Environmental Assessment and Review Framework

April 2013

PRC: Yunnan Sustainable Road Maintenance (Sector) Project

Prepared by the Yunnan Highway Administration Bureau for the Asian Development Bank

CURRENCY EQUIVALENTS

(as of 23 April 2013)

Currency unit	–	Yuan (CNY)
CNY1.00	=	$0.1616
$1.00	=	CNY6.1871

ABBREVIATIONS

ADB	–	Asian Development Bank
AP	–	Affected Person or People
CEWP	–	Construction Environmental Work Plan
CIEE	–	Consolidated Initial Environmental Examination
dBA	–	A measure of audible (the ear) noise
EA	–	Executing Agency
EARF	–	Environmental Assessment Review Framework
EIA	–	Environmental Impact Assessment
EMP	–	Environmental Management Plan
EPB	–	Prefecture Environmental Protection Bureau
ESSU	–	Environmental , Safety and Social Unit
GRM	–	Grievance Redress Mechanism (Process)
IA	–	Implementing Agency
IEE	–	Initial Environmental Examination
km	–	Kilometer
MEP	–	PRC's Ministry of Environmental Protection
MOC	–	Ministry of Communications
MOT	–	Ministry of Transport
NGO	–	Non-Government Organization
NPC	–	National People's Committee
PMO	–	Project Management Office
PMU	–	Program Management Unit
PPTA	–	Project Preparation Technical Assistance
RAMSAR	–	The Convention in Wetlands of International Importance
PRC	–	People's Republic of China
RoW	–	Right of Way
SC	–	YPDOT's Project Steering Committee
SEPA	–	State Environmental Protection Agency
SPS 2009	–	ADB Safeguard Policy Statement, June 2009
UNESCO	–	United Nations Environmental and Cultural Organization
USD	–	United States Dollar
YEPB	–	Yunnan Environmental Protection Bureau
YHAB	–	Yunnan Highway Administration Board
YHDIC	–	Yunnan Highway Development and Investment Co. Ltd.
YPDOT	–	Yunnan Provincial Department of Transport
YPG	–	Yunnan Provincial Government
YSRI	–	Yunnan Science and Technology Research Institute of Highways
YTPRDI	–	Yunnan Transport Planning and Design Research Institute
YTSRI	–	Yunnan Transportation Science and Research Institute

NOTE

In this report, "$" refers to US dollars.

Endorsement by EA

YUNNAN PROVINCIAL DEPARTMENT OF TRANSPORT

IFI-FINANCED PROJECT OFFICE

FACSIMILE

To:	Mr. Tyrrell Duncan Director EATC Asian Development Bank	
Fax No.:	(632)636-2426	Page one of: 1
Date:	April 1, 2013	

Dear Mr. Tyrrel Duncan:

Subject: Endorsement to EARF

The Environmental Assessment and Review Framework (hereinafter referred to as EARF) for Yunnan Sustainable Roads Maintenance Project is prepared and compiled in accordance with relevant involuntary resettlement safeguards requirements as per ADB's Safeguard Policy Statement (2009) and relevant laws and legislations of the People's Republic of China Government. During implementation of the Project, we will strictly abide by this EARF and where required will prepare Initial Environmental Evaluations for ADB approval following the procedures set out in the EARF.

Sincerely yours,

Yang Yan

Deputy Director General

Yunnan Provincial Department of Transport

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I. INTRODUCTION

A. Project Background

1. The Yunnan Sustainable Road Maintenance (Sector) Project (the Project) is located in Yunnan Province in People's Republic of China (PRC).

2. The Yunnan Highway Administration Bureau (YHAB) manages non-tolled national highways, provincial roads and important county roads. Given the strong focus on expressway network expansion in recent years, funding available for local road improvement and maintenance has been limited and condition of the network has deteriorated.

3. Yunnan Province has a high incidence of poverty well above the national average, 60% of the population are dependent on agriculture. The local road network provides rural communities with accessibility to markets, essential facilities and services. The current poor condition of the network severely reduces level of service and safety; raises transport costs and results in environmental degradation.

4. The outcome of the Project will be more sustainable management of the local road network in Yunnan. The project aims to: (i) improve the condition of the YHAB road network; (ii) increase the proportion of the YHAB road network receiving maintenance; (iii) strengthen YHAB's capacity and operational performance; and (iv) reduce the gap between estimated maintenance needs and available resources.

5. The Project includes four outputs: maintenance of 850 km of national, provincial and county roads; pilot of performance-based maintenance contracts; development of a road asset management system; and institutional development to enhance the performance and sustainability of YHAB's road maintenance. Implementation will be guided by four framework documents: a maintenance strategy; investment plan; an operational manual; and an institutional development plan.

6. During project preparation, the financing modality was changed from a project to a sector loan. In line with ADB Safeguard Policy Statement (SPS) 2009 requirements for this modality, a consolidated Initial Environmental Examination (CIEE) and Environmental Management Plan (EMP) have been prepared for the nine subprojects that have already been identified. This Environmental Assessment Review Framework (EARF) has been prepared to guide the preparation and implementation of subprojects that will be identified between 2013 and 2016 (Phases II-IV).

7. Prior to loan effectiveness, YHAB will set up a new Environment, Social and Safety Unit (ESSU) under its maintenance division to provide training and guidance on environmental, social and road safety assessment, management and monitoring for YHAB periodic, maintenance and rehabilitation works.

B. Maintenance Activities

8. YHAB has defined different types of maintenance activities as shown in Table 4 that may be carried out as part of this Project. The list of possible maintenance activities are classified as, major, medium or minor. They range from activities such as sweeping of shoulders, roadside railing repair, centerline painting, to small bridge deck replacement, road lighting improvements, culvert rehabilitation to pavement strengthening and replacement of both the subgrade and pavement, for sections of road of varying length.

9. Most subprojects will require a number of different maintenance activities in combination. Of the types of activities identified, entire roadway reconstruction, pavement repair and bridge, culvert and tunnel maintenance are likely to have the most significant impacts, whereas, traffic engineering maintenance (See Table) and landscape management are likely to have less significant impacts.

10. **Boundaries.** All maintenance activities will be carried out inside the existing road right-of-way (RoW) and without any increase in the road capacity. Roads are PRC Class II, III and IV. For Class III and IV roads this means a 5-6m wide RoW and Class II roads a RoW up to 12 m, including the shoulder, but excluding safety areas of a minimum of 1m on either side of the road (see Figure 1).

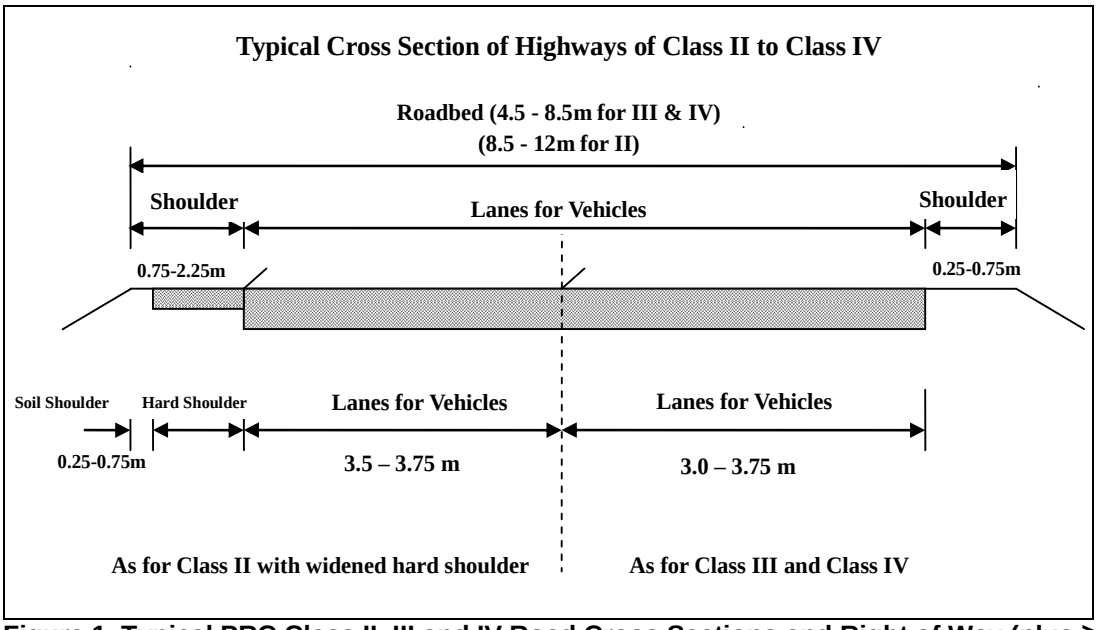

Figure 1. Typical PRC Class II, III and IV Road Cross Sections and Right of Way (plus ≥ 1 m on each side for safety)

11. The work will extend beyond these boundaries where construction materials such as bitumen, guard rails, concrete and asphalt mixtures will need to be trucked in from existing production facilities. No new aggregate or quarry sites are to be established as all such materials will be purchased from area suppliers.

C. Project Phases

12. Maintenance activities will be implemented over five years in four phases. The nine subprojects that have been selected for the first phase require a variety of major, medium and minor maintenance works, Table 4 provides definitions of types of maintenance activities.

13. Subprojects for subsequent years (Phases II-IV) will be identified on an annual basis, based on road condition, traffic surveys and specialised asset management software that prioritises based on technical, economic and social considerations.

14. Phase I roads are mostly Class II and III roads, selected as they require medium and major maintenance which will be confined within the RoW. The impacts and risks are commensurate with ADB Environment category B and C and Resettlement and Indigenous People category C. They are distributed across the province in varied terrain ranging from flat

subtropical open jungle in the far south-west, to mountainous temperate climate in the north-west. They represent the full range of potential environmental effects arising from the identified types of maintenance activities. A single CIEE and EMP has been prepared for the nine subprojects that will be subject to maintenance during Phase I which has been prepared in full compliance with ADB and PRC environmental standards and requirements.

D. Purpose of the Environmental Assessment and Review Framework (EARF)

15. In accordance with ADB's Safeguard Policy Statement (SPS) 2009, this EARF has been prepared to provide YPDOT, YHAB and their associated units and institutes with guidance on environmental assessment and management of future road maintenance activities to be undertaken on national, county and local roads as part of Phases II-IV of this Project.

16. The Project aims to strengthen institutional capacity and build on existing initiatives and practices to optimise operational performance. The contents of the EARF will be integrated within the framework documents that will provide the basis for the road asset management system, in particular the operations manual and institutional development plan.

17. The EARF is a sourcebook that provides guidance on the preparation of environmental assessment documents, implementation of mitigation and monitoring actions as well as advice on consultation and reporting. It has been reviewed and endorsed by YPDOT and YHAB, ensuring that it becomes a part of the agency's toolkit and provides a framework for continuously improving environmental performance during the design and delivery of maintenance projects.

18. The EARF includes the list of criteria used to select the project roads, a description of the likely impacts, the likely environmental assessment categories triggered by each maintenance activity in combination with the environmental sensitivity of the area where the project road is located.

19. The EARF also provides a step-by-step guide to ensure that the components of the Project comply with the provisions of ADB SPS 2009 and PRC environment legislation and standards. It describes environmental assessment and management, consultation and grievance redress procedures, as well as appropriate monitoring and reporting. It also provides examples of how mitigation and monitoring implementation costs can be estimated and typical costs to develop an IEE and EMP.

20. The EARF includes a generic EMP which presents Environmental Mitigation Measures Table and an Environmental Monitoring Measures Table (Annex 2). It also includes standard environmental contract clauses (Annex 4). These represent good practice standards that would help improve the environmental performance of maintenance contracts.

21. In support of these procedures, a program of environmental training and capacity building is planned, with workshops for YHAB and their contractors to take place at the start of each new work phase and/or contract.

II. ASSESSMENT OF LEGAL FRAMEWORK AND INSTITUTIONAL CAPACITY

A. PRC Environmental Policy

22. PRC has established a complete legal system to regulate environmental management. Among others, The Environmental Protection Law of PRC (1989) delineates general principles

for environmental protection, institutions for environmental management and supervision, requirements for protection and improvement, prevention and mitigation of pollutions and liabilities. To supplement the basic law and set supporting laws, ordinances, ministry decrees, governmental regulations, norms, and standards, are in place and in use across the country.

23. In PRC, National People's Congress (NPC) and its standing committee are the empowered national legislation institutions. Under NPC, the State Council (the cabinet of the central government) is entitled to issue environmental ordinances by decrees. As a member of the cabinet, the Ministry of Environmental Protection (MEP) plays a leading role in general environmental management, preparing environmental legislation, and encouraging the enforcement of environmental statutes. MEP also publishes specific ministry decrees to regulate environmental issues. Other ministries or administration agencies directly under the State Council are responsible for sectoral environmental management in related fields. They also issue ministry decrees related to environmental protection and conservation of natural resources. Some of the more prominent agencies are the State Forestry Administration managing most nature reserves, and the Ministry of Housing and Urban-Rural Development managing designated scenic regions.

24. The Provincial People's Congress and its standing committee can promulgate provincial environmental ordinances. In addition, many regulations, circulars, and other legal decrees concerning environmental and resource protection are published by ministries and agencies of the central government, local governments at varied levels, as well as their departments. PRC's environmental legislation has the following components: (i) relevant laws; (ii) State Council and provincial ordinances; (iii) ministerial decrees; (iv) government regulations; and (v) mandatory standards.

25. PRC's EIA legal system is applicable to only commercial or industrial development planning and construction projects. For the proposed road maintenance and rehabilitation works associated with this project, PRC's Environmental Assessment Law does not apply; however, the following legislation does:

(i) The Environmental Protection Law of PRC (1989), fundamental law;
(ii) The Environmental Impact Assessment Law of PRC (2002),
(iii) Management Directory of EIA Classification for Construction Project (MEP, 2008),
(iv) Regulations on Review and Approval of EIAs for Construction Project (MEP, 2009),
(v) Regulation on Hierarchical Review and Approval of EIAs for Construction Project in Yunnan Province (2010), covering management of the whole EIA process;
(vi) Environmental Protection Management Ordinance for Construction Project (1998),
(vii) Environmental Protection Management Regulation for Transport Construction Project (MOT, 2003),
(viii) Environmental Protection Ordinance of Yunnan Province (2004)
(ix) Notice on Enforcement of Environmental Supervision in Transport Construction Project (MOT, 2004), covering environmental management for the life cycle of the transport construction project;
(x) Water Pollution Prevention Law of PRC (2008) and relevant regulations, mandatory requirements for water pollution prevention and mitigation;
(xi) Air Pollution Prevention Law of PRC (2000) and relevant regulations, mandatory requirements for air pollution prevention and mitigation;
(xii) Environmental Noise Pollution Control Law of PRC (1996) and relevant

regulations, mandatory requirements for noise pollution prevention and mitigation;

(xiii) Solid Waste Pollution Control Law of PRC (2005) and relevant regulations, mandatory requirements for solid wastes pollution control and recycling;

(xiv) Water and Soil Conservation Law of PRC (2010) and relevant regulations, mandatory requirements for soil erosion control;

(xv) Land Management Law of PRC (2004), Highway Safety Ordinance of PRC (2011), and Quota for Land Use of Highway Construction Project (Ministry of Construction combined with Ministry of Land and Resources,1999), regulatory requirements for land acquisition of the highways;

(xvi) Nature Reserve Ordinance of PRC (1994), Ordinance for Scenic Resorts and Historic Sites of PRC (2006),

(xvii) Ordinance for Management of Nature Reserves in Yunnan Province (1998), mandatory requirements for conservation of the protected areas.

(xviii) Ordinance for Redress of Public Complaints (the State Council, 2005), Interim Procedures for Public Consultation in EIA (SEPA, 2006),

(xix) Environmental Complaints Management Regulation (SEPA, 2006), requirements for EIA public consultation and environmental grievance redress;

(xx) Notice on Strengthening EIA Management to Control Environmental Risks (SEPA, 2003) and Interim Management Regulation for Contingency Plan of Environmental Incidents (MEP, 2010), management requirements for environmental risks control, preparation and implementation of environmental contingency plan;

(xxi) Environmental standards and guidelines, including environmental quality standards for surface water, air, and ambient noise; emission standards for polluting sources of wastewater, air pollutants, and noise; as well as EIA guidelines such as Technical Guideline on EIA published by MEP.

(xxii) PRC guideline HJ/T169-2004, National Inventory of Hazardous Goods & MEP Dec.1, 2008.

26. Yunnan has a large number of protected areas, including a few with World Heritage status, as well as national, provincial and local designated sites. For each phase, determination of the location of any such sites in relation to the roads to be maintained will be necessary.

B. ADB Environmental Safeguard Requirements

27. **Safeguard Policy Statement.** The ADB Safeguard Policy Statement (SPS, 2009) defines safeguard requirements that apply to all projects financed by ADB. The objectives of ADB safeguards are to: (i) avoid adverse impacts of projects on the environment and affected people, where possible; (ii) minimise, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and (iii) help borrowers to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

28. **Exclusions.** ADB will not finance projects that do not comply with its SPS, nor will it finance projects that do not comply with the relevant country social and environmental laws and regulations, including those laws implementing country obligations under international law. In addition, ADB will not finance activities on the prohibited investment activities list (Appendix 5, SPS, 2009).

29. **Operations Manual.** The SPS is implemented via the safeguard procedures outlined in ADB Operations Manual - Bank Policies (Operations Manual Section F1/BP, Issued on 4 March 2010).

30. **Project Screening and Categorisation.** Project screening and categorization are undertaken to: (i) determine the significance of potential impacts or risks that a project might present with respect to the environment, involuntary resettlement, and indigenous peoples; (ii) identify the level of assessment and institutional resources required to address safeguard issues; and (iii) determine the information disclosure and consultation requirements.

31. A project's environmental status is determined by the category of its most environmentally sensitive component and the work to be undertaken, including direct, indirect, induced, and cumulative impacts. Each proposed project is screened to review type, location, scale, sensitivity and the magnitude of potential environmental impacts. The level of detail and comprehensiveness of the environmental assessment are commensurate with the significance of the potential impacts and risks.

32. **Category A.** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. An EIA and EMP are required. This Project will exclude any subprojects classified as category A.

33. **Category B.** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An IEE, including an EMP, is required. If any significant environmental impacts are identified during the IEE process, ADB may reclassify the project as category A triggering a full EIA. For this Project, a single CIEE and EMP has been prepared for subprojects proposed for Phase I. It is anticipated that this will be updated annually to address subprojects for future Phases.

34. **Category C.** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required. As this project has an overall classification of environment category B, all subprojects will be addressed within the CIEE and EMP, whether their impacts and risks are commensurate with category B or C.

35. **Information Disclosure.** AB SPS 2009 and Operations Manual Section F1/OP 2010 require that the draft EARF is posted before project appraisal. For category B projects, the project team makes draft IEE reports available to interested stakeholders before project approval by the Board, on request. If the final IEE is not available upon Board approval, the draft IEE is posted on ADB's website. ADB strongly recommends that IEEs and EMPs are translated into the relevant local languages and made available at (i) YHAB, Kunming; (ii) YHAB, General Sections at the prefecture level, and the County-level Maintenance Section, for review by all affected and interested persons. Document availability should also be advertised.

C. National and Local Environmental Laws, Standards and Regulations

36. PRC's environmental legislation covers almost all aspects of environmental protection defined by ADB SPS (2009). Generally, the categories and input requirements for the two systems are similar, although the ADB's process requires considerably more public consultation, and the preparation of a costed environmental management plan. Furthermore, the ADB SPS has flexibility built in, whereas the PRC procedure allows for little if any deviation from the steps, including specifics on level of detail. The PRC's approach to environmental assessment is remedial, providing mitigation and monitoring guidance once a project has been

established, whereas the ADB approach is more proactive and must be undertaken as part of the project formulation stage to ensure due consideration of environmental issues in the design process.

D. Institutional Capacity

37. YPDOT is responsible for the administration of the highway sector. For highway construction and operation (including toll roads), the key agency is the Yunnan Highway Development & Investment Co., Ltd (YHDIC). YHAB is responsible for operation and maintenance of nearly all non-toll national and provincial highways in Yunnan. The YHAB bureaus at the prefecture/county levels take care of county and rural highways, as well as a small number of provincial highways.

38. YPDOT's main consulting institute, the Yunnan Transport Planning and Design Research Institute (YTPRDI) prepares the project proposal, feasibility study and associated environmental assessments. Once they are approved, YHDIC takes over the project, and assigns project environmental management supervision during the construction phase to its engineering & technical office; the Yunnan Highway Science & Technology Research Institute (YSRI).

39. YSRI is a consulting and research institute under YHAB, dedicated to highway operation and maintenance. It is one of the main service providers for feasibility studies, designs, tests and experiments and scientific research for YPDOT

40. YPDOT's Planning Division is responsible for environmental assessment and management for the whole project cycle, including the environmental assessment review during project preparation, environmental inspection and supervision during contracting and construction, and environmental auditing during and after project commissioning. The financial division, construction management division, and office of ombudsman also take part in the environmental management.

41. Since all maintenance work is exempt from PRC's EIA law, the involvement of YEPD and local EPBs is limited to reacting to a complaint or by direct request from YPDOT or YHAB[1]. Consequently, the environmental assessment and management for maintenance projects is undertaken by YHAB's Planning Division and Road Maintenance Division, who have limited technical capacity in this area.

