed rural road (as applicable)	Pre construction Phase	Encumbrance-free land to be made available by the State Government	State Government/PIU	TSC
B. Construction Phase						
Land clearing operations	• The road land width requiring clearing shall be clearly demarcated on ground. • During land clearing operations, topsoil shall be collected, preserved, and reused as a base for turfing of embankment slopes or development of barren areas along roadside. • Trees falling within roadway width and other vegetative cover are to be removed. • Small temples, shrines if any is within the road land width, the same may be shifted to adjacent areas in consultation with local community leaders. • During clearing operations, any treasure trove, slabs with epigraphical evidence or edicts, sculptural or any material found and appear to have historical importance, it should be brought to the notice of Department of Archaeology, and instructions of this Department, if any, must be followed. • All public utilities like power transmission cables, telephone cables, water/sewerage lines, drains, tube wells etc falling within road land width shall be inventoried, and arrange for relocation /shifting to adjacent areas in consultation with the respective agencies/authorities. • Establish and maintain interaction with local community to ensure that no social resentment sets in due to operations.	All through the Rural roads excepting in stretches of habitations	Pre Construction Phase	Encumbrance-free land to be made available by the State Government to the contractor Relocation of utilities are to be undertaken by respective departments and costs are to be reimbursed	All facilities are to be planned and implemented by PIU and/or contractor as per the conditions of civil works contracts	Contractor's responsibility by PIU and PIU responsibility by TSC
Establishment of temporary office and storage area	• The temporary office and storage area for construction works shall be located away from human settlement areas (minimum 500 m) and forest areas (minimum 1 km). • The office and storage areas shall preferably be located on barren/waste lands and conversion of agricultural/cultivable lands for office and storage areas shall not be allowed under any circumstances. • All fuel oil/lubricants loading, unloading and storage areas shall be paved (impermeable), and have separate storm water collection system with facility for separation of oil/lubricants prior to discharge. • The temporary office and storage area shall be provided with adequate water supply, sanitation, septic tank/soak pit of adequate capacity so that it functions properly for the entire duration of its use. • After completion of construction works, the site shall be restored to its previous state by undertaking clean up operations.	As determined by contractor under approval of PIU	Pre construction and Construction Phase	To be included in contractor's cost	All facilities are to be planned and implemented by contractor under approval by PIU / PIC	PIU

Construction Camp Sites	• The construction campsites shall be located away from any local human settlement areas and preferably located on lands, which are barren/waste lands. • The camps shall be located, at a minimum, 5 km from forest areas to deter trespassing of construction labour. • The campsites shall be provided with adequate water supply, sanitation and all requisite infrastructure facilities. This would minimize dependence on outside resources, presently being used by local populace and minimize undesirable social friction thereof. • The camps shall have septic tank/soak pit of adequate capacity so that it can function properly for the entire duration of its use. • Construction camps shall be provided with kerosene/LPG to avoid dependence on firewood for cooking to the extent possible. • After completion of construction works, location of campsites shall be restored to its previous state by undertaking clean up operations.	As determined by contractor under approval of PIU	Pre construction and Construction Phase	To be included in contractor's cost	All facilities are to be planned and implemented by contractor under approval by PIU / PIC	PIU
Mobilization of construction materials - Stone aggregates, earth and construction water	• **Stone aggregates** shall be sourced only from licensed existing quarries. • A list of such existing quarries is available from responsible department/ authority for mining related works in each state. In case new quarries are to be opened, quarry license/permits are to be obtained from this department/authority. • In case, only stone crushing plants are to be installed near work sites, required permits are to be obtained and all conditions of permits are to be complied. • Ensure stone quarries and crushing units have pollution control system; occupational safety procedures/practices in place and regular inspection shall be carried to ensure compliance. This shall be a pre-condition for sourcing of materials from quarries/crushing plants. • **Earth borrow** areas identified during DPR stage shall be revisited to assess its environmental sensitivity and ensure it is not an ecologically sensitive areas. Permits are to be obtained from authorities and all permit conditions are complied. • The borrow areas are to be demarcated with signboards and operational areas are to be access controlled. • Topsoil from borrow areas (first 30cm) are to be preserved and used for redevelopment of borrow areas as per IRC provisions or as a base for turfing along embankment slopes. • The borrow areas as an option may be converted into ponds wherever possible, which can be used for storage of rainwater, a practice prevalent in West Bengal. • Conversion of agricultural lands for borrowing earth is to be discouraged to the use possible unless warranted by local conditions. In such cases, written consent shall be obtained from the landowners.	As determined by contractor under approval of PIU	Pre construction and Construction Phase	To be included in contractor's cost	All facilities are to be planned and implemented by contractor under approval by PIU / PIC	PIU