E. Environmental Assessment Capacity

42. The YTPRDI is the largest consulting institute of YPDOT and has a planning and environment unit responsible for environmental design of projects. This includes design related to wastewater treatment, noise abatement, solid waste recycling and disposal, stormwater runoff collection and treatment, roadside landscaping, energy saving, and post-construction revegetation.

43. The planning division of YTPDRI takes care of environmental issues that arise early in the project cycle such as alignment selection, identification of key environmental concerns, cooperation with EIA practitioners and preparation of the environmental chapter of feasibility studies. To enforce the countermeasures for soil erosion, the road design sub-institute YTSRI oversee the design of roadbed, slope, bridges, tunnels, embankments, soil borrow pits, quarries

[1] In reality this rarely happens since no lines of formal or informal communication have been established between these two agencies.

and other aspects, which are likely to induce environmental impacts. Currently, YTSRI is staffed with 25 professionals with 'environment' in their job description, but only two with specific environmental management training

44. According to YPDOT, the Ministry of Transport (MOT) requires all provincial departments of transport to build up their capacity in environmental management and monitoring. To that end, YTSRI established an environmental monitoring centre in 2011. Its present function is to collect transportation related statistics. YTSRI has assigned six engineers (two of them with an environmental background) to the environmental monitoring center. Despite this, YTSRI does not have environmental monitoring certification so cannot collect water and air quality data.

45. In March of 2011, YSRI set up an environmental division and a highway construction supervision division. The environmental division has eight employees, none involved in environmental assessment work. Therefore, environmental capacity is currently quite limited but the leadership of YHAB and YSRI is committed to address this gap.

46. Highway project environmental assessments are presently outsourced to qualified environmental consultants. Each year, there are twenty to thirty EIA studies completed for new highway or road upgrading projects. The main EIA contractors include the Yunnan Institute of Environmental Science, Environmental Protection Centre of MOT, Highway Scientific Research Institute of MOT, and China Merchants Chongqing Communications Research & Design Institute Co., Ltd. Less well known, but highly qualified in the environmental area are Yunnan University and Kunming University of Science & Technology, the latter especially in the fields of biology, ecosystem, and surface water protection.

47. Therefore, Yunnan province has extensive expertise but it is dispersed and little communication exists between agencies needing services such as YPDOT and qualified suppliers such as Kunming University of Science and Technology.

F. YHAB Environmental Institutional Development

48. **Environmental, Social and Safety Unit:** YHAB will set up a new Environment, Social and Safety Unit (ESSU) under its maintenance division, before loan effectiveness. During the Project, the ESSU will have full responsibility for environmental, social and safety aspects throughout the project cycle, they will: (i) develop procedures for road safety audits, consultations, and environmental and social assessment; procedures will apply to new periodic maintenance and rehabilitation works and be implemented by the ESSU; (ii) define standard health, environmental, and safety operating procedures for contractors, and monitoring requirements for supervision consultants; (iii) prepare road safety engineering guidelines; (iv) design and evaluate new safety engineering measures; and (v) routinely monitor its environmental, social and road safety performance.

49. The ESSU will work closely with the YHAB design teams in order to maximise opportunities to design-out negative impacts and to design-in enhancements, where appropriate. They will be staffed by at least one Environmental Specialist, one Road Safety Specialist, and one Social Development Specialist, who will all be employed full time during project implementation. The Environment Specialist will have at least 10 years of experience in environmental management for civil works with extensive experience in preparing environmental assessments and management plans, environmental supervision and delivery of training.

50. The key responsibilities of the Environment Specialist will include: (a) carrying out environmental surveys and assessments of subprojects; (b) assisting in screening and

categorizing subprojects; (c) preparing IEEs and EMPs; (d) ensuring that construction contracts include environmental management clauses and adhere to IEE and EMP; (e) advising supervision consultants and contractors on environmental compliance and reporting; (f) carrying out regular audits of civil works, (g) preparing guidelines and procedures for environmental management in YHAB, (h) monitoring against environmental indicators for reporting in the PPMS, (i) preparing and delivering environmental training, and (i) generally coordinating all aspects of the EARF, Operations Manual and the institutional development plan related to environment.

51. The ESSU will be fully outfitted with computer equipment (three laptop computers), basic software, a digital camera with Global Positioning System capability, a multifunction laser printer/scanner, and telecommunications equipment (mobile phones). YHAB will ensure that a collaborative working relationship between YPDOT's Environmental Management Centre and the ESSU is in place and designed to share data, technology, and equipment as required. YHAB will provide full-time access to a vehicle and driver, as well as funding for six trips per year per technical specialist to subproject sites to undertake monitoring tasks. YHAB will also formally assign responsibility for environmental, social and safety co-ordination to at least one person in each prefecture. The ESSU would then have a network of people to assist with field work and logistics. The institutional arrangements for environmental management, including the ESSU, are shown in Figure 2.

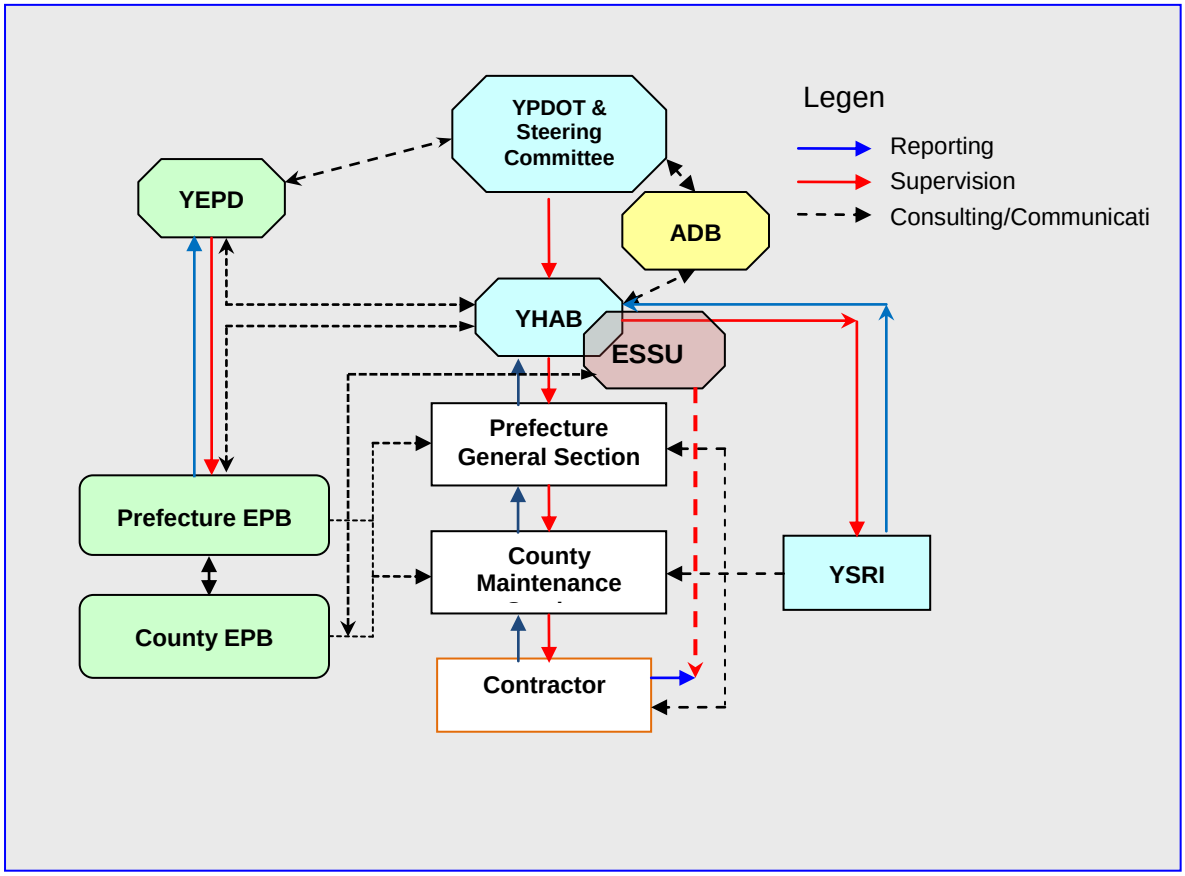

Figure 2: Institutional Arrangements for Environmental Management for Project

G. Environmental Assessment and Management Training

52. To strengthen environmental safeguard capacity within YHAB, an annual environmental training program will be delivered in Kunming and at the prefecture headquarters where subproject roads are located. The focus will be on design team teams, contractors and the implementing units of YHAB at the prefecture and county level[2]. The training will cover the following topic areas:

i. Understanding and applying international style EMPs
   - The executing and implementing agencies
   - The contractor
   - Others

ii. Compliance monitoring methods, needed equipment and its use
iii. Compliance monitoring information analysis
iv. Enforcement of environmental safeguards
v. Reporting

53. The training should cover case studies involving the completion of the screening checklist for at least one sub-project road, as well as a field trip to undertake a reconnaissance survey to establish the presence of any sensitive environmental conditions along a road.

54. The training will consist of a number of modules, requiring two days of lectures, plus question and answer periods, a case study exercise, and ample time for discussion. This training cycle for the government and the contractors will be repeated at the start of each phase of the project.

55. An international environmental consultant will prepare the environmental training modules. A national environmental consultant will work with the international trainer to translate the modules into Mandarin and deliver the training for Phase I. The ESSU will take on the responsibility for updating training modules and delivering training for subsequent phases with support provided by the international environmental consultant, as needed.

56. With this effort the environmental capacity within YHAB should increase markedly, to a point where for a future loan, environmental safeguards can be handled in-house in compliance with international donor requirements. Environmental Key Performance Indicators have been developed and are described in Section VII B, and will provide the mechanism for measuring improvement in environmental performance over the period of the loan.

H. Environmental Institutional Development Costs

57. **Training Materials and Delivery:** The preparation of the training materials for Phase I will require three weeks for the international trainer and two weeks for the national trainer. The delivery of the training will require one week each for the international and national trainer. The cost of training for Phase I will be covered by the PPTA and is likely to be around USD 21,000 excluding expenses. Training for Phases II-IV will be delivered by the ESSU, with support from the trainers, as needed. The costs of any required trainer support will be covered by the loan under the Project Management Consultancy contract.

58. **Cost of Operation of ESSU:** The estimated cost for the establishment of the ESSU will be USD 60,850, including first year operating and non-reoccurring expenses (see Table 1).

[2] By this time a more detailed training for YHAB and related government agencies will have been complete

59. For each additional operating year, total cost will be approximately USD 54,850 which will be borne by YHAB. The ESSU will be responsible for ensuring that YHAB and their contractors implement the environmental mitigation and monitoring measures, as defined in the EMP.

60. **International Consultancy Support:** The ESSU will be supported by an International Environmental Consultant. This consultant will provide two months of support in the first year and one month of support in each subsequent year, for a total of five months, this is estimated to cost approximately USD 115,000, plus USD 46,700 expenses. An estimate of costs is provided in Table 2. All costs associated with the implementation of pre-construction and operational measures are included within the estimates made for the annual operation of the ESSU (Table 1). This includes the assessment of subprojects for each subsequent phase (Phases II-IV), preparation of a subproject CIEEs and EMPs for approval by ADB, compliance monitoring and reporting.

61. **Contractor:** The Contractor will be responsible for implementing all construction environmental mitigation and monitoring measures as defined in the EMP. It has been assumed that civil works calculations will take into account any associated costs, as specified in the environmental contract clauses (Annex 4). A Mitigation and Monitoring EXCEL spreadsheet is included in Annex 7 (an actual spreadsheet is provided in the Project Operations Manual) to assist contractors with this calculation. The spreadsheet breaks down the work into project phases and nonrecurring versus reoccurring mitigation and monitoring costs. This sheet can be as simple or complex as needed, but its value is that, if applied, all calculations and assumptions can be easily traced and revised.

Table 1. Estimated costs for ESSU establishment, CIEE preparation and annual operation.

Item	Unit cost	No Units	Estimated Ann. Budget (USD)	One-Time Cost
Non-Reoccurring Costs of Establishment*				
Computers & software	1000	3		3000
Data storage system*	400	1		400
Laser Printer/scanner	600	1		600
Digital camera and GPS facility	800	1		800
Telecommunications equipment	400	3		1200
		Total Non-Reoccurring Costs:		**6,000.00**
Annual Reoccurring Costs*				
1. ESSU Staff 1	5800	1 Year	5800	
2. ESSU Staff 2	5800	1 Year	5800	
3. ESSU Staff 3	5800	1 Year	5800	
3. Administrative support (annual)			Provided by YHAB	
4. Office Operation/Consumables	3500	1 Year	3500	
5. Land transportation costs (fuel/tolls)	5000	1 Year	5000	
6. Field audit trip: airfares	275	18	4950	
7. Field audit trip: per diem	50	200	10000	
8. Driver	4000	1 Year	4000	
9 ESSU Vehicle (full time)	600	1 Year	10000	
Total Annual Reoccurring Costs per Phase			**54,850.00**	

* Costs estimated based on past experience, but to be verified by YHAB

Table 2. Estimate of Costs for International Consultant Support for ESSU

Item	Unit	No. Units	Unit Price USD	Total Price

International Environmental Specialist	Person Months	5	23,000	115,000
International Air Travel	Flights	5	4,000	20,000
Incidental expenses (visa/home travel)	Expenses	5	300	1,500
Field audit trip expenses; 3 airfares/year to 4 project prefectures plus land transport for one person	Domestic Flight Land Travel	12 12	300 250	3,600 3,000
Audit Per diems @USD 150/day	Day	120	150	18,000
Estimate of Cost				**161,700**

III. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Preconstruction Period

62. During the planning phase all environmental assessment documentation must be prepared and the plan for implementation of environmental management actions defined. By knowing where/what environmental sensitive receptors exist or future issues are likely, planners can avoid serious impacts by modifying a design, adjusting alignment segments, switching to more sustainable materials, or modifying the construction methods to be applied. Therefore, knowledge of these areas and issues is fundamental to technically sound and successful environmental assessment and its implementation.

63. In line with ADB SPS (2009), impacts and risks will be analysed in the context of the project's area of influence. For maintenance projects, this area of influence is likely to encompass the primary project site(s) and related facilities that the borrower and their contractors develop or control, such as access roads, borrow pits, disposal areas and construction camps.

64. **Policy, Process and Design-Related Impacts and Mitigation.** The pre-construction period is when there is most potential to influence the design and establish good practice. ADB SPS (2009) requires that alternatives to the project's design, technology, and components should be considered that will minimise environmental impacts and maximise environmental benefits and that the rationale for options selected are documented.

65. There are a number of common issues (Table 3) ranging from the most obvious such as not providing enough copies of the environmental documentation to all key stakeholders, to preparing the contract specifications before the environmental assessment is complete.

66. The best way to ensure that mitigation and monitoring takes place is to integrate the EMP requirements into the contract specifications. A sample EMP and examples of environmental contract clauses are included as Annex 2 and 5 of this EARF, respectively.

Table 3. Common Policy and Process Issues Arising During Preconstruction/Planning Stage, Leading to Environmental Impacts during Construction and Operations.

IMPACT	SUGGESTED MITIGATION MEASURE
Inadequate knowledge of environmental assessment scoping by the unit conducting the study, leading to missed potential impacts and lost opportunities to prevent impacts or maximize benefits which save the environment and money.	Project environmental screening using the template provided in this manual, should be completed to give a preliminary view of the type and extent of likely environmental issues that could be avoided by revisions to the plans and designs.
Proponent fails to translate environmental documentation and to distribute enough copies to all key stakeholders, preventing meaningful consultation.	Fully translated, into local language, EA documentation need to be prepared in both soft and hard copy for distribution to all YHAB units as well as the contractors.
Detailed design proceeding without due consideration of sensitive environmental receptors, identified mitigation and monitoring measures	Ensure that suggestions in environmental assessment documentation, suggesting ways to adjust design to reduce environmental impacts are available to detailed design team for possible design changes
Team preparing the environmental assessment documentation does not have the technical skill and/or experience with donor procedures to prepare a compliant document and borrower does not provide adequate assistance.	On-the-job training, ongoing support from ESSU team and appointed Consultants. Issues identified in semi-annual EMRs and addressed through review missions

IMPACT	SUGGESTED MITIGATION MEASURE
Design team prepares bid documents without inclusion of environmental clauses and a specific reference to the EMP mitigation and monitoring measures, and any mention of the links between environmental compliance and payment, essentially voiding much of the EMPs value.	The design team or whoever is preparing the bid documentation (specifications) should complete the bid documents only when the EMP is in hand and can be integrated into the clauses as required or simply used as a set of clause. A sample set of environmental clauses is included in Annex 5 of this manual.
Contract documentation does not include specific reference to the requirement of environmental safeguards expertise with the contractor, namely the person(s) involvement in the preparation of the Construction Environmental Work Plan (CEWP)	In preparing their bid documents Proponent needs to confirm that requirement for some proof that environmental expertise will be provided by the contractor(s). The ESSU could review the draft bid documents to check that safeguard requirements have been incorporated.

B. Construction Period

67. All contractors will attend an environmental training course on the EMP to ensure that they are fully aware of project requirements for environmental management, monitoring and reporting. The training will cover the development and use of the CEWP. Other common construction-period related impacts may include:

(i) poor contractor housekeeping practices leading to localized and even widespread contamination and potentially chronic pollution problems;
(ii) contaminated surface runoff or direct pollution or degradation from construction practices and equipment;
(iii) air pollution from non compliant and/or poorly maintained equipment;
(iv) excessive noise during construction, including non-compliance with noise curfews;
(v) excessive dust from maintenance activities such as quarry operations and asphalt milling;
(vi) inadequate management of waste at construction sites;
(vii) inadequate handling and management of petroleum products, including fuels and bitumen;
(viii) inadequate materials management, e.g. sand and aggregate; and,
(ix) disruption of access for people living along road to receive maintenance work.

68. Potential construction impacts associated with the types of maintenance activities carried out by YHAB are identified in Table 5.

C. Operating Period

69. All work proposed for this project will be on existing roads, and confined to within the existing RoW. All roads are already in operation and none will see increases in design capacity as a result of the rehabilitation. There will be some increase in the speed of the traffic in urban areas where existing conditions for some roads will see a dramatic improvement (e.g. on Phase I Road X214). This could lead to increased road and community safety issues, which is being addressed as described below.

D. Indirect and Cumulative and/Induced Impacts

70. **Indirect and Induced Impacts.** There are no significant negative indirect environmental impacts associated with the maintenance activities proposed for this project. Improved roads can lead to increased average vehicle speeds and therefore increase the safety risks. To minimize this, a major road safety program has been included in this project. Various traffic ‘calming’ methods and installations of signs and markings are proposed for encouraging safe

traffic speeds in both urban and rural settings. This will be combined with a community road safety awareness programme.

71. There are a number of important positive impacts such as (i) reduced travel time to markets, and services, (ii) improved public transport due to the attraction of providers to an improved road network, and (iii) if a future unpaved project road is paved, the elimination of dust and fewer respiratory problems.

72. **Cumulative Impacts.** The proposed maintenance work, which will take place within the existing road RoW corridors, is unlikely to trigger any cumulative impacts. The ESSU should however examine the timing of other major construction work taking place near the road works (e.g., the gas pipeline construction paralleling the maintenance on G320 in Ruili and S234) to minimise disruption to local communities.

E. Overview: Impacts, Mitigation and Monitoring Actions

73. YHAB identified at least 86 maintenance actions (Table 5) that could be applied to project roads. These were grouped by YHAB into three types (minor, medium and major) of work which may be applied to entire roadway structure repair, pavement repair, bridges, tunnels and culvert repair, traffic engineering repairs and greening works. Of the 86 actions, 77 are considered unlikely to have any significant environmental impacts or risks, seven could have impacts and risks commensurate with ADB environment category B and two with ADB environment category C. In a situation where several maintenance activities are applied to the same stretch of road, the highest category for any one activity is applied to the entire road section. Any subprojects classified as ADB environment category A would be excluded from this project.

74. This project is ADB environment category B, a single CIEE and EMP will be prepared annually that addresses the subprojects associated with each phase. The subprojects associated with a particular phase may have a range of environmental impacts and risks. Some of these could be dealt with through generic EMP measures, whereas others will need specific EMP measures related to the activity or a sensitive receptor.

75. The section that follows discusses the maintenance activities with the most significant impacts. Each activity is cross referenced to Table 5 by the number shown in parenthesis. For minor maintenance, generic EMP measures that are relevant to all subprojects would be applied, for major and medium maintenance activities specific mitigation and monitoring measures are identified.

F. Major and Medium Maintenance Activities

76. The following discussion refers to the medium and major maintenance categories and associated maintenance activities listed in Table 5.

77. **Entire Roadway Structure Restoration**. YHAB have identified up to 13 different activities associated with this type of maintenance. Of these, only one activity is considered likely to have potential impacts and risks commensurate with ADB environment category B, two are considered marginal, depending on sensitivity of environmental receptors in the project area of influence.

78. The three maintenance activities with impacts and risks potentially commensurate with ADB environment category B are:

(i) Reconstruction of large retaining wall or slope protection: ≥ 50m long (1.3.2)

79. **Impacts:** The work would require an extended work period on the road, temporary degradation of the natural environment including air quality and noise, some water quality degradation and erosion.

80. **Mitigation Measures:** Apply 'for all subproject EMP measures' and specific EMP measures for control, handling and storage of construction materials, protection from erosion, and monitoring of weather to avoid exposing slopes just before rain storms.

81. **Monitoring Measures:** Prepare a Monitoring Checklist (Annex 3) and a CEWP (Annex 7) based on the EMP and complete and submit monthly compliance reports to the General Section and YHAB.

(ii) Clean Up after Major Natural Disaster such as Flood, Flash Flood, Large Landslide or Mudflow (1.3.3)

82. **Impacts:** Flooding and landslides can have very significant local effects and clean up is machine-intensive and usually involves the movement of large volumes of material temporary storage and installation of new engineering works. Usually large equipment must be brought on site, resulting in localized noise and dust conditions. If the disaster is major, on-site refuelling may also be required, leading to the risk of spills.

83. **Mitigation Measures:** Apply 'for all subproject EMP measures' and specific measures in relation to construction materials handling and equipment operations, stabilization of any damaged sites, quick removal of debris and off-site disposal, and clean-up of any stagnant water to minimise risk of vector diseases, such as malaria and dengue fever.

84. **Monitoring Measures:** Prepare a Monitoring Checklist (Annex 3) and a CEWP (Annex 7) based on the EMP and complete and submit monthly compliance reports to the General Section and YHAB.

(iii) Widening and Upgrading a Road; Reclassified from 4 to 3 within the Existing RoW (1.3.4)

85. **Impacts:** Extended and intensified construction period, natural environment, temporarily degraded, including air quality, noise, surface water quality and some erosion. Some degradation will be permanent, possible change to surface water drainage.

86. **Mitigation Measures:** Apply 'for all subproject EMP measures' and develop specific EMP measures for road reconstruction and widening, focused on construction methods and management of exposed ground as well as equipment and contractor staging areas and for fuel management, asphalt handling and storage procedures.

87. **Monitoring Measures:** Prepare a Monitoring Checklist (Annex 3) and a CEWP (Annex 7) based on the EMP and complete and submit monthly compliance reports to the General Section and YHAB.

88. **Pavement Repair**. Two of the identified pavement repair maintenance activities are considered commensurate with ADB environment category B. They relate to major asphalt works and roadway preparation and paving. With activity 2.3.1(ii) where the work involves less than 15 km of pavement replacement, it will be sufficient to apply EMP measures applicable to all subprojects.

(iv) Placement and Operation of an Asphalt Processing Plant (2.2.4)

89. **Impacts:** Serious temporary dust, noise, air pollution, odour for nearby residences and businesses, surface water contamination associated with bitumen storage, asphalt plant fuel storage spills and leakage; leakage during application of asphalt, traffic delays, health effects;

90. **Mitigation Measures:** Apply 'for all subproject EMP measures' and develop specific EMP measures for siting the plant, handling and storage protocol for the asphalt, bitumen, asphalt plant diesel fuel, the management of odour, dust, and noise and air quality degradation, decommissioning and clean up of mobile plant needs. All EMP measures would apply.

91. **Monitoring Measures:** Prepare a Monitoring Checklist (Annex 3) and a CEWP (Annex 7) based on the EMP and complete and submit monthly compliance reports to the General Section and YHAB.

(v) Replacement of Pavement, including subgrade for ≥ 5km of road (2.3.1)

92. **Impacts**: Serious dust, noise, air pollution, odour, surface water contamination with bitumen storage, leakage during application of asphalt, traffic delays, considerable access restrictions, health effects from silica dust created by asphalt milling machine.

93. **Mitigation Measures**: Apply 'for all subproject EMP measures' and specific measures for the management of asphalt milling (water spraying), movement of construction materials and waste, temporary dust and noise control and control of fuelling, storage and any aggregate and asphalt processing.

94. **Monitoring Measures:** Prepare a Monitoring Checklist (Annex 3) and a CEWP (Annex 7) based on the EMP and complete and submit monthly compliance reports to the General Section and YHAB.

95. **Bridges, Culverts and Tunnel Repair.** Five of the maintenance activities listed in Table 5 have potential impacts and risks commensurate with ADB environment Category B **or Category A**..

(vi) Repair or replacement of damaged wooden bridges, and/or apply anti corrosion, decay prevention material over water (3.2.1)

96. **Impacts:** Serious potential impact on water course, debris in water, materials and construction in watercourse and on shore for piers and improper disposal of treated wood.

97. **Mitigation Measures:** Apply 'for all subproject EMP measures' and specific measures for the management of the removal of bridge structures over water, application of paints and wood preservative to rehabilitated elements and storage and handling of anti corrosion materials to be used to protect the new or rehabilitated structure.

98. **Monitoring Measures:** Prepare a Monitoring Checklist (Annex 3) and a CEWP (Annex 7) based on the EMP and complete and submit monthly compliance reports to the General Section and YHAB.

(vii) River Bed 'Training' and Pier Reinforcement (>30m length) to Reduce Wear on Structures in Riverbed (3.2.6).

99. **Impact:** Permanent change to the course of a natural waterway, work in a waterway and application of materials in a watercourse might require dewatering around piers and footings, water quality degradation and habitat loss.

100. **Mitigation Measures:** Apply 'for all subproject EMP measures' and specific measures to minimise impacts on any sensitive aquatic species, to minimize siltation and discharge of construction waste into the watercourse.

101. **Monitoring Measures:** Prepare a Monitoring Checklist (Annex 3) and a CEWP (Annex 7) based on the EMP and complete and submit monthly compliance reports to the General Section and YHAB.

(viii) River Entrainment Structure installation/repair for >30m (3.2.4(i))

102. **Impact:** permanently change the course of a natural waterway, work in a waterway and application of materials in a watercourse. Water quality degradation, temporary diversion, habitat loss.

103. **Mitigation Measures:** Apply 'for all subproject EMP measures' and develop specific measures to minimise impacts of near and in water construction activities, proper care of petroleum products post construction clean up.

104. **Monitoring Measures:** Prepare a Monitoring Checklist (Annex 3) and a CEWP (Annex 7) based on the EMP and complete and submit monthly compliance reports to the General Section and YHAB.

(ix) New Short Tunnel Construction Within Road RoW (3.3.8)

105. **Impacts:** This work is equal to a new road section, including all waste management, slope stability issues, access road construction etc., plus all tunnel safety and materials disposal concerns, blasting and drilling.

106. **Mitigation Measures:** This work requires a full category A EIA. Mitigation measures would focus on the construction period and proper management of key tasks such as drilling and blasting, waste materials handling and movement and use of construction materials including concrete and precast sections.

107. **Note:** *Since this type of maintenance activity is likely to be environment Category A, it cannot be undertaken as a maintenance task on this project.*

(x) Construct a New Road Corridor or Ferry Terminal Access Road (3.3.9)

108. **Impacts:** Potentially serious dust, noise, air pollution, surface water contamination, surface water flow disruption, construction materials handling and storage issues, access restriction issues, traffic delays, health effects, resettlement issues.

109. **Mitigation Measures:** As a new road, mitigation measures must focus in construction and operating periods, addressing all construction related effects as defined above and future operations and traffic related effects.

110. **Note:** *Since this type of maintenance activity is likely to be environment Category A, it cannot be undertaken as a maintenance task on this project.*

G. Other Impacts

111. ADB SPS 2009 includes a requirement for determining impacts on the following components of the environment or as a result of the use of certain materials. Therefore, as part of the assessment of impact the following topics must be addressed:

a) habitat degradation and loss;

b) impact on natural resources such as minerals timber, etc.;

c) use of any hazardous materials such as petroleum products and pesticides;

d) impact on physical and cultural resources; and,

e) impacts on health and safety.

112. Given that the maintenance activities are restricted to the existing road RoW and work is of very short duration and the only hazardous materials handled are petroleum products and possibly paints, impacts are expected to be negligible. Further, the application of the screening checklist as shown in Annex 2, provides an initial indication of the likelihood of these impacts occurring.

113. **Bioengineering Methods:** In addition to traditional methods for erosion control as set out in the PRC technical highway standards, bioengineering methods should be considered, where appropriate for the local conditions. These methods tend to be far less costly than civil engineering solutions, are well suited for implementation using local labour, use local materials, and have been tested and proven effective in conditions similar to those along the project roads[3]. Once installed, they also cost less to maintain. A few of the most common bioengineering approaches and their standard engineering solutions are listed in Table 4 and further details are provided in Annex 8.

Table 4. Erosion control functions, civil and bio-engineering mitigation techniques
(Copied from Howell, 1999 [5] Figure 1.2)

Function	Civil engineering technique	Bio-engineering technique	Combination of both
Catch	Catch walls Catch fences	Contour grass lines or brush layers Shrubs and large bamboo clumps	Catch wall with densely planted shrubs Catch wall with bamboo clumps planted above
Armour	Revetments Surface rendering	Mixed plant storeys giving complete cover Grass carpet	Vegetated stone pitching Jute netting with planted grass
Reinforce	Reinforced earth Soil nailing (sodding)	Densely rooting grasses, shrubs and trees Most vegetation structures	Wire bolster cylinders and planted shrubs or trees Jute netting with planted grass
Anchor	Rock anchors Soil anchors	Deeply rooting trees	Combination of soil anchors and deeply rooting trees
Support	Retaining walls Prop walls	Large trees and large bamboo clumps	Retaining wall with a line of large bamboo clumps planted above
Drain	Masonry surface drains Gabion and french drains	Downslope and diagonal vegetation lines Angled fascines or brush layers	Herringbone-pattern wire bolster cylinders and angled grass lines French drains and angled grass lines

[3] Howell, J. (1999) Roadside Bioengineering Reference Book and Site Handbook . ISBN 1 86192 170 5 http://www.cd3wd.com/cd3wd_40/cd3wd/SOILWATR/H2079E/EN/B1364_2.HTM (English only) - Written for roads in Nepal with problems and conditions similar to those found in Yunnan.

H. Potential Environmental Benefits

114. The 86 road maintenance activities proposed will result in a number of benefits, as already discussed in the induced impacts section above, these include:

- reduced travel time;
- dust suppression and better air quality in the road corridor airshed;
- reduced flood risk due to repair of culverts and drains;
- reduced vehicle operating cost due to less frequent repairs and fewer stops and starts;
- safer roads and reduced accidents due to improved signage, markings and traffic calming; and
- improved public transportation services as the quality of roads improves.

115. These benefits need to be identified and quantified where possible, then recorded in the environmental assessment document.

Table 5. Likely Impacts and Mitigation Measures for Road Maintenance Activities Proposed for Phase II-IV Subproject Roads

MAJOR CLASSIFICATION and Secondary Classification		Key Environmental Impacts	Relevant EMP measures	Predicted Environmental Category
1. ENTIRE ROADWAY STRUCTURE RESTORATION				
1.1 Minor Maintenance and Repair				
1.1.1	Finish hard shoulder construction, slopes, prune vegetation on side of hard shoulder	Minor noise and dust, some traffic delays	EMP 2.5.1 EMP 2.6.2, EMP 2.7.3	**C**
1.1.2	Median strip vegetation and revegetation	Some traffic delays	EMP 2.3 EMP 2.6.2.	**C**
1.1.3	Road debris removal	Some dust and traffic delays	EMP 2.7.3 EMP 2.7.5 EMP 2.8.1	**C**
1.1.4	Roadway sweeping	Some dust	EMP 2.3 EMP 2.8.1	**C**
1.1.5	Repair local damage to retaining walls	Minor works, brick replacement and possible minor stoneworks	EMP: 2.8.1	**C**
1.1.6	Local shoulder reinforcement	Minor works , minor grading no impact	EMP: 2.8.1	**C**
1.2 Medium Maintenance and Repair				
1.2.1	Some carriageway widening within RoW (<50m), improve curve safety	Some, noise, dust, temporary access restrictions	EMP 2.7.2 EMP 2.7.3 EMP 2.8.1	**C**
1.2.2	Comprehensive repair of retaining walls, slope protection, road shoulders, drainage ditches.	Some erosion, siltation into water courses during construction, access restrictions and delays Consider upgrade of drainage protection associated with water resources.	EMP:2.4.1 EMP 2.4.3 EMP 2.7.2	**C**
1.2.3	Comprehensive repair of landslide-damaged area	Potential for major erosion and materials movements—heavy equipment operation and sidecasting of waste materials down-slope	EMP 2.2.4 EMP 2.2.6	**C**
1.2.4	Clearing long stretches of ditches, drainage canals and paved ditches	Proper disposal of waste from ditches as it could be	EMP:2.2.8 EMP 2.3.1	**C**

		contaminated, i.e. not near water courses, but in land-based disposal pits. Consider composting	EMP 2.3.5,	
1.2.5	Minor bridge repair, such as railing and potholes repair and leveling of bridge deck	Some erosion, siltation into water courses during construction, access restrictions and delays, also possible drainage of small amounts of petroleum products into water course	EMP 2.3.1 EMP 2.3.3, EMP 2.3.4, EMP 2.4.1	**C**
1.3 Major Maintenance and Repair				
1.3.1	Roadway minor realignment but within RoW for road class	Dust , Noise, some water pollution, materials storage issues, tree removal and revegetation	Apply all EMP Measures	**C**
1.3.2	Reconstruction of large retaining wall or slope protection: ≥ 50m	Extended construction period. Temporary degradation of environment, including air quality, noise, surface water quality—some erosion	Apply all EMP Measures	**B (marginal)**
1.3.3	Clean up after natural disaster such as flood, flash flood, large landslide, or mud flow—extending over an area exceeding 1km^2.	Extended and intensified construction period. Temporary degradation of environment, including air quality, noise, surface water quality—some erosion.	Apply all EMP Measures	**B (marginal)**
1.3.4	Widen and upgrade a road so that it can be reclassified from class 4 to 3. (*Note: based on MEP Decree 2, 2008, reconstruction along an existing road regardless of length requires only a Category C assessment).* *Further, under the Loan agreement, reclassification is not permitted*	Extended and intensified construction period. Temporary degradation of environment, including air quality, noise, and surface water quality—some erosion. Some degradation will be permanent, possible change to surface water drainage	Apply all EMP Measures **Note**: This type of work is actually reconstruction not maintenance and could trigger Environment Category A and exclusion from the project.	**B**
2. PAVEMENT REPAIR				
2.1 Minor Maintenance and Repair				
2.1.1	Maintenance and removal of dirt and debris from carriageway	Minor noise and dust, some traffic delays	Apply for all subproject EMP measures	**C**
2.1.2	Exclude surface water, snow, ice accretion, laying anti-skid material, dust extinguishing agent or compacted snow to maintain traffic	Minor noise and dust, some traffic delays, also draining of melt water into water courses and possible contamination or roadside wells	Apply for all subproject EMP measures	**C**
2.1.3	Sand road evenness, repair rutting (road grading)	Minor noise and dust, some traffic delays, also draining of melt water into water courses	Apply for all subproject EMP measures	**C**
2.1.4	Application of crushed gravel and sand to road surface dust suppression in those areas and determining via instrumentation the best way to repair the wear layer	Minor traffic delays and some noise and dust	Apply for all subproject EMP measures	**C**
2.1.5	Asphalt pavement sweeping, repair of cracks in asphalt,	Minor dust and traffic delays	Apply for all subproject EMP measures and EMP:2.5.2	**C**
2.1.6	Daily application of clear seam to concrete asphalt cracks as required	Minor chemical leakages if rain occurs shortly after application	Apply for all subproject EMP measures and	**C**

			EMP 2.3.2 EMP 2.3.3	
2.1.7	Curb repairs and whitewashed stone	Minor dust and traffic delays	Apply for all subproject EMP measures	**C**
2.1.8	Minor repairs using local aggregate sources	Minor dust and traffic delays	Apply for all subproject EMP measures	**C**
2.1.9	Repair/rehab of small roadside borrow areas	Minor dust and traffic delays	Apply for all subproject EMP measures	**C**
2.1.10	Repair damage to culverts due to accidents	Traffic delay and minor silt addition to watercourse	Apply for all subproject EMP measures	**C**
2.1.11	Concrete pavement partial repair of the pavement surface	Noise, dust and some traffic delay	Apply for all subproject EMP measures	**C**
2.1.12	Repair frost heaves on gravel roads and add slab material	Noise, dust and some traffic delay	Apply for all subproject EMP measures	**C**
2.2 Medium Maintenance and Repair				
2.2.1	Improve road cross-slope surface	Noise, dust and some traffic delay	Apply for all subproject EMP measures	**C**
2.2.2	Application of gravel, intermittent pavement thickening and repair road 'humps and serious degradation.	Noise, dust and some traffic delay	Apply for all subproject EMP measures	**C**
2.2.3	Apply seal coat	Spillage of materials and traffic delay during application	EMP 2.3.2 EMP 2.3.3 EMP 2.4.2	**C**
2.2.4	Placement and operation of a mobile asphalt processing plant	Serious Dust, Noise, air pollution, odour, surface water contamination with bitumen storage, leakage during application of asphalt, traffic delays, health effects	Apply all EMP measures	**B**
2.2.5	Pavement joint replacement	Dust, noise, traffic delays	EMP 2.5.2 EMP 2.7.2 EMP 2.7.3	**C**
2.2.6	Full replacement of curbs along the entire road section	Longer construction period , exposed soils and erosion, traffic delays	Apply for all subproject EMP measures	**C**
2.2.7	Establishment and management of temporary bypasses at maintenance sites	Some dust, noise, air pollution, odour, surface water contamination with bitumen storage, leakage during application of asphalt, traffic delays, health effects	Apply for all subproject EMP measures	**C**
2.3 Major Maintenance and Repair				
2.3.1	(i) Replacement of entire pavement layer for ≥10km, including subgrade and raising horizontal alignment. (ii) Only pavement layer replacement **Note:** *based on MEP Decree 2, 2008, reconstruction along an existing road regardless of length requires only a Category C assessment.* A reasonable international best practice trigger between C and B will be 10 km.	(i) Serious Dust, Noise, air pollution, odour, surface water contamination with bitumen storage, leakage during application of asphalt, traffic delays, health effects from Asphalt milling machine (ii)same conditions as above but much less and only temporary effects	(i) Apply all EMP Measures (ii) Apply for all subproject EMP measures	**(i) B** **(ii) C**
2.3.2	Pavement strengthening, including some widening within RoW, any distance	Serious Dust, Noise, air pollution, odour, surface water contamination with bitumen storage, leakage during application of asphalt, traffic delays, health effects	Apply for all subproject EMP measures	**C**