Mobilization of construction materials - Stone aggregates, earth and construction water *(contd……)*	• **Fly ash** shall be used in all road construction works, which are within the 100 km from thermal power stations. The Rural Roads manual specifies design and construction procedures for construction of fly ash embankments. • **Water** for construction works shall **NOT** be drawn from sources, which serve routine needs of local people. • In case water is sourced from existing private tube wells, well owner shall be informed about the quantity and duration for which water drawls will be carried out and possible implications. Written consent for use of groundwater shall be obtained. • In case new tube wells are to be constructed, required permits are to be obtained from the Ground Water Department and permit conditions, if any are to be complied. • In any case, care shall be taken not to source all requirements from one single source and no two sources (in case of tube wells) shall be less than 500 m from each other.					
Transportation of construction materials	• Existing tracks/roads are to be used for hauling of materials to extent possible. • The alignment of haul roads (in case of new ones) shall be finalized to avoid agricultural lands to the extent possible. In unavoidable circumstances, suitable compensation shall be paid to people, whose land will be temporarily acquired for the duration of operations. The compensation shall cover for loss of income for the duration of acquisition and land restoration. • Prior to alignment of new haul roads, topsoil shall be preserved or at least shall be used for any other useful purposes like using in turfing of embankment rather than allowing its loss by construction activities. • Dust suppression along transportation links is to be ensured by deploying water tankers with sprinkling system are to be deployed along haul roads. • The vehicles deployed for material transportation shall be spillage proof to avoid or minimize the spillage of the material during transportation. Transportation links are to be inspected daily to clear accidental spillage, if any. • Precaution shall be taken to avoid inconvenience to the local community due to movement of materials.	As determined by contractor under approval of PIU	Pre construction and Construction Phase	To be included in contractor's cost	All facilities are to be planned and implemented by contractor under approval by PIU /PIC	PIU

Diversion of traffic	• Frame appropriate traffic diversion schemes (in specific stretches as per progress of construction work) and implemented to avoid inconvenience due to construction works to present road users. • The traffic diversion signs should be bold and clearly visible particularly at night. • Diversion schemes are required to ensure smooth traffic flow, minimize accidents to road users during construction works.	All through the alignment of proposed rural road	Construction Phase	To be included in contractor's cost	Diversion schemes shall be prepared by Contractor and approved by PIU/PIC	PIU
Cut and fill	• Finalisation of alignment plan and profile shall consider options to minimise excessive cuts or fills. The design shall as per the relevant IRC provisions, Rural Road manual. • The cut and fill quantities required for profile correction shall be balanced to the extent possible, to avoid dependence on earth from borrow areas. • In both cases of cut and fill, top soil shall be preserved and reused for turfing of embankment slopes or redevelopment of borrow areas or any other areas in the vicinity of roads. • Under no circumstances, topsoil shall be allowed to be used as a fill material in road construction activities.	All through the alignment of proposed rural road	Construction Phase	To be included in contractor's cost	The alignment plan and profile is to be reviewed by contractor, and approvals are to be obtained from PIU/PIC, if any revisions are to be effected	PIU
Preparation of embankment and road base	• The road construction works will raise, extend and enlarge existing roadway/tracks all along the alignment. Therefore, mitigation measures to contain erosion and drainage problems are essential. • The engineering measures for countering soil erosion, slope protection, drainage wherever required shall be considered and implemented as per relevant IRC provisions. • Measures like selection of less erodable material for embankment construction, compaction, adequate embankment slopes and turfing shall be considered as per IRC provisions and Technical Specifications for construction of Rural Roads.	All through the alignment of proposed rural road (in stretches wherever applicable)	Construction Phase	To be included in contractor's cost	The alignment plan and profile is to be reviewed by contractor, and approvals are to be obtained from PIU/PIC, if any revisions are to be effected	PIU

Cross Drainage Structures	• The road construction will also require construction of several cross drainage structures, across streams/rivers flowing across the road. • Refer to hydrological studies to ensure that construction of drainage structures is not likely to alter drainage pattern, and discharge capacities of drainage structures are designed to facilitate smooth passage of water and heading up or flooding is avoided even in flood season. • Schedule the construction works to dry season so that impacts on water quality of stream/river is minimise or avoided. • Precaution shall be exercised to prevent oil/lubricant/ hydrocarbon contamination of channel bed during construction works. Spillage, if any, shall be immediately cleared with utmost caution to leave no traces. • Ensure all construction wastes are removed from work site and stream /river beds are to be cleaned up (at least 50 m on both upstream and downstream sides of water courses) after completion of construction but prior to onset of monsoon.	At all locations of CD structures along the rural roads	Construction Phase	To be included in contractor's cost	The planning, and construction/ upgradation of existing/new cross drainage structures roads are responsibilities of contractor under approval by PIC/PIU Environmental officer and other team members of PIC will monitor and ensure appropriate implementation	PIU
Tree Planting	• Tree planting operations shall be commenced immediately after completion of embankment compaction. • Tree plantation along the road shall be undertaken as per permit conditions issued by the Department of Forests, prior to tree felling. • The species shall be suitable for local climate and available. The concerned District Forest Officer can be consulted for selection of species and technical guidance, if required. • Proper care shall be taken to increase survival rate of saplings like regular watering, pruning, provision of tree guards, manure for better nourishment, etc. including timely replacement of perished saplings.	All through the alignment of proposed rural road (in stretches wherever applicable)	Construction Phase	To be included in contractor's cost	The tree plantation work can be entrusted to forest department under the supervision of PIU/PIC	PIU