2.3.3	Bridge deck pavement replacement but not full replacement to deck girders. No increase in bridge capacity	Some dust and danger of surface water contamination	Apply for all subproject EMP measures	**C**
3. Bridges Culverts and Tunnel Maintenance Work				
3.1 Minor Maintenance and Repairs				
3.1.1	Dust, snow clearing, sanding and anti skid application	Minor noise and dust, some traffic delays, minor drainage of chemicals into water course	Not Applicable	**C**
3.1.2	Bridge joint and scupper maintenance (lubrication)	Minor noise and dust, some traffic delays	EMP 2.3.3 EMP 2.7.2 EMP 2.7.3	**C**
3.1.3	Bridge painting	Potential for paint spillage into watercourse	EMP 2.3.2 EMP 2.3.3 EMP 2.4.3	**C**
3.1.4	Routine culvert and bridge maintenance	Some minor amounts of materials (debris) into watercourse	EMP 2.4	**C**
3.1.5	Minor repairs of bridge railing and deck, and repair of non-structural damage to piers	Some minor amounts of construction materials (debris) into watercourse	EMP 2.4	**C**
3.1.6	Minor deck placement, strengthening and repair	Some minor amounts of construction materials (debris) into watercourse	EMP 2.4	**C**
3.1.7	Rock and masonry work repair	Some minor amounts of construction materials (debris) into watercourse	EMP 2.2.1	**C**
3.1.8	Clean debris and falling rock from entrances of tunnels	Minor traffic delay and localized dust and noise	EMP: 2.7.2	**C**
3.2 Medium Maintenance and Repair				
3.2.1 (i) and (ii)	(i) Repair or replacement entire wooden bridges, including application of wood preservative materials over water (ii) Same as (i) but not over waterbody	(i) Serious impact on watercourse, debris in water, materials and construction in watercourse on shore for piers. (ii) spillage of anticorrosion materials such as special paint and careful application according to applicable PRC-GB	(i) Apply all EMP Measures (ii) EMP 2.3.1 EMP 2.3.2	**(i) B** **(ii) C**
3.2.2	Apply anti-corrosion paint for metal to all medium size bridges, i.e ≤ 30m in length.	Spillage of anticorrosion materials such as special paint and careful use according to applicable PRC-GB and other guidelines	Apply for all subproject EMP measures	**C**
3.2.3	Repair or replace bridge bearings, expansion joints,	Some minor amounts of construction materials (debris) into watercourse	EMP 2.2	**C**
3.2.4	Repair permanent abutments, sidewalls, decks	Debris and materials in water course, construction in water course, temporary flow diversion	EMP 2.2	**C**
3.2.5	Widen narrow bridge decks by ≤ 1m	Some minor amounts of construction materials (debris) into watercourse	EMP:2.2	**C**
3.2.6(i) and (ii)	River bed 'training' and pier reinforcement, to reduce wear on structures in riverbed.	This involves permanently change the course of a natural waterway, work in a waterway and application of materials in a watercourse	(i) If more than 30m of training and more than 2 pier repairs apply all EMP measures (ii) if <30m and <2 piers apply "for all subprojects" EMP measures.	**(i) B** **(ii) C**
3.2.7	Minor non-structure tunnel repair-	Dust, noise, temporary local air	EMP No 2.5.1 (5)	**C**

	reinforcement-type work	quality degradation		
3.2.8	Culvert Replacement and repositioning	Improper sizing and placement resulting in upstream ponding and downstream erosion—also blockage during construction	Apply for all subproject EMP measures and EMP 2.2.2 EMP2.2.3 EMP 2.4.1 EMP 2.4.2…	**C**
3.3 Major Maintenance and Repair				
3.3.1	Bridge deck pavement replacement	Some dust and danger of surface water contamination with asphaltic material	EMP 2.4.1, EMP2.4.2	**C**
3.3.2	Widening and strengthening, deck replacement of medium size bridges (between 30m and 100m total length): **without structural repair**	Some impact on watercourse, debris in water, materials and construction in watercourse on shore for piers.	Apply for all subproject EMP measures	**C**
3.3.3	Bridge abutment, sidewall and deck repair of small bridges	Some dust and danger of surface water contamination with asphaltic material as well as concrete	Apply for all subproject EMP measures	**C**
3.3.4 (i) and (ii)	River entrainment structure installation/repair undertaken	This involves permanent change to the course of a natural waterway, work in a waterway and application of materials in a watercourse	(i) If more than 30m of training and more than 2 pier repairs apply all EMP measures. (ii) if <30m and <2 piers apply EMP `for all subprojects` measures	**(i) B** **(ii) C**
3.3.5	Medium size bridges (between 30m and 100m total length; repairs on suspension and cable stayed bridges, including individual cable replacement	(i) Some potential impact on water course, debris in water, materials and construction in watercourse on shore for piers.	Apply for all subproject EMP measures	**C**
3.3.6	Improve approaches to medium size bridges	Some small amounts of materials into water course or onto facility crossed by bridge—no significant impacts predicted	Apply for all subproject EMP measures	**C**
3.3.7	Construct new small interchange—but remaining within road RoW	Possibly short period of erosion, noise, dust and air quality disruption, access restriction and Need for revegetation	Apply for all subproject EMP measures	**C** **If outside RoW; Category A**
3.3.8	New short tunnel construction on existing road	This work is equal to a new road section, including all waste management, slope stability issues, access road construction etc.	Prepare a full EIA and EMP,	**A** As this work triggers a full EIA, not allowed as part of this project
3.3.9	New Road corridor—Also would cover a new access road to a ferry terminal	Potentially serious dust, noise, air pollution, surface water contamination, surface water flow disruption, construction materials handling and storage issues, access restriction issues, traffic delays, health effects	Prepare a full EIA and EMP,	**A:** As this work triggers a full EIA, it cannot be undertaken as part of this project
3.3.10	Tunnel ventilation and lighting, drainage overhaul or update of the facilities	Any work that does not include constructing new ventilation shafts or installing new large capacity transformers for greater power consumption –no significant effects are anticipated	Apply for all subprojects EMP measures	**C**
3.3.11	Tunnel reinforcement works beyond spot	Dust, safety and traffic delays	Apply for all	**C**

	repairs		subprojects EMP measures	
4. Traffic Engineering Works				
4.1 Minor Maintenance and Repair				
4.1.1	Maintenance of signage, km-markings/piles, boundary markers and cleaning of such items	Minor materials clean up and traffic delays	No impacts, as long as good housekeeping measures are applied as per EMP:2.3	**C**
4.1.2	Placement and repair of snow fencing,	Minor materials clean up and traffic delays	None needed	**C**
4.1.3	Painting of lines on road	Minor materials clean up and traffic delays	None needed	**C**
4.2 Medium Maintenance and Repair				
4.2.4	Replacement of any signs and markers, or provision of new ones at new locations	Minor materials clean up and traffic delays	None needed	**C**
4.2.5	Comprehensive replacement of existing guardrail, fencing and snow fencing	Minor materials clean up and traffic delays	None needed	**C**
4.2.6	Comprehensive road marking repainting for (3 sections)??	Minor materials clean up and traffic delays	None needed	**C**
4.2.7	Maintenance of any communication towers in RoW	Minor materials clean up issues, possible noise and anti corrosion paint use—or related tasks and traffic delays	None needed	**C**
4.3 Major Maintenance and Repair				
4.3.1	Adding new guardrails, replacement, fencing and snow fencing, etc.	Minor roadside construction activity and materials temporarily stored on roadside—no significant impacts anticipated	None needed	**C**
4.3.2	Update of telecommunication and electronics toll system; except towers	No environmental effects anticipated	None needed	**C**
4.3.3	Replacement of Communication towers in RoW	Some excavation and use of heavy equipment to replace communications tower(s). No significant impacts	EMP 2.2.2 EMP 2.2.3	**C**
4.3.4	Updating of power supplies to all road facilities, communication equipment including increases to power supply capacity-transformers, etc. within RoW	Updating power supplies involves increasing power supply, requiring upgrading of transformers, possibly the transmission lines from substation —environmental impacts are possible	EMP 2.8	**C**
5. GREENING WORKS				
5.1 Minor Maintenance and Repair				
5.1.1	Pruning and tending of trees	No impacts anticipated	EMP 2.6.1 EMP 2.6.2	**C**
5.1.2	Application of chemical fertilizers, pesticides, weeding	Potential for minor contamination of runoff water	EMP 2.8.3,	**C**
5.1.3	Replacement of trees and painting/whitewashing of tree trunks	No impacts anticipated	None needed	**C**
5.2 Medium Maintenance and Repair				
5.2.1	Add to and replace trees and plants from nursery	No impacts anticipated	None Needed	**C**

IV. ENVIRONMENTAL ASSESSMENT FOR ROAD MAINTENANCE

A. Screening

116. **Step 1**: Subproject roads proposed for Phase II-IV will be screened to determine their environmental classification using the project 'subIDForm' checklist (See Figure 3) and the prediction of maintenance activity impact category defined in Table 5. The use of these two tools help confirm the environmental classification of the project, combining a rapid evaluation of the sensitivity of the environment in which the road section is located with the likely effects of the maintenance activities.

117. This screening method was designed in line with the ADB method for the environmental classification of projects. All references to environmental categories, A, B and C assume that potential associated environmental impacts and risks are commensurate with ADB environment categories, A, B and C.

D	Environmental Assessment-G108		
General Comments	**Environment Categorization Checklist**	**Env. Cat.**	**Next steps**
Mainly farm land. Some environmentally sensitive features along this road. Mostly medium maintenance planned: resurfacing of 1 medium and 2 small bridge decks.	☐ Potential loss or damage to Cultural heritage site ☐ Encroachment into buffer or core of protected natural area ☐ Encroachment onto significant wetland providing important habitat ☐ Damage to Old-growth forest ☐ Permanent loss of important biodiversity Category A Triggers ☐ Works in densely populated district e.g. urban zone, village, town or ☐ Establishment of a new quarry or placement of new asphalt plant ☐ Slope stabilization works > 50m ☐ Replacement of more than 5 irrigation canals ☐ Bridge replacement, river bed training >30m or more than 2 in-water pier reinforcement ☐ Resettlement of >= 50 vulnerable people, >= 100 ethnic minority people, or >= 200 unclassified ☐ Temporary bypass at maintenance site > 50 m, road closure of more than 24 hours ☐ Continuous pavement works > 15 km Category B Triggers ☐ Other specific impact: ☑ Check Table 8, IEE Annex C to confirm Category	C	EMP Contract Clauses

Figure 3. The Environmental Section of the YHAB Operational Manual SubIDForm checklist

118. In general, a project will be classified as 'Category A' if the proposed activities:

1. involve any new road or major new structures, such as a tunnel or bridge;
2. will generate impacts affecting an ecologically sensitive area, particularly if the project is located less than 1000 meters from any designated wildlife or forestry reserve, national park, protected cultural heritage and archaeological sites, or areas with other national or international designations (e.g. RAMSAR, UNESCO sites), important water resources, and,
3. exists[4] and already passes through any ecologically, culturally or archaeologically sensitive areas.

119. The following sections describe the environmental assessment and management procedures that will apply to this project, which has been classified as environment category B, any subprojects classified as environment category A would be excluded.

[4] Based on Annex 5 of ADB's 2009 SPS, ADB will not fund any new projects affecting ecologically sensitive areas.

B. Scoping

120. **Step 2:** Before conducting any environmental assessment, a scoping exercise is recommended to define the project's 'corridor of impact', usually the legal RoW (Figure 1) plus additional land either side of the carriageway/alignment, plus any temporary storage areas. A recent topographic map of the project area showing the project road(s) in relation to topography, water courses, settlement areas and preferably land-use should be developed and used in the scoping exercise. A table, defining these parameters for each subproject should be prepared and included in the IEE. The screening and scoping will determine the project environmental classification and project area of influence.

C. Identifying Baseline Conditions and Impacts

121. **Step 3:** The baseline environmental conditions are established by reviewing secondary data sources, consultation with the relevant government agencies, including the YHAB General and Maintenance sections and a site visit[5] to gain an understanding of terrain/topography, soils, geology, forest cover, protected areas, land-use, adjacent physical cultural resources and ambient air, noise and water quality conditions in the project corridor. The baseline represents the existing conditions against which any changes due to project effects will be measured. All data sources should be referenced, indicating the author, date and title of the publication.

122. **Status of Cultural and Archaeological Relics:** If there is some evidence, based on discussion with the Maintenance Section, that the road passes through a culturally/historically important area, the ESSU should check the records of the Provincial Cultural Relics Department and then check with the County Cultural Relics Bureau. The consultation of the public about sites and their location is often a useful reference point.

123. Sometimes contractor excavations may unearth previously unknown relics. In the event of a discovery, works should be stopped and the County Cultural Relics Department consulted on how best to proceed.

124. **Step 4: Impact Prediction-** This step involves predicting likely change as a result of major construction activities and road operating changes as a result of the rehabilitation. Construction period effects on air quality, noise, surface water quality, safety and health impacts, as well as impacts due to added traffic volume need to be assessed[6]. The locations where baseline data are collected or where monitoring takes place and the timing of these activities should remain uniform for mitigation and monitoring actions, facilitating future comparative analysis or audits.

D. Public Consultations and Information Distribution

125. **Step 5**: The objective of public consultation is to engage affected general public as well as government officials (at several levels) in a dialogue leading to better mitigation measures and helping to identify oversights regarding impacts. The consultation must be preceded by the provision of information on the project to the affected communities; often via a short written booklet and an invitation to attend a workshop/information session. It is important to provide enough lead time (at least 1-3 weeks) for communities to attend such sessions[7].

[5] For IEE, most of the data are secondary information. A field visit is required when no credible data exist.
[6] The majority of road maintenance activities do not result in significant operating period traffic increases thus making construction period effects the most important ones.
[7] It is standard procedure to provide any citizen attending with a small stipend to cover expenses, including at least 2 meals.

126. Consultation should be carried out for all projects. Consultation and disclosure requirements will be agreed with ADB following review of project checklist and categorisation documentation. An information sheet defining details of the project work, location, timing and specific map showing the project site in relation to surrounding land-uses should be prepared by the ESSU and distributed through the General Sections to communities along the project road. Such a sheet must include a date, time and location for a consultation session (see Annex 5). This information should be distributed at least 2 weeks before the consultation date and take place once details of the EMP are known.

127. Details on the work and potential impact on local people should be presented orally at the session, and participants encouraged to provide feedback on proposed activities and associated impacts.

128. For each session, minutes and attendance sheets should be prepared according to the template provide in Annex 5.

E. Preparation of the Environmental Management Plan (EMP)

129. **Step 6:** The EMP is the most important output of an environmental assessment. It must be practical, specific and systematic, such that it can easily be converted to mitigation and monitoring actions which:

- the design team and contractors can undertake;
- the people assigned monitoring tasks can easily complete; and,
- can be translated into, or simply referenced as, environmental clauses in contract specifications.

130. Each mitigation measure needs to be matched with a monitoring activity. Good EMPs not only identify the source of the impact, the effect on the biophysical environment and the monitoring action to be taken, but also where, how often, when and who should implement each mitigation and monitoring action and who is responsible.

131. The environmental assessment team should record each predicted impact, define an appropriate mitigation action that either prevents the impact or reduces it to a level acceptable under PRC standards and international best practice, and then specify when, where and who should implement and supervise each action. The Sample EMP included in this report (Annex 2) provides mitigation and monitoring measures for the full range of maintenance activities that YHAB may carry out under this project.

132. The inclusion of environmental clauses and the EMP in the contract documents and the environmental training program will improve contractor commitment to implementation of the EMP. Having EMPs available just prior to bid document preparation would also greatly help the design team with integrating mitigation and monitoring items into the design and bid documents.

F. Reviewing Capacity for Environmental Management

133. **Step 7** involves the identification of the agencies and units that will be involved in the environmental assessment, management and supervision of the mitigation and monitoring actions from preconstruction through the operating period. YHAB is the lead implementing and supervising agency and their prefecture (General Section) and county-level (Maintenance Section) counterparts will be involved in project-specific design, field assessments, mitigation and monitoring actions. Using mostly the interview approach, the analysis should be short and focused, identifying needs based on obvious gaps, such as lack of experience in undertaking international-level assessments or lack of experience with preparation and implementation of

EMPs. Attentive interviews will almost always result in those needing assistance identifying what they require. Finally, appropriate capacity building actions addressing both longer term and short term requirements in relation to realistic budgetary limits need to be specified and costed. For this project, involving a variety of maintenance activities, two sets of training sessions are proposed. For the government side, including the executing and implementing agency a four to five day training program is proposed.

134. Since the contractors play such an important role in EMP implementation, all appointed contractor(s) will attend mandatory training.

G. Estimating Mitigation, Monitoring and Training Costs

135. **STEP 8** involves costing of each of the mitigation and monitoring measures as well as institutional capacity building. Applying a cost to the environmental work will help YHAB know what to expect and the contractor can budget for the necessary actions. Costing details must be systematic and include rates, unit costs and separate out all actions that are often referred to as environmental, are normally found in other budget items, for example slope stabilization, revegetation, fuel handling and storage protocols and work camp waste management. This way the risk of 'double counting' is reduced. This estimation is done by using the EMP columns that identify the mitigation and associated monitoring measures, then estimating the cost to undertake each. It is important to separate capital or one-time expenses, from reoccurring costs, such as compliance monitoring during the construction period. An EXCEL template, worked out for an actual project road is provided in Annex 6 and an excel spreadsheet is included in the project operational manual.

H. Reporting and Document Production

136. **STEP 9.** The preparation of the CIEE and EMP should begin at the very start of the work with the completion of a detailed Table of Contents. This should be based on the mandatory content defined in the ADB SPS 2009, Annex 1 & 2[8]. (www.adb.org/safeguards). The CIEE and EMP prepared for Phase I will also provide an example to follow.

I. Implementing Outputs from an Environmental Assessment

137. **Applying Environmental Clauses and Environmental Contract Specifications**. The preparation of construction contract clauses addressing environmental mitigation is often difficult since the timing of environmental assessment completion and contract specification preparation are not coordinated. Since clauses are really the only way to hold contractors accountable, this task is essential and must be done in as much detail as is required to protect the environment. The suggested approach is that proponents use the baseline clauses included in Annex 5, and then cross reference with the EMP.

138. The bid documents should be prepared with the EMP in hand such that a relevant and practical set of environmental clauses, closely mirroring the EMP, find their way into the contract specifications. The ADB loan agreement with the proponent includes a covenant stating that the proponent agrees to implement the EMP.

139. On completion of the IEE and EMP and once approvals (sign off) are final, the ESSU will provide the contract preparation team of YHAB with a project-specific EMP as well as the set of contract clauses to insert. The EMP for each subproject road will combine mitigation and monitoring measures applicable to all subprojects and specific mitigation and monitoring measures developed for a particular subproject or activity. The first suggested clause in Annex

[8] The SPS document is also available in Chinese and has been provided to YHAB in hard and soft copy versions.

3 stipulates that the contractor must provide a certification of understanding and knowledge of all environmental safeguard requirements in the contract; establishing a binding commitment. With such a commitment in place, YHAB will consider non compliance a very serious matter and take immediate action.

140. A compliance monitoring checklist (Annex 3) will be prepared by the ESSU and field inspections (by either the ESSU or the designated General and Maintenance Section staff) will be completed at least once during the work to establish performance. The environmental performance of YHAB and their Contractors will be monitored against project indicators (as listed in Table) will be applied to the construction work and results included in the overall performance review and payment calculations.

141. **Construction Period.** To better manage the mitigation and monitoring tasks defined in the EMP, the ESSU or supervising consultant will assist the Contractor with the preparation of a CEWP (see sample in Annex 8) showing mitigation and monitoring measures in relation to key project activities and milestones to remind the contractor of when the construction period mitigation and monitoring tasks must be started and completed.

142. During the planning /preconstruction stage for any subproject, the ESSU should prepare a compliance monitoring checklist. The best approach may be to combine the EMP mitigation and monitoring tables (see Annex 2,) into one, then add columns to record actions taken, dates and results observed (see template Annex 3). This workplan then provides the basis for audit of contractor implementation of mitigation and monitoring measures. Major responsibility for implementation of environmental mitigation and monitoring measures will rest with the contractor(s), supervised the ESSU and assigned staff from the General and/or Maintenance Sections. CEWPs and monitoring checklists will be completed every month and provide the basis for quarterly project progress and annual reports as discussed in more detail in Section VII.

143. **Operating Period.** Within three months of the end of the construction period or whichever comes first, the ESSU should instruct the contractor(s) to prepare the construction period environmental mitigation and monitoring summary (usually a table). This table needs to be handed to the operating unit of the road for follow up, e.g., maintenance of construction period revegetation or tree plantings. The road operator will use this report to ensure any ongoing mitigation and monitoring requirements are fulfilled.

V. CONSULTATION, INFORMATION DISCLOSURE AND GRIEVANCE REDRESS MECHANISM

A. Consultation

144. **Requirement.** As this loan will not permit projects classified as environment category A, this section only presents consultation requirements for subprojects that are environment category B or C. ADB requires that the borrower conducts meaningful consultation with affected people and that special attention is paid to vulnerable groups to ensure they have sufficient opportunities to participate in consultations. Consultation processes should be appropriately documented in the CIEE, quarterly and annual reports submitted to ADB and Project Completion Report.

145. **Consultation Process.** For category B projects one consultation session is needed. The consultation could be carried out when the annual CIEE and EMP is being prepared or when the surveys are being undertaken. The project implementation team should present the

project, its location and timetable for implementation, an overview of the environmental assessment process, key findings, adverse impacts, benefits and proposed mitigation and management to inter alia, all people within the corridor of impact, local party officials, EPBs and community woman organizations. These data should be defined as tentative or interim, implying that participants' input will be applied to project planning and design. The participants should be explicitly invited (not instructed) to provide comments on what is presented. To facilitate follow up, adequate and convenient contact information should be provided to the participants.

146. As discussed in Section IV, consultation for assessments involving basic maintenance activities taking place within a road RoW and often within the edge-of-pavement, do not require the rigorous consultation associated with more complex projects with more significant risks. The standard ADB process can be modified when only minor impacts are envisaged. The revised procedure involves conducting informal multiple community interview sessions at various locations along each project road. Using a questionnaire as a guide, information is exchanged and records are kept, and then included as an annex to the IEE, the documentation prepared for Phase I can be referenced as a guide. Consultation should be planned and delivered by the ESSU. Participation should include both General and Maintenance Section people, preferably those named as environmental contacts by YHAB, and familiar with the proposed maintenance activities.

B. Information Disclosure

147. For any subproject, information should be provided to roadside communities during the project feasibility or detailed design stage. Ideally it should take place during the early stage of the IEE surveys and can take the form of a brochure or letter providing the following information:

- Project name and work boundaries shown on a map (to scale);
- Purpose of information disclosure and invitation to public to comment and advise on any observed problems;
- Scope of work to be performed, types of equipment on site;
- Timetable for IEE and construction from start to departure of contractor;
- Likely impacts and proposed mitigation measures;
- Predicted benefits and value to the local community;
- Contact information for public to use to submit any comments and the date plus venue for a local consultation session.

148. The brochure or letter should be prepared by the ESSU and then distributed by the local maintenance section to roadside communities. The consultation session should be held when the draft EMP is available and its contents can be presented at the session.

C. Grievance Redress Mechanism (GRM)

149. YHAB has developed an environmental Grievance Redress Mechanism (GRM),[9] which will be readily accessible to affected persons and will be applied to every maintenance project. The GRM has been scaled to the potential risks and adverse impacts of the project. It addresses affected persons' concerns and complaints promptly, using an easily comprehensible and transparent process. The GRM will be provided, at no cost and without fear of retribution, to

[9] The GRM is fully compliant with the PRC's Public Complaints Decree No. 431(01- 2005), and the State Environmental Protection Agency (SEPA) Environmental Complaints Management Regulation (Decree No. 34),

the affected people. Given the minor nature of the maintenance work, significant grievances are not expected. The GRM process is shown in Figure 4.[10]

150. YHAB will make certain that the GRM is accessible to varied community members, including vulnerable people such as single mothers, the very poor, the elderly, and youth. YHAB will post their contact information, including addresses, postal codes, emails, hotline numbers and websites at General and Maintenance Section offices located in the capital city or town of each prefecture. They will also consult with affected village committees prior to works to inform them of the GRM, relevant contacts and methods of resolution to maximise accessible to potentially affected persons.

151. The basic grievance redress steps are described below and shown in Figure 4. The ESSU will be responsible for facilitating, tracking and reporting grievance resolution at each step:

Step 1: The affected person should first try to resolve the issue of concern directly with the contractor and the local village committee. A solution must be presented within five days. If successful, no further follow-up is required.

Step 2: If there is no resolution the person can file the grievance with the county office of YHAB, the Maintenance Section or the Prefecture level Office the General Section. A resolution must be reached within two weeks

Step 3: If no resolution is found the complainant can take the next step and contact the county or prefecture government offices where resolution will be required within two weeks.

152. During loan implementation, all complaints received will be tracked and their resolution fully documented and reported to ADB by the ESSU. The process of documenting the operation of the GRM will include the following elements:

(i) tracking forms and procedures for gathering information from the contractor/highway section and complainant(s);

(ii) updating the complaints database routinely;

(iii) identifying grievance patterns and causes, promoting transparency and information disclosure, and periodically evaluating effectiveness of the environmental GRM, environmental controls, and their implementation; and

(iv) collecting and submitting input to the quarterly reports from General and Maintenance Sections for inclusion in progress reports for ADB.

153. To ensure that the GRM is effective and accessible, the people living in the project corridor will be made aware of how to use it by the contractor and/or the ESSU.

154. GRM steps, a copy of Figure 4 and relevant contact details will be distributed to each village head, in the relevant local languages, for posting in the village office.

[10] This process has been coordinated with the social sector work and is fully compatible

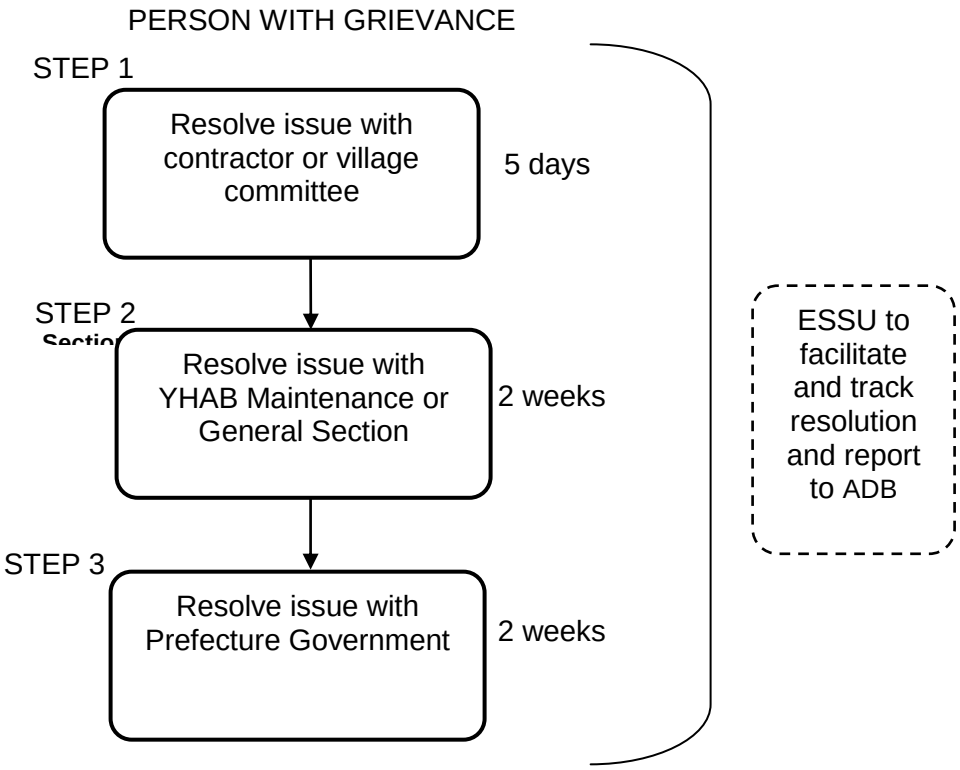

Figure 4. Steps of environmental grievance redress mechanism

VI. INSTITUTIONAL ARRANGEMENTS AND RESPONSIBILITIES

A. Roles and Responsibilities

155. This section describes the proposed institutional arrangements and defines roles and responsibilities for environmental management, monitoring and reporting requirements for the Project (as illustrated in Section II, Figure 2).

156. **YEPD and EPBs.** The EIA Classification Decree of MEP (2008), does not classify highway maintenance works as construction projects, maintenance activities are not subject to PRC environmental assessment, management procedures or approval by YEPD. During the assessment, the local EPBs, representatives of local communities, and other key stakeholders can be consulted and it is recommended that local EPBs are made aware of the project GRM and relevant persons to contact in the event of receiving a complaint.

157. **YPDOT.** YPDOT is the executing agency (EA) and has overall responsibility for compliance with ADB requirements and the loan covenants. YPDOT serves as the leading authority, coordinating relevant parties to develop highway maintenance schemes to the required standards.

158. **YHAB**. YHAB is the implementing agency (IA) for the project. As the IA, YHAB, with cooperation of General and Maintenance Sections and design institutes, coordinates all environmental assessment work for the project and is responsible for selection of subprojects, their design, appointment of contractors, implementation and post-construction monitoring. YHAB will nominate safeguard focal points in the General and Maintenance sections to help co-ordinate environmental assessment, monitoring and reporting.

159. **YSRI.** Two professionals from the environmental division of YSRI joined the PPTA team during the environmental assessments of Phase I works and the preparation of the IEE, EMP and EARF in order to gain experience and capability to assist with Phases II-IV.

160. **ESSU.** The ESSU will be established within YHAB's maintenance division. The environmental specialist will lead the environmental assessment and management activities for Phases II-IV. The ESSU and the designated YHAB prefecture focal points, in co-ordination with provincial departments of YHAB and YSRI, will undertake the preparatory works and undertake/coordinate all other work necessary to complete the environmental assessments and implement environmental requirements as set out in this EARF, the IEE and EMP. The ESSU, in co-ordination with the General and Maintenance Sections, will monitor the day-to-day environmental mitigation and monitoring tasks undertaken by the contractor and contribute to quarterly project progress reports.

161. Design changes and adjustments to methods proposed in the IEE to minimise environmental impacts will be reviewed and confirmed by YHAB[11] and ADB. Standardized environmental clauses (see Annex 5 of the EARF) will be added to construction contracts.

162. YHAB, through the ESSU, and the General and Maintenance Sections, should encourage the close cooperation of communities along the subprojects to help with the supervision of the implementation process, ensuring better compliance of the design and construction work with the requirements specified in the EMP. The ESSU will be responsible for facilitating and tracking grievance resolution and reporting on the GRM to ADB.

[11] The IEE is a YHAB document; the consultant facilitates its preparation. Once YPDOT/YHAB endorses the IEE, it becomes a binding agreement between YPDOT/YHAB and ADB.

163. **Provincial Level.** In compliance with the EIA law and the State Council Ordinance, YPDOT is the initial reviewing authority for environmental assessment reports, under normal conditions, followed by final review and approval by YEPD. Prefecture EPBs and county EPBs could be invited to make comments and to provide inputs for the finalization of assessment reports. In some cases, prefecture transport bureaus and county transport bureaus participate as co-implementing agencies, in which case they participate in the environmental assessment review process[12].

164. **Contractor.** For maintenance work, the success of environmental mitigation depends largely on the contractor doing what is specified in the EMP and/or the environmental clauses in the contract.

165. **ADB:** Once loan disbursement begins, the ADB will review implementation and assess performance against indicators (see Section VII, Table 6). YHAB will submit quarterly project progress reports to ADB, these reports will be used as the basis for the periodic performance review, review missions, and special audits. Separate periodic environmental monitoring reports will not be required unless specific environmental issues arise and are subsequently requested by ADB. The ESSU will address compliance with the EMP and any other environmental clauses with support from the International Environment Consultant and ADB, as needed. If non-performance issues arise, ADB has the option to control loan disbursement.

VII. MONITORING, PERFORMANCE INDICATORS AND REPORTING

A. Monitoring

166. **Environmental Monitoring.** The ESSU will be responsible for environmental monitoring. During pre-construction stages they will confirm that contractors have received environmental training and that all necessary documentation has been translated and distributed to key stakeholders. In particular, they will verify that the construction contract(s) have the requisite environmental clauses and/or references to the EMP included and that contractors have copies of the EMP(s). The ESSU will also be responsible for delivering and reporting progress on training programs for YHAB and their Contractors.

167. During construction, the ESSU will assist contractors with the preparation of a CEWP (see example in EARF Annex 8) for each subproject. The CEWP will be filled in monthly by the contractors to report progress on the implementation of the EMP. The ESSU will undertake quarterly compliance audits of YHAB and their Contractors using a monitoring checklist (see example in EARF Annex 3). The CEWPs and monitoring checklists will inform the quarterly project progress reports and the annual performance and sustainability assessment report that will be prepared for ADB.

168. The ESSU will conduct post-construction consultations to establish the effectiveness of EMP mitigation measures implemented. The issues raised during the IEE consultations will be the focus of these surveys. The results will be used to improve the effectiveness of mitigation measures on future projects, or on the same road if maintenance is repeated in the future.

169. **Project Monitoring.** Within 3 months of loan effectiveness, YHAB with support of the project management consultant will establish a project performance monitoring system which will monitor three levels of information:

(i) **Project Progress.** The ADB Project Management Office (PMO) will annually monitor annually progress against the indicators and targets set in the project Design and Monitoring Framework. The indicators will be submitted as part of the

[12] PRC's EIA law does not include maintenance activities as needing any environmental assessment.

Quarterly Progress Reports to ADB. They will provide information necessary to update ADB's project performance reporting system.

(ii) **YHAB Performance and Sustainability.** The PMO will monitor the performance and sustainability of YHAB's road maintenance program. YHAB will carry out annually road network condition surveys. ADB Project Office will collect data and information necessary to prepare an annual performance and sustainability report. The report monitors the effectiveness, efficiency, management performance of the program, as well as it social and environmental sustainability.

(iii) **Subproject Progress.** Information on the progress of each subproject under Outputs 1 and 2 will be monitored by the field offices and reported to the ADB Project Office; information includes: (a) baseline social data, (b) procurement, physical and financial progress, and (c) status of implementation of EMP, Resettlement Plan (RP) and Social Development Action Plan (SDAP). The PMO will update the information on a quarterly basis and report to ADB in the Quarterly Progress reports. Within six month after the completion of a subproject, the ADB Project Office will update social data, finalize physical and financial information, finalize information on the implementation of EMPs, RPs and SDAP, and re-evaluate economic benefits based on new traffic count results.

(iv) **Compliance Monitoring and Reporting.** Status of compliance with loan covenants will be monitored and reported to ADB in the quarterly project progress reports. This includes compliance with the project Results Agreement, which includes commitments by YHAB and YPDOT in financial, technical, managerial, safety, environment and road safety areas. Status of the implementation of the EMPs, RPs and SDAP will be integrated in the quarterly project progress reports and reviewed during ADB annual missions. In addition, an annual performance and sustainability assessment report will be prepared for ADB will summarise progress made with capacity development and improved institutional arrangements for maintenance, including environmental assessment, management and training It will also report on the effectiveness of YHAB and their Contractors in implementing the project including compliance with EMP mitigation and monitoring measures. The information for the quarterly and annual reports will be prepared by the ESSU for the PMO who will report to ADB. The ESSU will also prepare environmental inputs for the project completion report.

(v) **Environmental Reporting.** Contractors will complete a CEWP monthly to record progress with implementation of the EMP. The ESSU will undertake quarterly compliance audits of YHAB and their contractors, evaluate performance against project environmental indicators, and submit a quarterly monitoring report to YHAB. These environmental reports will be included as an appendix in the quarterly project progress report and will inform the annual performance and sustainability assessment report that will be submitted to ADB, as described in Section VIII, X of the PAM. The project team will review the environmental appendix and disclose it on the ADB website within 14 calendar days of receipt from the Borrower in line with ADB Public Communications Policy (2011). Separate periodic environmental monitoring reports will not be required unless specific environmental issues are identified in the quarterly project progress reports, annual report or during review missions and subsequently requested by ADB. The effectiveness of this system of EMP reporting will be reviewed after the first annual performance and sustainability assessment report has been received and reviewed. The ESSU will prepare environmental inputs for the project completion report, this report will also be disclosed on the ADB website.

(vi) **Environmental Performance Indicators.** The ESSU will help measure environmental performance against project indicators. Table 6 lists proposed indicators and targets for 2012 and 2013. Targets for subsequent years will be set annually. The indicators will be used to assess the overall environmental performance of YHAB and the effectiveness of prescribed environmental mitigation and monitoring measures in controlling impacts associated with subprojects. A chart showing performance indicator scores for subprojects will be prepared by the ESSU and presented in each quarterly monitoring report submitted to ADB. In addition, YHAB environmental performance will be monitored annually and reported in the annual performance and sustainability report, as described above.

Table 6. Environmental Performance Indicators for Maintenance Work

Indicator	Units	2012: Target	2012 Actual	2013 Target	Score (%)
Indicators to monitor YHAB environmental performance					
Number of environmental specialists in YHAB ESSU.	#	0	0	1	
% of Medium and Major maintenance works which are classified as Category B works and have EMPs being implemented by Contractor(s).	%	50	0	100	
% of Medium and Major maintenance work with completed Environmental Screening documents.	%	50	25	100	
% of all Contractor(s) working on project with completed CEWPs and/or being effectively implemented.	%	25	0	50	
% of maintenance activities implemented following the Environmental Procedures defined in the EARF.	%	50	25	100	
% of medium and major maintenance works, recycling/ reusing construction materials such as pavement, old concrete, etc.: Recycling 76-100% Recycling 50-75% Recycling <50%	%	50	25	75	
% contractors operating low emission heavy equipment, as defined by manufacturer's specification	%	25	?	75	
% contractors with verifiable environmental safeguards expertise provided on the job as needed	%	100	0	100	
% of completed construction monitoring checklists showing that actual implementation of mitigation and monitoring is more or less in step with what was planned	%	100	?		
Number of Trainees at each annual training session	No.	30			
Indicators to monitor subproject environmental performance					
%of beneficial environmental impacts stemming from maintenance action identified by IEE team and taking place	%				
Number of graduates of the contractor training session work on the subproject	No.	NA	NA	1	
Number of non-compliance occurrences recorded for contractor for subproject	No.	NA	NA	0	
Number of concerns /issues voiced concerning poor traffic management at subproject construction sites	No.	0	NA	0	
Number of occurrences of damage to assets that requires compensation during implementation	No.	0	NA		

ANNEXES

Annex 1: Project Screening Form
Annex 2: Sample of an Environmental Management Plan (mitigation and monitoring tables)
Annex 3: Sample Compliance Monitoring Checklist-Prepared from EMP
Annex 4: Sample Environmental Clauses for Inclusion in Contract Documents
Annex 5: Template of consultation meeting record
Annex 6: Sample Mitigation and Monitoring Costing Table (based on EXCEL spreadsheet)
Annex7: Sample Construction Environmental Work Plan (CEWP)
Annex 8: Selecting the Bioengineering method to apply

ANNEX 1: Project Screening Form

The Operational Manual developed for YHAB as part of this project contains 'subIDForms', one for each Phase I subproject. The subIDForm summarizes engineering, planning, financial, social and environmental conditions as well as the work to be performed for each subproject. The Environment section of the form has a number of items referred to as classification triggers[13]. The triggers that best define the environmental sensitivity of the subproject were checked off, thereby defining the most likely environmental assessment classification for that subproject.

The triggers as presented in the subIDForm are shown below:

D	Environmental Assessment-G108		
General Comments	**Environment Categorization Checklist**	**Env. Cat.**	**Next steps**
Mainly farm land. Some environmentally sensitive features along this road. Mostly medium maintenance planned: resurfacing of 1 medium and 2 small bridge decks.	☐ Potential loss or damage to Cultural heritage site ☐ Encroachment into buffer or core of protected natural area ☐ Encroachment onto significant wetland providing important habitat ☐ Damage to Old-growth forest ☐ Permanent loss of important biodiversity — Category A Triggers ☐ Works in densely populated district e.g. urban zone, village, town or ☐ Establishment of a new quarry or placement of new asphalt plant ☐ Slope stabilization works > 50m ☐ Replacement of more than 5 irrigation canals ☐ Bridge replacement, river bed training >30m or more than 2 in-water pier reinforcement ☐ Resettlement of >= 50 vulnerable people, >= 100 ethnic minority people, or >= 200 unclassified ☐ Temporary bypass at maintenance site > 50 m, road closure of more than 24 hours ☐ Continuous pavement works > 15 km — Category B Triggers ☐ Other specific impact: ☑ Check Table 8, IEE Annex C to confirm Category	C	EMP Contract Clauses

The environmental section of the SubIDForm as shown above was designed to display the environmental classification as well as the follow up actions required. For example, the next step for subproject G108 is shown above since the Category C, would be suggest the use of the general EMP and contract clauses. Each subproject must have a completed subIDForm.

[13] This form is very similar to ADB's environmental screening checklist only streamlined, give these subprojects' low level of impact.

ANNEX 2
Sample Environmental Management Plan

Note: This Environmental Management Plan (prepared by the EARF author) provides an example of how complete EMPs should be prepared. Mitigation and monitoring measures are shown as two tables which are cross referenced numerically. These two tables can be collapsed into a monitoring checklist (Annex 3).

The EMP provided is at a high level of detail, and for each road maintenance work receiving a category B designation; the EMP will be prepared to a level of detail related to the scale of the impacts identified. Therefore, for a simple IEE it might be only 2 pages long. The important EMP features are cross referencing between mitigation and monitoring and a description of specific actions, location and responsibility.

Each new road will be subject to the environmental screening using the subIDForm provided in Annex 1; and then the work proposed will be checked against the maintenance work categorization table (Table). If these two screening activities results in a B category, a detailed EMP will be prepared, with a focus on the most relevant mitigation measures.

The EMP presented here will be used as a template and based on impacts identified, will be tailored to fit the project. YHAB does not anticipate completing one assessment for a set of roads as was the case with Phase I, but rather screening each project and then completing an IEE. The Phase I roads were assessed as one project because of significant time restrictions and the need to implement the work quickly. For future phases there will be more lead time before contracting takes place.