Hot Mix Plants and Laying of bitumen	• Hot mix plants shall be at least 500 m away from human settlements and preferably located on leeward side of most dominant wind direction. • Consent/permits to establish and operate are to be obtained from State Pollution Control Board and all permit conditions are to be implemented/complied. • The hot mix plants shall be set up on barren/waste lands and conversion of agricultural/cultivable lands for this purpose shall not be allowed under any circumstances. • All operational areas like storage, handling, loading, unloading areas shall be paved, and have separate storm water collection system with facility for separation of oil/lubricants prior to discharge. • The storm water from storage area shall not be directly discharged into any, near by water courses/drains. • The hot mix pants shall be provided with adequate water supply, sanitation, septic tank/soak pit of adequate capacity so that it functions properly for the entire duration of its use. • After completion of construction works, the site shall be restored to its previous state by undertaking clean up operations. • Hot mix plants shall have required measures for control of dust, air, and noise pollution as per regulatory limits of State Pollution Control Board measures. • Appropriate traffic diversion schemes shall be implemented during bitumen paving is under progress and all works shall be planned and swiftly completed to avoid inconvenience to road users.	As determined by contractor under approval of PIU	Construction Phase	To be included in contractor's cost	All facilities are to be planned and implemented by contractor under approval by PIU and PIC	PIU
Equipment/ vehicles deployed for Construction works	• All diesel run equipment/vehicles/ deployed for construction activities shall be regularly maintained for smooth operation, a measure contributing to air quality and noise. • Vehicles/equipment shall be periodically subjected for emission tests and shall have valid **POLLUTION UNDER CONTROL** certificates. Revalidation of certificates shall be done once in 3 months. • All vehicles deployed for material movement shall be spill proof to the extent possible. In any case, all material movement routes shall be inspected daily twice to clear off any accidental spills.	As determined by contractor	Construction Phase	To be included in contractor's cost	All facilities are to planned and implemented by contractor under approval by PIC/ PIC	PIU

Occupational Safety and Health Hazards at Work and camp sites	• All personnel at work sites shall be provided with protective gears like helmets, boots, etc. so that injuries to personnel are avoided or minimized. • Children (less than 18 years) and pregnant women shall not be allowed to work under any circumstances. • No personnel shall be allowed to work at site for more than 10 hours per day (8-hour makes one work shift). • Workforce, likely to be exposed to noise levels beyond regulatory stipulated limits, shall be provided with protective gears like hear plugs etc and regularly rotated. • Dust suppression measures like sprinkling of water shall be ensured at all operations areas. • The construction camps shall have health care facilities for adults, pregnant women and children. • All construction personnel shall be subjected to routine vaccinations and other preventive/healthcare measures. • The work and campsites shall have suitable facilities for handling any emergency situation like fire, explosion, etc. • All areas intended for storage of hazardous materials shall be quarantined and provided with adequate facilities to combat emergency situations. All required permits for storage of inflammable/hazardous materials are to be obtained. • The personnel in charge of such areas shall be properly trained, licensed and with sufficient experience. • The operational areas shall be access controlled and entry shall be allowed only under authorization. • The construction camps shall have in-house community/common entertainment facilities. Dependence of local entertainment outlets by construction camps should be discouraged/prohibited to the extent possible.	As determined by contractor	Construction Phase	To be included in contractor's cost	All facilities are to planned and implemented by contractor under approval by PIU/ PIC	PIU
Clean up of construction work Sites and Disposal of waste	• All operational areas under road construction works like work sites, office/storage area, work force camps, and borrow areas, shall be cleaned up and restored to its previous state soon after operations are complete. • All construction waste shall be disposed in approved areas. Local district authorities shall be consulted to determine disposal site and implement any conditions imposed while issuing permits.	Along all the alignment	Prior claiming the final payment	To be included in contractor's cost	Contractor with the approve plan from PIC/PIC	PIU