Annex 2.1 Sample Environmental Management Plan (EMP): Mitigation Measures Table

Environmental Issue	Mitigation Measures	Applicable Subproject	Location[2]	Time Frame	Responsibility	
					Implementation	Supervision
1. PRECONSTRUCTION PERIOD						
1.1 The lack of environmental .technical capacity within YHAB and its General and Maintenance Sections in implementation and reporting on EMP work leads to the collapse of the environmental safeguards tasks defined in the IEEs and ADB Guidelines	1.1 YHAB will organize, outfit and establish a staffed Environmental Safeguards Unit within YSRI. The ESSU will be staffed by 2 people, full time. As part of this PPTA, ADB will provide funds for an international and national environmental specialist to develop and deliver a 5-day environmental assessment and management training workshop for government staff and a 2-day workshop for contractors,		Headquarters of the 6 General Sections involved	The ESSU and 5-day training for government officials to be completed prior to the completion of bidding- The 2-day seminar for contractors to be completed as soon as the contractors have been selected		
1.2 No provision for translation of IEE and related documents for use by General and Maintenance Sections, and for use in Bid documents (at least the EMP)	1.2 YHAB will provide the successful contractor with the translated IEE , including the EMP, with instructions on how the mitigation measures and monitoring are to be undertaken, making provision for assistance to the contractor in preparing the Construction Environmental Work Plan (CEWP). Secondly, the Engineer from the General Section will provide the Maintenance		Not applicable As part of 1.1 Workshop will be held in General Sections	Translate during detailed design stage and provide instructions prior to contractor field mobilization. To be determined		

	Section site engineer with the IEE EMP and any supporting reports for use in their inspection process. Given the uncertainty of inspection qualifications , the workshops as defined above will be held at the 6 General Section offices					
1.3 Bid documents prepared without access to or use of the IEE and particularly this EMP	1.3 No bid documents will be prepared without the authors have read and having a copy of the mitigation and monitoring plans found in the IEE. These tables plus sample environmental clauses together help formulate the safeguard clauses to include in the contract specifications.		NA	Before the bid documents for Section 3 and 6 contracts are completed		
1.4 Failure of designers to include design measures that will prevent later impacts such as poor traffic management and excessive tree removal	1.4 During detailed design the YHAB will incorporate mitigation measures defined in the IEE as follows:: **1.** minimizing the removal of mature trees from roadsides during widening operations; **2.** planning for optimum traffic management during construction operations **3.** provision of step-by-step guidance on environmentally acceptable bridge and culvert replacement methods		1. At any locations where mature trees will be cut down 2. At all sites along an existing road 3. N A	1. Interviews with local people and shepherds 2. Initially at preconstruction planning and then prior to work starting in a treed stretch. 3.Continuous 4.Early in the construction period before any bridge building tasks place		
1.5 Announcement of subproject with road signs	1.5 Four weeks before work begins announce the project on roadside sign(s), at a location(s) easily accessible by the public. Signs should be presented in a language that can be understood by affected people, in Yunnan, there may be a need to provide signs in multiple languages. At the same time, provide information on the construction activity via the Maintenance Section		All Subprojects	At both ends (boundaries) of the project	3-4 weeks before the start of work	Maintenance Section
2. CONSTRUCTION PERIOD						
2.1 Environmental Documentation not in hand						
2.1.1 Contractor fails to retain a environmental specialist to prepare the CEWP and to implement all mitigation and monitoring measures, leading to a failure to implement the EMP	2.1.1 , Contractor will be required to retain an environmental expert with environmental assessment experience to prepare the CEWP and obtain all relevant permits. The contractor will not be permitted to mobilize the workers without an approved CEWP and the appropriate permits in place.		NA	Prior to the start of the construction work.		
2.2 Soils, Earthworks & Erosion						
2.2.1 Improper management of earthworks transport and Storage procedures, including cleaning; leading to dust and air pollution	2.2.1 Large volumes of quarry rock, aggregate and sand will be transported and stored in the work site. These operations and storage areas will be constantly exposed to the elements and will create primarily dust during the frequent windy conditions. Dust will be managed by daily use of watering trucks.		Anywhere where there is material moved, earthworks cutting and filling	Throughout the construction period		

	All topsoil needs to be collected and reused to rehabilitate/revegetate the areas disturbed.					
2.2.2 Inadequate erosion control and slope stabilization leading to land slip and chronic erosion at cuts and water crossings.	2.2.2 Contractor will be required to know the subsoil materials that are being cut into and excavated and have ready appropriate plans to stop land slippage and erosion,. At water crossings where structures are to be upgraded, careful replacement and use of gabions with culverts and bioengineering methods for rapid revegetation and slope stabilization will be used. Bioengineering approaches to be explored		Based in a analysis of soils conditions by contractor and consultation with the General Sections hydrology expertise	Throughout the construction period		
2.2.3 Slope slippage and landslide zones, due to previous errors, left unaddressed	2.2.3 In any road sections were maintenance takes place and where there is a history of landslides, slope slippage, the contractor will be required to report any such conditions (if not already known) to the Maintenance Section and propose a costed remedial action, then undertake this work to stabilize the road and reduce risk of failure; including bioengineering solutions, metal netting and other proven methods.		Roadsides	Prior to the start of maintenance work in that road section		
2.2.4 Risk of erosion, landslide and destruction of landscape from side borrow operations	2.2.4 Any need for borrow material outside of the RoW will be subject to local environmental approvals and procedures and should also be carried out in consultation with ADB. Mitigation measures will consider bioengineering approaches		Along any stretches where road will be raised and fill is needed, particularly in areas with long visual distances	Throughout the construction period		
2.2.5 Side casting of waste by Contractor degrading down-slope area and blocking/ contaminating water body	2.2.5 Side casting of waste earthen materials is not permitted where slope is more than 5% and a side cast waste materials cannot be easily stabilized and prevented from eroding during a rain event, or extend outside the road RoW.		On all Project Roads	Throughout construction		
2.2.6 Use of unlicensed aggregate and quarry operations	2.2.6 The contractors must obtain materials from a legally licensed quarry and must avoid getting materials from important natural resource areas such as protected forests and river beds, etc		All subprojects	Throughout the construction period		
2.2.7 Inappropriate disposal of spoils from construction work leading to contamination	2.2.7 Contractors will be required to a) attempt to recycle all clean spoils material where possible and b) consider composting or b) dispose of all other material at sites approved by the local EPB.		All work sites, construction maintenance yards and any other areas operated by the contractor and involved in the project	Throughout construction period		
2.3 Poor Contractor Operating Procedures						
2.3.1 Failure to adhere to construction related good housekeeping practices, including solid and sanitary waste	2,3,1 Contractors will adhere to standard good housekeeping practices as defined in the contract Terms & Conditions and Contract Specifications. Special considerations will be given to **1.** management of construction waste and water		All work camps, construction maintenance yards and any other areas operated by the contractor and involved in the project	During the construction period		

management	**2.** equipment lubricants and fuel, including management and collection of waste oils and fuel particularly related to refuelling depots, maintenance areas and diesel generator sets **3.** Sewage will require latrines or chemical toilets with complete clean up after the construction is complete. **4.** Garbage will be collected and properly disposed of after recycling and sorting, This work will be completed in accordance with PRC, regulations and standards which the contractor will be expected to know. Also, the contractor shall orient all construction workers in basic sanitation and health care issues, and on the specific hazards of their work and will need to certify to that effect at the start of the construction period. **5.** Once the site is no longer needed the contractor must fully decommission it, with special emphasis on waste removal and clean up of any spills or hazardous materials plus any necessary revegetation.					
2.3.2 Management of bitumen storage, asphalt, sealcoat and concrete production facilities to avoid leakage, dust and air pollution for community in vicinity	2.3.2 YHAB has indicated that no new facilities will be needed, but for smaller jobs bitumen will be stored at the worksites. Under these conditions, the contractor will be required to provide secure locations for storage, handing and safe disposal of any worksite bitumen supplies. Adherence to PRC's hazardous materials handling regulations (as defined in IEE) will be adhered to .		At bitumen storage area, particularly at mobile asphalt plants where bitumen is loaded into boiler and heated for mixing	Throughout the construction period		
2.3.3 Management of petroleum products such as fuel, lubricants and bitumen to avoid spill and contamination.	2.3.3 Contractor will be required to have the following spill prevention measures in place at all work sites: **1.** all fuelling to be done on a concrete surface provided with spill catch tank that can be cleaned and all spilled fuel recovered and recycled based on discussions with fuel supplier. **2.** All repair and maintenance work must either be done on a concrete surface with oil spill catch basin or oil catch pans must be provided at all service areas and training provided to all 'mechanics'. **3.** All fuel use areas where spills and leakage is possible, e.g. the generator, must have drip basins installed to prevent any leakage. These recovered materials must be recycled. **4.** A fuelling areas must be equipped with proper fuel nozzles **5.** All fuel tanks must have means for containment of accidental spills. **6.** All bitumen handling, including for asphalt crack seal, must not		At any work camps, maintenance yards and any other areas that the contractor uses or subcontractor use during the construction period	Throughout the construction period		

	permit any material from leaking to the ground, including transfer areas and any areas where bitumen is transported in drums. **7.** Bitumen drums must be stored in a dry covered secure place where no leakage to water or ground is possible. Drums must be recycled at least 1X/yr. **8.** Any spills must be cleaned up according to PRC regulations and standards within 24 hours of the occurrence, with contaminated soils and water treated according to PRC regulations and standards.					
2.3.4 Overloading of construction vehicles leading to damage to existing roads	2.3.4 Contractor to provide waybills—or record book entries of materials hauled as required by Maintenance Section and/or ESSU inspector(s)		All materials haul roads	At all times		
2.3.5 No or inadequate consideration for recycling and reuse of construction 'wastes' by the contractor	2.3.5 The contractor will need to demonstrate that an attempt has been made to reuse, recycle, convert by composting construction wastes such as asphalt, wooden materials, plant materials and other benign organic matter		At construction sites were spoils exist	Throughout construction		
2.4 Surface Water, Drainage and Water Pollution						
2.4.1 Modification of surface drainage during culvert and bridge replacement and raising of horizontal road alignment without repair and rehabilitation after construction is finished	2.4.1 When modifying or interfering with surface drainage of any sort the contract will have to undertake the following: **1.** All culverts must be sized at or larger than the one being replaced and with care about slope and erosion protection at inflow and outflow. All construction materials in the channel must be removed so as not to provide any obstruction. Culvert removal and replacement will be done when there are low flows or no water in the channel and during the dry months of the year. **2.** Bridges will be repaired and widened and as such there will be machinery at least at the water edge. Maximum care is needed to avoid degradation of the river, stream shore and to undertake excessive excavation at the shore and in the water (at least not when there is water in the stream). Demolition must be done in a way that prevents large chunks of material from falling into the river. Stabilization of disturbed crossing banks must take place as part of the construction work and include filter fabric , gabions and preferably bioengineering techniques.		1. At all existing culvert sites and where new culverts are specified in the design drawings 2. At all bridges which will need widening and repair 3. Along any road sections where vertical alignments are to be raise via the addition of fill material.	Throughout the construction period		

	3. Where horizontal alignments are raised to reduce flooding, extra care is needed to be sure that all drainage channels convey water properly. To achieve this, the contractor must undertake a surface drainage inventory of the future raised road sections and map out where existing and needed new culverts are to go. There may be cases where old culverts need to be relocated. **4.** When modifying the existing drainage system through culvert replacement, the contractor must minimize flood risk by carefully confirming that all works to be undertaken will not flood roadside properties due to improper design or construction practices. The contractor will be required to fully rehabilitate property damaged due to flooding.					
2.4.2 Management of contaminated construction wastewater	2.4.2 Where drainage from a construction site involves more than 20 lineal meters of roadway, a drainage channel into a grassed area of some detention area allowing an suspended sediment and minor contaminants to settle, must be prepared by the contractor(s)		All construction sites where silt runoff is possible	Throughout the construction period		
2.4.3 Fuel storage for generators powering the asphalt plant, aggregate preparation plant, and for vehicles and avoidance of leakage of hazardous materials into surface and groundwater.	2.4.3 All fuel storage sites must be checked daily for leaks and held in an impervious site where spilled/leaking material can be collected.		All Storage and handling sites	Daily check		
2.5 Air and Noise Pollution						
2.5.1 Excessive construction-period air pollution	2.5.1 Emissions will be kept to a minimum by: **1.** ensuring that the contractor's fleet of vehicles are properly maintained according to manufacturer's specifications; and **2.** use acceptable fuel and haul loads within specified limits. **3.** Vehicle idling time limits to no more than 2 minutes and **4.** equipment maintenance specifications will be imposed through construction inspection and regular reporting, **5.** Dust control at the construction site will be particularly stringently controlled by watering, setting strict speed limits of no more than 30kph in or near settled areas, and sweeping of paved haul roads. **6.** Equipment such as the diesel generator will be included in the emission control program and		Anywhere at construction sites where vehicles of the contractor or under the contractors control (including paying for services), such as subcontracted trucks hauling materials	Throughout the construction period		

	will be and regularly tuned to prevent excessive TPM pollution.					
2.5.2 Dust and Noise from Road Milling Machine	2.5.2 Due to respirable silica dust from cutter heads, contractor needs to have water spray nozzles on milling machine a) directed at the point of cutting and the drum, one nozzle every 30-40 cm and b) nozzles along the conveyor on both sides every ½ meter. Avg. water flow should be around 24L/min. Alternative is to provide dust masks to all operators and workers supporting the milling operation		At any site where asphalt milling to take place	Prior to start of any milling work		
2.5.3 Managing dust, noise and drainage associated with earthworks and haul roads.	2.5.3 Mitigation will involve **1.** enforcing a speed limit of 30 kph within 500m of any village and the use of chemical dust suppressants at least on road for 500m on either side of a village, Same approach is to be taken if the other site is used. **2.** restricting operating hours through roadside villages and settlements to between hours of 0800 and 1800.		1. All access roads and haul routes for materials movement, particularly through settlement areas, villages and towns 2. Define restricted locations as anywhere within a 1 km distance of a settlement area, with a preference for sites downwind of settlements.	Throughout the construction period		
2.5.4 Air pollution	2.5.4 TPM, NO2 and SO2 will be monitored once a month. Two samples will be taken (one during the morning traffic peak, and one when construction has stopped for the day) at each of six stations along the road.	G320a, X214, S211 and S 321	Two samples will be taken (one during the morning traffic peak, and one when construction has stopped for the day) at each of six stations along the road.	Monthly cycle for 4 subproject roads	Contractor or retained specialist consultant	ESSU/YHAB
2.5.5 Excessive Noise	2.5.5 At the same locations and times that air quality is tested, noise measurements will be completed, but with site variations focused on sensitive receptors such as schools, residential areas and health care facilities. Measurement frequency will be the same as for air quality	G320a, X214, S211 and S 321	Two samples will be taken (one during the morning traffic peak, and one when construction has stopped for the day) at each of six stations along the road.	Monthly cycle for 4 subproject roads	Contractor or retained specialist consultant	ESSU/YHAB
2.6 Flora and Fauna						
2.6.1 Protection of roadside trees and shelter belt planting along roadsides	2.6.1 For each section of the road, contractors are required to develop a sketch map of the location number and species of trees along the roadside that are located within the area likely to be cleared. In areas where there are large trees creating a treed/shaded corridor, designers will be contacted and alternative designs, such as narrowing the carriageway and transforming this area into a roadside rest area should be discussed and an option found that requires the minimum tree loss. Any tree removed		Along any section of the road were trees are encroaching into the area to be cleared for widening	Along any section of the road were trees are encroaching into the area to be cleared for widening		

	will be replaced by replanting several (>2) young trees of the same species.					
2.6.2 Selection of landscape species and management of plantings	2.6.2 Specify native species of local provenance that are appropriate for the local setting for any new areas of landscaping. Ensure that any invasive species cleared during landscape works are managed in accordance with PRC regulations and standards. Consider opportunities for establishing composting facilities at General Maintenance Sections, to enable recycling of green waste.		Along any section of the road where trees and other vegetated roadside habitat could be disturbed as part of clearance for widening	At any site where landscape management takes place.		
2.7 Cultural Sites and Local Communities						
2.7.1 Loss of Cultural/Arch. Heritage, including cemeteries and roadside graves	2.7.1 Since all the work is within existing RoWs and in previously disturbed soil, the risk of loss of historical or cultural relics is highly unlikely. However when widening roads in villages and towns, contractors will have to meet with local mayor to consult about any possible past relics or foundations of old buildings along the road. Contractor will also need to consult the database on archaeological sites in Yunnan, retained with the Prov. Cultural Relics Department as well as the County Cultural Relics Bureau. Any finds during works must be reported to the Maintenance Section Head and all construction work stopped until authorities have inspected the site.		At any suspected heritage site (particularly in minority people territory). Particularly, within 200m of any town or village along a project road.	During the construction period and ahead of excavation at any such site Prior to earth moving in these areas		
2.7.2: Loss of Access For Roadside Residents	2.7.2 The Contractor shall provide safe and convenient passage for vehicles and pedestrians to and from side roads and property accesses connecting the project road/area. Work that affects the use of side roads and existing accesses shall not be undertaken without provision of adequate alternate routes; to the prior satisfaction of the Engineer. The works shall not interfere unnecessarily with access to, and use of public roads and any other access footpaths to or from properties whether public or private.		Along any project roads—where residences, businesses, etc. lead directly onto road where maintenance is taking place	Prior to the start of any work		
2.7.3 Inadequate traffic diversions and access road dust management	2.7.3 Temporary bypasses will be constructed with the approval of the Engineer. The temporary traffic detours shall be kept free of dust by frequent sweeping or application of water.		As defined by the YHAB representative on the job	Implemented at start of any work where traffic diversion or access reduction is expected		
2.7.4 Spread of Vector-Born Diseases	2.7.4 Contractors will be required to conduct rigorous inspections of the work sites to be sure that there are no stagnant waters. This will include removal of all old tires with water in them, drums containing stagnant water and filling in of any ponded areas created as part of the construction presence and where water can stagnate. These are all breeding grounds for malaria, encephalitis and dengue fever mosquitoes		All construction sites, particularly these were excavation has taken place .	Within 5 days of any rain event capable of leaving ponded water-Throughout the construction period.		
2.7.5 Inadequate	2.7.5 In order to protect the safety of communities on the construction zone contractors will need to provide appropriate		All construction sites involving a larger work area	Prior to start of a construction		

community safety	traffic management, lighting, management of excavations, making communities aware of any particular hazards.		and period of more than or equal to 7 days	activity		
2.7.6 Hiring locally	2.7.6 Contractors will be encouraged to hire at least unskilled labour locally		For all work contracts	Immediately after contractor mobilization	Contractor	YHAB
2.7.7 Work outside the RoW	2.7.7 Construction activities may, in rare instances, be necessary outside the RoW. Where this becomes necessary, the use of land outside the RoW must be planned and agreed with owners of the affected land and properties prior to the start of the construction		Communities and/or owners affected	At least 2 weeks prior to start of work	Contractor	ESSU
2.8 Occupational Health And Safety						
2.8.1 Protecting the workforce and maintaining a safe working environment	2.8.1 a) Contractor must provide vests, hard hats and protective footwear for all workers handling heavy materials, and working with caustic and hazardous materials such as concrete and asphalt, on bridges, pesticides for verge management etc. b) Contractor must provide protective masks to milling machine operators, and anyone working in the area of the milling machine dust- with masks of a micron size, capable of capturing dust down to 2 microns. c) The contractor must take the time to show how protective equipment is used, when it must be worn and that penalties including lost work days on site could result if such equipment is not used		All work sites at all times	a)-b) At start of construction and work and available throughout the construction period. c) at the start of a contract where workers will be involved with heavy equipment and in active traffic areas		
2.8.2 Lack of medical assistance facility on site	2.8.2 Contractor must have first aid services available to all staff and workers at all times; Contractor must have at least one emergency treatment specialist on call at all times and available for emergency treatment as required.		All construction sites	All the time		
2.8.3 Storage, handing and use of toxic and/or hazardous materials	2.8.3 Handling of all caustic and petroleum based materials must be done, wearing protective footwear and clothing as well as protection against fugitive dust. Application on steep slopes avoided. Storage of such materials must be protected from the weather and safe from potential tampering and theft. . Transport of such materials will be made according to PRC regulations and standards including pre-notification of shipment to local EPB		For all construction operations	At any time during the construction period		
2.8.4 No Provision of sanitary toilet facilities at all times	2.8.4 Contractor must provide sanitary toilet for all full-time workers on the construction site and make sure it is serviced daily Contractor must provide sanitary and private, shower/washing areas for all work camp staff		All work sites operated by contractor and without existing facilities	At all times during the construction period		
2.8.5 improper control of movement of large equipment and handling of	2.8.5 Large vehicle safety equipment such as reverse alarms, the provision of assistants when vary large equipment is moved on the construction site , , including markings and		The entire construction operation	At all times throughout the construction period		

construction items	traffic cones.					
2.8.6 Child Labour	2.8.6 No Children (less than 14 year of age) can work on any contract		Everywhere the contractor is involved	At all times		
2.8.7 Records of Safety and Health	2.8.7 The Contractor shall maintain such records and make such reports concerning safety, health, and welfare of persons and damage to property available for inspection as the Engineer may from time to time prescribe		Everywhere the contractor is involved	At all times		
2.8.8 Reporting of Accidents	2.8.8 The Contractor shall report to the Engineer details of any accident as soon as possible after its occurrence. In the case of any fatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means		For all work sites	Weekly		
2.8.9; Provision of Potable Water	2.8.9 The contractor shall provide potable water to all staff working on the worksite and at all times		All construction sites	All the time		
2..8.10 Working into the night and disturbing communities	2.8.10 Generally contractors will be restricted to work only during the daylight hours. However consultation and agreement with local communities will allow for modifications. Contractor consultation with subproject corridor communities will be important		All construction sites within 500 m of a community or sensitive facility such as hospital or school	All the time	Contractor	ESSU/YHAB
3. OPERATING PERIOD						
3.1 Increased risk of pedestrian accidents due to improved roads, faster speeds and greater traffic volume	3.1 To manage these problems the operator will enforce speed limits through increased 'radar' surveillance, better and more frequent signage and increased speeding fines. In villages at crossing the owner will improve the signage and include amber lights were possible.		In every village and town where the road will be upgraded	Planned during the detailed design stage and installed during the construction period then completed at the start of operations		
3.2 Diverted traffic damaging roads and endangering communities	3.2 A number of the subprojects parallel toll road and it has been observed that under these conditions, improvements to non-tolled roads results in truck traffic shifting to avoid tolls. To prevent that YHAB will install height barriers at both entrances to the affected roads		Where the road parallels expressways	Immediately before the improved roadway becomes operational	General Section and ESSU	YHAB
3.3 Social and community-based enhancements in support of positive impacts	3.3 In support of positive impacts of reduced travel time and safer conditions due to installation of improvements, two enhancements will be considered by YHAB. These will be providing support to any private transport entity wanting to restore road transport services along subproject roads and secondly		Communities where enhancements are to be provided as decided by YHAB	Within 6 months of improved road being operational and continuing for 1 year	General Section and ESSU	YHAB

Annex 2.2 Sample Environmental Management Plan: Environment Monitoring Measures Table

Environmental Issue	Monitoring Details	Applicable Subproject	Timing	Executing Unit	Reporting Responsibility
1. PRE-CONSTRUCTION (DESIGN) PERIOD-					
1.1 The lack of environmental technical capacity within General and Maintenance Sections in implementation and reporting on EMP work leading to the collapse of the environmental safeguards tasks defined in the IEEs and ADB Guidelines	1.1 Collect written material indicating that YHAB has provided instructions for the contractors to use to better use the IEE output Confirm that EMU is operational training session was delivered by reviewing trainee evaluations completed by participants		At least 1 month before construction begins Within the 1st month construction begins.		
1.2 No provision for translation of IEE and related documents for use by General and Maintenance Sections, and for use in Bid documents (at least the EMP)	1.2 Confirm that Chinese version of IEEs and EMPs are with the General and Maintenance Sections of YHAB Confirm that bid documents contain environmental clauses tailored to the project conditions as well as a general set		Before bidding begins		
1.3 Bid documents prepared without access to or use of the IEE and particularly this EMP	1.3 Confirm that design and bid documentation reflect IEE and EMP recommendations reflected in the design and bid documentation.		After IEE has been completed and bid documents are under preparation		
1.4 Failure of designers to include design measures that will prevent later impacts such as poor traffic management and excessive tree removal	1.4 Monitor to verify that best practices and environmentally acceptable design elements including engineering methods are used in the engineering design documentation.		1 month before the end of the 'design' period.		
1.5 Announcement of subproject with road signs	1.5 Four weeks before work begins announce the project on roadside sign(s), at a location(s) easily accessible by the public. Signs should be presented in a language that can be understood by affected people, in Yunnan, there may be a need to provide signs in multiple languages. At the same time, provide information on the construction activity via the Maintenance Section		At both ends (boundaries) of the project		
2. CONSTRUCTION PERIOD					
2.1 Environmental Documentation not in hand					
2.1.1 Contractor fails to retain a environmental specialist to prepare the CEWP and to implement all mitigation and monitoring measures, leading to a failure to implement the EMP	2.1.1 Meet with contractor's environmental expertise and discuss all issues and to confirm experts period on the job throughout the construction period.		Within 1st month of contractor's work on the job		
2.2 Soils, Earthworks & Erosion					
2.2.1 Improper management of earthworks transport and Storage procedures, including cleaning; leading to	**2.2.1** Undertake, as part of the construction inspection, regular confirmation that earthworks are handled in an environmentally acceptable manner and dust control is undertaken at all time,		As part of the regular engineering inspection schedule—a short		

dust and air pollution	including the use of tarpaulins by trucks hauling fine materials, as well as watering and use of chemical suppressants along the haul road sections for 1 km at villages, and that a speed limit of 30kph is enforced.		confirmation statement will be provided		
2.2.2 Inadequate erosion control and slope stabilization leading to land slip and chronic erosion at cuts and water crossings.	**2.2.2** Undertake regular inspection to confirm that slope stabilization and standard erosion protection method are being used by the contractor for all work where there is clearing of topsoil, cutting and filling		Inspect all roads where slope instability is a problem and where such work is being undertaken		
2.2.3 Slope slippage and landslide zones, due to previous errors, left unaddressed	**2.2.3** Identify landslide, unstable slope areas and inspect on rehabilitation and stabilization		Same as above		
2.2.4 Side borrow operations leading to erosion, landslide and destruction of landscape	2.2.4 Undertake inspections to determine the type of borrow operations the contractor is applying and ensure that roadside borrowing is not taking place and is always out of the visual field from the road.		Early during construction		
2.2.5 Side casting of waste by Contractor degrading down-slope area and blocking/ contaminating water body	**2.2.5** Contractor report on waste materials management and location of any side casting reviewed and inspection completed. If excessive side casting clean up required. An inspection report, including photos must be filed.		Collect reports from contractor at least 1X/month		
2.2.6 Inadequate handling contaminated construction waste materials	2.2.6 Examine contractor's reports on the management of contaminated construction materials; follow up by a discussion with local citizens in areas where such issues are likely.		Confirm when 505c remains to be done,, via contractor statements, that handling of waste materials is compliant		
2,2.7 Inappropriate disposal of spoils from construction work leading to contamination	2.2.7 Contractor prepares a statement indicating disposal method and location for cleared materials.		Within the first week of start of construction where spoils are generated		
2.3 Poor Contractor Operating Procedures					
2.3.1 Failure to adhere to construction related good housekeeping practices, including solid and sanitary waste management	**2.3.1.** Using a monitoring checklist, confirm that the items as listed in the EMP; Mitigation Measures Table Item 2.1.3 [1-5] are fully implemented.		Complete inspection after start of work and when 75% complete and submit checklist to General Section		
2.3.2 Failure of contractor to manage bitumen/asphalt and concrete production facilities leading to leakage, dust and air pollution for community in vicinity	**2.3.2** Confirm that sighting specification for both asphalt and concrete plants are according to PRC's Regulation and Specifications, but also that are at least as far away from settlement areas as defined in the mitigation table. Bitumen storage and handling is done without spillage		Before plant is sighted but when plans have been formulated		
2.3.3 Failure to contractor to properly manage petroleum products such as fuel, lubricants and bitumen, leading to spill and contamination.	2.3.3 Using the monitoring checklist, the 8 specific spill and contamination prevention measures listed in item 2.3.3 of the Mitigation Table will be assessed and reported on. Any non-compliance will be rectified immediately.		Inspect after start of work and 75% complete assignment		
2.3.4 Overloading of construction vehicles leading to damage to existing roads	2,3,4 Contractor to provide waybills—or record book entries of materials hauled as required by Maintenance Section and/or ESSU inspector(s)		With each construction inspection cycle		

2.3.5 No or inadequate consideration for recycling and reuse of construction 'wastes' by the contractor	2.3.5 The contractor will need to demonstrate that an attempt has been made to reuse, recycle, convert by composting construction wastes such as asphalt, wooden materials, plant materials and other benign organic matter		Inspect as part of regular construction inspection or every three months, whichever comes first		
2.3.6 Work Duration	2.3.6 General or Maintenance section to discuss work duration with selected contractor and urge rapid completion—then track progress based on inspection reports		At start and midway through agreed to timetable	Contractor	General or Maintenance Section
2.4 Surface Water, Drainage and Water Pollution					
2.4.1 Modification of surface drainage during culvert and bridge replacement and raising of horizontal road alignment without repair and rehabilitation after construction is finished	2.4.1 The Construction inspector(s) will inspect and verify that adequate drainage works and protection have been provided: specifically that the four mitigation measures defined in 2.4.1 of the Mitigation Table are fully implemented in a timely manner. Clearing of all culverts, confirming that they have not been blocked with construction materials will be completed		Complete as part of the regular construction inspection schedule		
2.4.2 Contaminated construction site drainage water discharging into water course or contaminating local water supplies	2.4.2 Inspect large construction sites to verify drainage water management scheme		Once the construction site is fully operational		
2.4.3 Bitumen storage and fuel storage for asphalt plant power leakage into surface drainage and groundwater	2.4.3 Request inspection reports from contractor and undertaken spot audits of the asphalt plants and fuel storage sites for any work lasting more than 2 months and requiring on a mobile asphalt plant.		Inspect the plant, 1 month after operations begin, and at the end of the job		
2.5 Air and Noise Pollution					
2.5.1 Excessive construction-period air pollution	2.5.1 Using a monitoring checklist confirm that the six mitigation actions defined in 2.5.1 of the Mitigation Table are being implemented		Complete half way through the specific maintenance activity		
2.5.2 Dust and Noise from Road Milling Machine	2.5.2 Inspect milling machine operations and check for dust suppression and operator masks-		Inspect the milling machine operation1X/week		
2.5.3 Managing dust, noise and drainage associated with earthworks and haul roads.	2.5.3 Obtain written confirmation from contractor that the mitigation measures defined are being implemented Confirm operating period restriction , but consider any agreements made with communities		AS part of regular inspection reporting by contractor	ESSU and Contractor	YHAB
2.5.4 **Air pollution**	2.5.4 TPM, NO2 and SO2 will be monitored once a month. Two samples will be taken (one during the morning traffic peak, and one when construction has stopped for the day) at each of six stations along the road.	G320a, X214, S211 and S 321	Two samples will be taken (one during the morning traffic peak, and one when construction has stopped for the day) at each of six stations along the road.	Monthly cycle for 4 subproject roads	Contractor or retained specialist consultant
2.5.5 Excessive Noise	2.5.5 Review noise data provided by contractor and confirm validity		At end of each noise measurement cycle	ESSU and Contractor	YHAB
2.6 Flora and Fauna					
2.6.1 **C**ontractor undertakes an excessive and unnecessary roadside natural vegetation cover	2.6.1 Inspection of cutting plan and confirmation of consultation with local Forestry Dept., then review and record re-planting/revegetation efforts.		1X after the trees have been replanted		

removal, wetland draining or filling, or tree removal program damaging roadside habitats , the old trees and shelter belt plantings along roadsides	Inspection that any other habitats, such as wetlands, undisturbed roadside vegetated habitats are not being disrupted by the work.				
2.6.2 Selection of landscape species and management of plantings	Review landscape specifications proposed for subprojects. Review at which General Maintenance Sections composting facilities can be established.		During design and planning	Contractor ESSU & General and Maintenance Section staff	ESSU/YHAB
2.7 Cultural Sites and Local Communities					
2.7.1 Loss of Cultural/Arch. Heritage, including cemeteries and roadside graves	2.7.1 Confirm that all roadside cultural and historical sites have been identified and all proper procedures according to PRC regulations have been adhered to.		Obtain confirmation documentation from contractor		
2.7.2: Loss of Access For Roadside Residents	2.7.2 Confirm that contractor(s) has reestablished existing road access for roadside residents impacted.		1time after work complete, but before final payment to contractor		
2.7.3 Inadequate traffic diversions and access road dust management	2.7.3 Inspect traffic management at diversion sites and time delays and record diversion staff functions		2X during the conduct of the work		
2.7.4 Spread of Vector-Born Diseases	2.7.4 Inspect all construction sites were earth removal can lead to ponding, particularly during the wet season and were construction materials are stored in the open, permitting small ponding—and mosquito hatches—Request immediate clean up and complete a visual inspection for mosquito larvae		Visit project site twice 2-3 days after rain and during the warm season		
2.7.5 Inadequate community safety	2.7.5 In order to protect the safety of communities on the construction zone contractors will need to provide appropriate traffic management, lighting, management of excavations, making communities aware of any particular hazards.		All construction sites		
2.7.6 Hiring locally	2.7.6 Obtain written statistic on number of local hires		All construction sites	ESSU	YHAB
2.7.7 Work outside the RoW	2.7.7 Confirm that consultation and proper steps were taken prior to working outside RoW		Any possible sites where work is to be outside RoW	ESSU	YHAB
2.8 Occupational Health And Safety					
2.8.1 Inadequate safety footwear and protective Clothing provided, plus not adequate training in its use and	2.8.1 Complete a weekly occupational health and safety inspection reporting on all safety matters defined in Items 2.8.-2.8.10—using a simple checklist provided—as this form.		Weekly during the construction period		
2.8.2 Inadequate control of traffic in active work areas	2.8.2 Regular construction inspection to address this compliance item, establishing safe active traffic control at worksites.		Throughout construction at active traffic locations		
2.8.2 Lack of medical assistance facility on site	2.8.2 See above		Weekly during the construction period		
2.8.3 Storage, handing and use of toxic, and/or hazardous materials	2.8.3 inspection of the storage areas and application sites of toxic materials to be undertaken		Weekly during the construction period		
2.8.4 No Provision of sanitary toilet facilities at all times	2.8.4 See above		Weekly during the construction period		
2.8.5 improper control of movement of large equipment and handling of construction items	2.8.5 See above		Weekly during the construction period		
2.8.6	2.8.6		Midway		

Child Labour	Confirm that child labor is not practiced by examining the labour hire records		through the project		
2.8.7 Records of Safety and Health	2.8.7 See above		Weekly during the construction period		
2.8.8 Reporting of Accidents	See above		Weekly during the construction period		
2.8.9; Provision of Potable Water	2.8.9 Confirm that this is provided at all times and is accessible to all workers		Daily		
2..8.10 Working into the night and disturbing communities	2.8.10 Verify that contractor is abiding by working hour restrictions as agreed in contract and with local communities		Periodic inspection	Maintenance Section, reporting by local citizens	ESSU/YHAB
3. OPERATING PERIOD					
3.1 Increased risk of pedestrian accidents due to improved roads, faster speeds and greater traffic volume	3.1 Inspect urban areas where road has been improved, survey re average speed and define what speed management measures have been installed-if needed.		6-8 months after improved road becomes fully operational again		
3.2 Diverted traffic damaging roads and endangering communities	3.2 Confirm construction of the height barriers and report to YHAB		Immediately before the improved roadway becomes operational	General Section	YHAB
3.3 Social and community-bsed enhancements in support of positive impacts	3.3 Conduct the survey as defined in 3.1 and report results in annual operating period report		Wiithin 6 months of improved road being operational and continuing for 1 year	General Section	YHAB

Note: Regarding Cross-referencing of the Mitigation and Monitoring tables.

Each of the mitigation and monitoring measures is given a task number. These are consistent throughout the two matrix tables and should carry over to the costing table. That way all can be easily compared.

The compliance monitoring checklist (Annex 3) has also been fully cross referenced to the mitigation and monitoring tasks defined in the two EMP tables.

The result is a fully transparent and traceable environmental safeguards program.

ANNEX 3
Sample Compliance Monitoring Checklist and Form

Environmental Issue (1.1) etc., refer to mitigation measures defined in EMP	Mitigation Measures Described: Exact Wording from EMP	Location[2] where action required	Time Frame: When is mitigation measure to be implemented	Name of Responsible Unit		Implementation		Monitoring Action Described: Exact Wording from EMP	Implementation		Follow Up Action Needed
				Implementation	Super-vision	Yes/ No	Date: dd/mm/yy	Exact wording from EMP and Numbering found in Mitigation Table	Yes/ No	Date: dd/mm/yy	
1. PRECONSTRUCTION PERIOD											
1.1 The lack of environmental technical capacity within General and Maintenance Sections in implementation and reporting on EMP work leading to the collapse of the environmental safeguards tasks defined in the IEEs and ADB Guidelines	1.1 YHAB will organize, outfit and establish a staffed Environmental Safeguards Unit within YSRI. The ESSU will be staffed by 2 people, one full time and the second about ½ time. As part of this PPTA, ADB will provide funds for an international and national environmental specialist to develop and deliver a 5-day environmental assessment and management training workshop for government staff and a 2-day workshop for contractors,	Headquarters of the 6 GS involved	Prior to the start of construction for Gov. but after the contractor has been named					1.1 Collect written material indicating that YHAB has provided instructions for the contractors to use to better use the IEE output			
1.2 No provision for translation of IEE and related documents for use by General and Maintenance Sections, and for use in Bid documents (at least the EMP)	1.2 YHAB will provide the successful contractor with the translated IEE , including the EMP, with instructions on how the mitigation measures and monitoring are to be undertaken, making provision for assistance to the contractor in preparing the Construction Environmental Work Plan (CEWP). Secondly, the Engineer from the General Section will provide the Maintenance Section site engineer with the IEE EMP and any supporting reports for use in their inspection process. Given the uncertainty of inspection qualifications , the workshops as defined above will be held at the 6 General Section offices	Not applicable As part of 1.1 Workshop will be held in General Sections	Translate during detailed design stage and provide instructions prior to contractor field mobilization. To be determined					1.2 Confirm that Chinese version of IEEs and EMPs are with the General and Maintenance Sections of YHAB Confirm that bid documents contain environmental clauses tailored to the project conditions as well as a general set			

Environmental Issue (1.1) etc., refer to mitigation measures defined in EMP	Mitigation Measures Described: Exact Wording from EMP	Location[2] where action required	Time Frame: When is mitigation measure to be implemented	Name of Responsible Unit		Implementation		Monitoring Action Described: Exact Wording from EMP	Implementation		Follow Up Action Needed
				Implementation	Supervision	Yes/ No	Date: dd/mm/yy	Exact wording from EMP and Numbering found in Mitigation Table	Yes/ No	Date: dd/mm/yy	
1.3 Bid documents prepared without access to or use of the IEE and particularly this EMP	1.3 No bid documents will be prepared without the authors having read and having a copy of the mitigation and monitoring plans found in the IEE. These tables plus sample environmental clauses together help formulate the safeguard clauses to include in the contract specifications.	NA	Before the bid documents for Section 3 and 6 contracts are completed					1.3 Confirm that design and bid documentation reflect IEE and EMP recommendations reflected in the design and bid documentation.			
1.4 Failure of designers to include design measures that will prevent later impacts such as poor traffic management and excessive tree removal	1.4 During detailed design YHAB will incorporate mitigation measures defined in the IEE as follows:: 1. minimizing the removal of mature trees from roadsides during widening operations; 2. planning for optimum traffic management during construction operations 3. provision of step-by-step guidance on environmentally acceptable bridge and culvert replacement methods	1. At any locations where mature trees will be cut down 2. At all sites along an existing road 3. N A	1. Initially at preconstruction planning and then prior to work starting in a treed stretch. 2.Continuous 3.Early in the construction period before any bridge building tasks place					1.4 Monitor to verify that best practices and environmentally acceptable design elements including engineering methods are used in the engineering design documentation.			
1.5 Announcement of subproject with road signs	1.5 Four weeks before work begins announce the project on roadside sign(s), at a location(s) easily accessible by the public. Signs should be presented in a language that can be understood by affected people, in Yunnan, there may be a need to provide signs in multiple languages. At the same time, provide information on the construction activity via the Maintenance Section	All Subprojects and at both ends of the construction area	3-4 weeks before the start of work					1.5 Confirm that signs are up and local residents have been alerted to the work in time for proper planning of alternate transportation means			

Environmental Issue (1.1) etc., refer to mitigation measures defined in EMP	Mitigation Measures Described: Exact Wording from EMP	Location[2] where action required	Time Frame: When is mitigation measure to be implemented	Name of Responsible Unit		Implementation		Monitoring Action Described: Exact Wording from EMP	Implementation		Follow Up Action Needed
				Implementation	Supervision	Yes/ No	Date: dd/mm/yy	Exact wording from EMP and Numbering found in Mitigation Table	Yes/ No	Date: dd/mm/yy	
2. CONSTRUCTION PERIOD											
2.1 Preparation of Environmental Documentation											
2.1.1 Contractor fails to retain an environmental specialist to prepare the CEWP and to implement all mitigation and monitoring measures, leading to a failure to implement the EMP	2.1.1, contractor will be required to retain an environmental expert with environmental assessment experience to prepare the CEWP and obtain all relevant permits. The contractor will not be permitted to mobilize the workers without an approved CEWP and the appropriate permits in place. This is applicable only to projects with IEEs or EIAs	Prior to the start of the construction work.	NA					2.1.1 Meet with contractor's environmental specialists and discuss all issues and to confirm experts period on the job throughout the construction period			
2.2 Soils, Earthworks & Erosion											
2.2.1 Improper management of earthworks transport and Storage procedures, including cleaning; leading to dust and air pollution	2.2.1 Large volumes of quarry rock, aggregate and sand will be transported and stored in the work site. These operations and storage areas will be constantly exposed to the elements and will create primarily dust during the frequent windy conditions. Dust will be managed by daily use of watering trucks. All topsoil needs to be collected and reused to rehabilitate/revegetate the areas disturbed.	Anywhere where there is material moved, earthworks cutting and filling	Throughout the construction period					**2.2.1** Undertake, as part of the construction inspection, regular confirmation that earthworks are handled in an environmentally acceptable manner and dust control is undertaken at all time, including the use of tarpaulins by trucks hauling fine materials, as well as watering and use of chemical suppressants along the haul road sections for 1 km at villages, AND that a speed limit of 30kph is enforced.			
2.2.2 Inadequate erosion	2.2.2 Contractor will be required to know	Based in a analysis of soils	Throughout the construction					**2.2.2** Undertake regular inspection to			

Environmental Issue (1.1) etc., refer to mitigation measures defined in EMP	Mitigation Measures Described: Exact Wording from EMP	Location[2] where action required	Time Frame: When is mitigation measure to be implemented	Name of Responsible Unit		Implementation		Monitoring Action Described: Exact Wording from EMP	Implementation		Follow Up Action Needed
				Implementation	Super-vision	Yes/ No	Date: dd/mm/yy	Exact wording from EMP and Numbering found in Mitigation Table	Yes/ No	Date: dd/mm/yy	
control and slope stabilization leading to land slip and chronic erosion at cuts and water crossings.	the subsoil materials that are being cut into and excavated and have ready appropriate plans to stop land slippage and erosion. At water crossings where structures are to be upgraded, careful replacement and use of gabions with culverts and bioengineering methods for rapid revegetation and slope stabilization will be used. Bioengineering approaches to be explored	conditions by contractor and consultation with the General Sections hydrology expertise	period					confirm that slope stabilization and standard erosion protection method are being used by the contractor for all work where there is clearing of topsoil, cutting and filling			
2.2.3 Slope slippage and landslide zones, due to previous errors, left unaddressed	2.2.3 In any road sections were maintenance takes place and where there is a history of landslides, slope slippage, the contractor will be required to report any such conditions (if not already known) to the Maintenance. Section and propose a costed remedial action, then undertake this work to stabilize the road and reduce risk of failure, including bioengineering solutions, metal netting and other proven methods.	Roadsides	Prior to the start of maintenance work in that road section					**2.2.3** Identify landslide, unstable slope areas and inspect on rehabilitation and stabilization			
2.2.4 Side borrow operations leading to erosion, landslide and destruction of landscape	2.2.4 Any need for borrow material outside of the RoW will be subject to local environmental approvals and procedures and should also be carried out in consultation with ADB. Mitigation measures will consider bioengineering approaches	Along any stretches where road will be raised and fill is needed, particularly in areas with long visual distances	Throughout the construction period					2.2.4 Undertake inspections to determine the type of borrow operations the contractor is applying and ensure that roadside borrowing is not taking place and is always out of the visual field from the road.			
2.2.5 Side casting of waste by Contractor degrading down-slope area and blocking/ contaminating water	2.2.5 Side casting of waste earthen materials is not permitted where slope is more than 5% and a side cast waste materials cannot be easily stabilized and prevented from eroding	On all Project Roads	Throughout construction					**2.2.5** Contractor report on waste materials management and location of any side casting reviewed and inspection completed. If excessive side casting clean up required. An			

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body	during a rain even							inspection report, including photos must be filed.			
2.2.6 Inadequate handling contaminated construction waste materials	2.2.6 Should past landuse of excavation sites suggest contamination and these materials need to be excavated, the contractor must treat these soils as hazardous materials, seek proper disposal permits and get expert advice on how and where to dispose of decontaminate these soils.	Any road shoulders where excavation is planned	Prior to any road shoulder excavation or clearing					**2.2.6** Examine contractors' reports on the management of contaminated construction materials. Follow up by a discussion with local citizens in areas where such issues are likely.			
2,2.7 Inappropriate disposal of spoils from construction work leading to contamination	2.2.7 Contractors will be required to a) attempt to recycle all clean spoils material where possible and b) consider composting or b) dispose of all other material at sites approved by the local EPB.	All project roads	Throughout construction					**2.2.7** Contractor prepares a statement indicating disposal method and location for cleared materials.			
2.3 Poor Contractor Operating Procedures											
2.3.1 Failure to adhere to construction related good housekeeping practices, including solid and sanitary waste management	2.3.1 Contractors will adhere to standard good housekeeping practices as defined in the contract Terms & Conditions and Contract Specifications . Special considerations will be given to 1. management of construction waste and water 2. equipment lubricants and fuel, including management and collection of waste oils and fuel particularly related to refuelling depots, maintenance areas and diesel	All work camps, construction maintenance yards and any other areas operated by the contractor and involved in the project	Throughout the construction period					**2.3.1.** Using a monitoring checklist, confirm that the items as listed in the EMP; Mitigation Measures Table Item 2.1.3 [1-5] are fully implemented.			

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	generator sets 3. Sewage will require latrines or chemical toilets with complete clean up after the construction is complete. 4. Garbage will be collected and properly disposed of after recycling and sorting, This work will be completed in accordance with PRC, regulations and standards which the contractor will be expected to know. Also, the contractor shall orient all construction workers in basic sanitation and health care issues, and on the specific hazards of their work and will need to certify to that effect at the start of the construction period. 5. Once the site is no longer needed the contractor must fully decommission it, with special emphasis on waste removal and clean up of any spills or hazardous materials plus any necessary revegetation.										
2.3.2 Management of bitumen storage, asphalt, sealcoat and concrete production facilities to avoid leakage, dust and air pollution for community in vicinity	2.3.2 YHAB has indicated that no new facilities will be needed, but for smaller jobs bitumen will be stored at the worksites. Under these conditions, the contractor will be required to provide secure locations for storage, handing and safe disposal of any worksite bitumen supplies. Adherence to PRC's hazardous materials handling regulations (as defined in IEE) will be adhered to .	At bitumen storage area, particularly at mobile asphalt plants where bitumen is loaded into boiler and heated for mixing	Throughout the construction period					**2.3.2** Confirm that sighting specification for both asphalt and concrete plants are according to PRC's Regulations. And Specifications, but also that are at least as far away from settlement areas as defined in the mitigation table. Bitumen storage and handling is done without spillage			

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2.3.3 Failure to contractor to properly manage petroleum products such as fuel, lubricants and bitumen, leading to spill and contamination.	2.3.3 Contractor will be required to have the following spill prevention measures in place at all work sites: 1. all fuelling to be done on a concrete surface provided with spill catch tank that can be cleaned and all spilled fuel recovered and recycled based on discussions with fuel supplier. 2. All repair and maintenance work must either be done on a concrete surface with oil spill catch basin or oil catch pans must be provided at all service areas and training provided to all 'mechanics'. 3. All fuel use areas where spills and leakage is possible, e.g. the generator, must have drip basins installed to prevent any leakage. These recovered materials must be recycled. 4. A fuelling areas must be equipped with proper fuel nozzles 5. All fuel tanks must have means for containment of accidental spills. 6. All bitumen (including asphalt crack seal) handling must not permit any material from leaking to the ground, including transfer areas and any areas where bitumen is transported in drums. 7. Bitumen drums must be stored in a dry covered secure place where no leakage to water or ground is possible. Drums must	At any work camps, maintenance yards and any other areas that the contractor uses or subcontractor use during the construction period	Throughout the construction period					2.3.3 Using the monitoring checklist, the 8 specific spill and contamination prevention measures listed in item 2.3.3 of the Mitigation Table will be assessed and reported on. Any non-compliance will be rectified immediately.			

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	be recycled at least 1X/yr. 8. Any spills must be cleaned up according to PRC's Regulations and Standards within 24 hours of the occurrence, with contaminated soils and water treated according to PRC's Regulations and Standards.										
2.3.4 Overloading of construction vehicles leading to damage to existing roads	2.3.4 The tonnage of material hauled must not exceed the road capacity. If the material mobilization causes damage of the road, then contractor must repair it immediately.	All materials haul roads						2.3.4 Contractor to provide waybills—or record book entries of materials hauled as required by Maintenance Section and/or ESSU inspector(s)			
2.3.5 No or inadequate consideration for recycling and reuse of construction 'wastes' by the contractor	2.3.5 The contractor will need to demonstrate that an attempt has been made to reuse, recycle, convert by composting construction wastes such as asphalt, wooden materials, plant materials and other benign organic matter	At construction sites were spoils exist						2.3.5 The contractor will need to demonstrate that an attempt has been made to reuse, recycle, convert by composting construction wastes such as asphalt, wooden materials, plant materials and other benign organic matter			
2.3.6 **Work Duration**	2.3.6 Contractors will be encouraged to complete the work as quickly as possible, consulting with local communities on best timing and agreeing to such a timetable	All construction sites	Throughout construction					2.3.6 General or Maintenance section to discuss work duration with selected contractor and urge rapid completion—then track progress based on inspection reports			
2.4 Surface Water, Drainage and Water Pollution											
2.4.1 Modification of surface drainage during culvert and	2.4.1 When modifying or interfering with surface drainage of any sort the contract will have to undertake the	1. At all	Throughout the construction period					2.4.1 The Construction inspector(s) will inspect and verify that adequate drainage works and protection have been provided:			

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bridge replacement and raising of horizontal road alignment without repair and rehabilitation after construction is finished	following: 1. All culverts must be sized at or larger than the one being replaced and with care about slope and erosion protection at inflow and outflow. All construction materials in the channel must be removed so as not to provide any obstruction. Culvert removal and replacement will be done when there are low flows or no water in the channel and during the dry months of the year. 2. Bridges will be repaired and widened and as such there will be machinery at least at the water edge. Maximum care is needed to avoid degradation of the river, stream shore and to undertake excessive excavation at the shore and in the water (at least not when there is water in the stream). Demolition must be done in a way that prevents large junks of material from falling into the river. Stabilization of disturbed crossing banks must take place as part of the construction work and include filter fabric, gabions and preferably bioengineering techniques. 3. Where horizontal alignments are raised to reduce flooding, extra care is needed to be sure that all drainage channels convey water properly. To achieve this, the contractor must undertake a surface drainage inventory of the future raised road	existing culvert sites and where new culverts are specified in the design drawings 2. At all bridges which will need widening and repair 3. Along any road sections where vertical alignments are to be raise via the addition of fill material. 4. At all locations where culverts and any other						specifically that the three mitigation measures defined in 2.4.1 of the Mitigation Table are fully implemented in a timely manner. Inspection provides written confirmation that all culverts are clear of construction debris.			

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	sections and map out where existing and needed new culverts are to go. There may be cases where old culverts need to be relocated 4. When modifying the existing drainage system through culvert replacement, the contractor must minimize flood risk by carefully confirming that all works will not flood roadside properties due to improper design or construction practices. The contractor will be required to fully rehabilitate property damaged due to flooding.	water conveyance features are temporarily blocked, replaced, moved or otherwise changed									
2.4.2 Contaminated construction site drainage water discharging into water course or contaminating local water supplies	2.4.2 Where drainage from a construction site involves more than 20 lineal meters of roadway, a drainage channel into a grassed area of some detention area allowing an suspended sediment and minor contaminants to settle, must be prepared by the contractor(s)	All construction sites where silt runoff is possible	Throughout the construction period					2.4.2 Inspect large construction sites to verify drainage water management scheme			
2.4.3 Bitumen storage and fuel storage for asphalt plant power leakage into surface drainage and groundwater	2.4.3 All bitumen and fuel storage sites must be checked daily for leaks and held in an impervious site where spilled material can be collected.	All Storage and handling sites	Daily check					2.4.3 Request inspection reports from contractor and undertaken spot audits of the asphalt plants and fuel storage sites for any work lasting more than 2 months and requiring on a mobile asphalt plant.			
2.5 Air and Noise Pollution											
2.5.1 Excessive construction-period	2.5.1 Emissions will be kept to a minimum by:	Anywhere at construction sites where vehicles of the	Throughout the construction period					2.5.1 Using a monitoring checklist confirm that the six mitigation			

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air pollution	1. ensuring that the contractor's fleet of vehicles are properly maintained according to manufacturer's specifications and 2. use acceptable fuel and haul loads within specified limits. 3. Vehicle idling time limits to no more than 2 minutes and 4. equipment maintenance specifications will be imposed through construction inspection and regular reporting, 5. Dust control at the construction site will be particularly stringently controlled by watering, setting strict speed limits of no more than 30kph in or near settled areas, and sweeping of paved haul roads. 6. Equipment such as the diesel generator will be included in the emission control program and will be and regularly tuned to prevent excessive TPM pollution.	contractor or under the contractors control (including paying for services), such as subcontracted trucks hauling materials						actions defined in 2.5.1 of the Mitigation Table are being implemented			
2.5.2 Dust and Noise from road milling machine	2.5.2 Due to respirable silica dust from cutter heads, contractor needs to have water spray nozzles on milling machine a) directed at the point of cutting and the drum, one nozzle every 30-40 cm and b) nozzles along the conveyor on both sides every ½ meter. Avg. water flow should be around 24L/min. Alternative is to	At any site where asphalt milling to take place						2.5.2 Inspect milling machine operations and check for dust suppression and operator masks-			

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	provide dust masks to all operators and workers supporting the milling operation										
2.5.3 Managing dust, and noise associated with earthworks and haul roads.	2..5.3 Mitigation will involve 1. enforcing a speed limit of 30 kph within 500m of any village and the use of chemical dust suppressants at least on road for 500m on either side of a village, Same approach is to be taken if the other site is used. 2. restricting operating hours through roadside villages and settlements to between hours of 0800 and 1800.	1-2. All access roads and haul routes for materials movement, particularly through settlement areas, villages and towns	Throughout the construction period					2.5.3 Obtain written confirmation from contractor that the mitigation measures defined are being implemented Confirm operating period restriction , but consider any agreements made with communities			
2.5.4 Air pollution	2.5.4 TPM, NO2 and SO2 will be monitored once a month. Two samples will be taken (one during the morning traffic peak, and one when construction has stopped for the day) at each of six stations along the road.	Two samples will be taken (one during the morning traffic peak, and one when construction has stopped for the day) at each of six stations along the road.	Monthly cycle for 4 subproject roads					2.5.4 Review noise data provided by contractor and confirm validity			
2.5.5 Excessive Noise	2.5.5 At the same locations and times that air quality is tested, noise measurements will be completed, but with site variations focused on sensitive receptors such as schools, residential areas and health care facilities. Measurement frequency will be the same as for air quality	Two samples will be taken (one during the morning traffic peak, and one when construction has stopped for the day) at each of six stations along the road.	Monthly cycle for 4 subproject roads					2,5,5 Collect dataset for each noise measurement cycle and verify validity			

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2.6 Flora and Fauna											
2.6.1 excessive roadside natural vegetation cover removal, wetland draining or filling, or tree removal program damaging roadside habitats , the old trees and shelter belt plantings along roadsides	For each section of the road, contractors are required to develop a sketch map of the location number and species of trees along the roadside that are located within the area likely to be cleared. In areas where there are large trees creating a treed/shaded corridor, designers will be contacted and alternative designs, such as narrowing the carriageway and transforming this area into a roadside rest area should discussed and an option found that requires the minimum tree loss. Any tree removed will be replaced by replanting several (>2) young trees of the same species. No areas beyond the RoW are to be disturbed. This includes vegetated roadside habitat. wetland areas, providing potential habitat for wildlife	Along any section of the road were trees and other vegetated roadside habitat could be disturbed as part of cleared for widening	Prior to any clearing taking place					2.6.1 Inspection of cutting plan and confirmation of consultation with local Forestry Dept., then review and record re-planting/revegetation efforts. Secondly confirm, via a site visit that any other sensitive habitat has been left undisturbed			
2.6.2 Selection of landscape species and management of new plantings	2.6.2 Specify native species of local provenance that are appropriate for the local setting for any new areas of landscaping. Ensure that any invasive species cleared during landscape works are managed in accordance with PRC regulations and standards. Consider opportunities for establishing composting facilities at General Maintenance Sections, to enable recycling of green waste.	Along all subprojects	Ongoing throughout the construction period					2.6.2 Inspection to confirm that work has remained within RoW and no additional areas is disturbed. If sensitive sites are known, they are marked with tape or temporary fencing			
2.7 Cultural Sites and Local Communities											
2.7.1 Loss of Cultural/Arch. Heritage, including cemeteries and	2.7.1 Since all the work is within existing RoWs and in previously disturbed soil, the risk of loss of historical or cultural relics is highly unlikely.	At any suspected heritage site (particularly in minority people	During the construction period and ahead of excavation at					2.7.1 Confirm that all roadside cultural and historical sites have been identified and all proper procedures according to PRC regulations have been adhered to.			

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roadside graves	However when widening roads in villages and towns, contractors will have to meet with local mayor to consult about any possible past relics or foundations of old buildings along the road. Contractor will also need to consult the database on archaeological sites in Yunnan, retained with the Prov. Cultural Relics Department as well as the County Cultural Relics Bureau. Any finds during works must be reported to the Maintenance Section Head and all construction work stopped until authorities have inspected the site.	territory Particularly, within 200m of any town or village along a project road.	any such site Prior to earth moving in these areas								
2.7.2: Loss of Access For Roadside Residents	2.7.2 The Contractor shall provide safe and convenient passage for vehicles and pedestrians to and from side roads and property accesses connecting the project road/area. Work that affects the use of side roads and existing accesses shall not be undertaken without provision of adequate alternate routes; to the prior satisfaction of the Engineer. The works shall not interfere unnecessarily with access to, and use of public roads and any other access footpaths to or from properties whether public or private.	Along any project roads—where residences, businesses, etc. lead directly onto road where maintenance is taking place	Prior to the start of any work					2.7.2 Confirm that contractor(s) has reestablished existing road access for roadside residents impacted.			
2.7.3 Traffic diversions and access road dust management	2.7.3 Temporary bypasses will be constructed with the approval of the Engineer. The temporary traffic detours shall be kept free of dust by frequent sweeping or application of water.	As defined by the YHAB representative on the job	Implemented at start of any work where traffic diversion or access reduction is expected					2.7.3 Inspect traffic management at diversion sites and time delays and record diversion staff functions			
2.7.4 Spread of Vector-Born Diseases	2.7.4 Contractors will be required to conduct rigorous inspections of the work sites to be sure that there are no stagnant waters. This will include	All construction sites, particularly these were	Within 5 days of any rain event capable of leaving ponded water-					2.7.4 Inspect all construction sites were earth removal can lead to ponding, particularly during the wet season and were			

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	removal of all old tires with water in them, drums containing stagnant water and filling in of any ponded areas created as part of the construction presence and where water can stagnate. These are all breeding grounds for malaria, encephalitis and dengue fever mosquitoes	excavation has taken place .	Throughout the construction period.					construction materials are stored in the open, permitting small ponding—Request immediate clean up and complete a visual inspection for mosquito larvae			
2.7.5 Community safety	2.7.5 IN order to protect the safety of communities on the construction zone contractors will need to provide appropriate traffic management, lighting, management of excavations, making communities aware of any particular hazards.	All construction sites involving a larger work area and period of more than or equal to 7 days	Prior to start of a construction activity					2.7.5 Complete inspection to confirm that community safety measures are being implemented.			
2.7.6 Hiring locally	2.7.6 Contractors will be encouraged to hire at least unskilled labour locally	For all work contracts	Immediately after contractor mobilization					2.7.6 Obtain written statistic on number of local hires			
2.7.7 Work outside the RoW	2.7.7 Construction activities may, in rare instances, be necessary outside the RoW. Where this becomes necessary, the use of land outside the RoW must be planned and agreed with owners of the affected land and properties prior to the start of the construction	Communities and/or owners affected	At least 2 weeks prior to start of work					2.7.7 Confirm that consultation and proper steps were taken prior to working outside RoW			
2.8 Occupational Health And Safety											
2.8.1 Protecting the workforce and maintaining a safe working environment	2.8.1 a) Contractor must provide vests, hard hats and protective footwear for all workers handling heavy materials, and working with caustic and hazardous materials such as concrete and asphalt, on bridges, pesticides for verge management etc. b) Contractor must provide protective	All work sites at all times	a)-b) At start of construction and work and available throughout the construction period. c) at the start of a contract where workers					2.8.1 Complete a weekly Occupational Health and Safety inspection reporting on all safety matters defined in Items 2.8.1-2.8.10—using a simple checklist . Use the items listed as shown below			

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	masks to milling machine operators, and anyone working in the area of the milling machine dust- with masks of a micron size, capable of capturing dust down to 2 microns. c) The contractor must take the time to show how protective equipment is used, when it must be worn and that penalties including lost work days on site could result if such equipment is not used		will be involved with heavy equipment and in active traffic areas								
2.8.2 Lack of medical assistance facility on site	2.8.2 Contractor must have first aid services available to all staff and workers at all times; Contractor must have at least one emergency treatment specialist on call at all times and available for emergency treatment as required.	All construction sites	All the time					2.8.2 See 2.8.1 above			
2.8.3 Storage, handing and use of toxic and/or hazardous materials	2.8.3 Handling of all caustic and petroleum based materials must be done, wearing protective footwear and clothing as well as protection against fugitive dust. Application on steep slopes avoided Storage of such materials must be protected from the weather and safe from potential tampering and theft. Transport of such materials will be made according to PRC regulations and standards including pre-notification of shipment to local EPB	For all construction operations	At any time during the construction period					2.8.3 inspection of the storage areas and application sites of toxic materials to be undertaken			
2.8.4 No Provision of sanitary toilet facilities at all times	2.8.4 Contractor must provide sanitary toilet for all full-time workers on the construction site and make sure it is serviced daily Contractor must provide sanitary and private, shower/washing areas for all work camp staff	All work sites operated by contractor and without existing facilities	At all times during the construction period					2.8.4 See 2.8.1 above			

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2.8.5 Control of movement of large equipment and handling of construction items	2.8.5 Large vehicle safety equipment such as reverse alarms, the provision of assistants when vary large equipment is moved on the construction site ; , including markings and traffic cones.	The entire construction operation	At all times throughout the construction period					2.8.5 See 2.8.1 above			
2.8.6 Child Labour	2.8.6 No Children (less than 16 years of age) can work on any contract	Everywhere the contractor is involved	At all times					2.8.6 Confirm that child labor is not practiced by examining the labour hire records			
2.8.7 Records of Safety and Health	2.8.7 The Contractor shall maintain such records and make such reports concerning safety, health, and welfare of persons and damage to property available for inspection as the Engineer may from time to time prescribe	Everywhere the contractor is involved	At all times					2.8.7 See 2.8.1 above			
2.8.8 Reporting of Accidents	2.8.8 The Contractor shall report to the Engineer details of any accident as soon as possible after its occurrence. In the case of any fatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means	For all work sites	Weekly					2.8.8 See 2.8.1 above			
2.8.9; Provision of Potable Water	2.8.9 The contractor shall provide potable water to all staff working on the worksite	All construction sites	All the time					2.8.9 Confirm that this is provided at all times and is accessible to all workers			
2..8.10 Working into the night and disturbing communities	2.8.10 Generally contractors will be restricted to work only during the daylight hours. However consultation and agreement with local	All construction sites within 500 m of a community or	At all times					2.8.10 Verify that contractor is abiding by working hour restrictions as agreed in contract and with local communities			

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	communities will allow for modifications. Contractor consultation with subproject corridor communities will be important	sensitive facility such as hospital or school									
3. OPERATING PERIOD											
3.1 Increased risk of pedestrian accidents due to improved roads, faster speeds and greater traffic volume	3.1 To manage these problems the operator will enforce speed limits through increased 'radar' surveillance, better and more frequent signage and increased speeding fines. In villages at crossing the owner will improve the signage and include amber lights were possible.	In every village and town where the road will be upgraded	Planned during the detailed design stage and installed during the construction period then completed at the start of operations					3.1 Inspect urban areas where road has been improved, survey re average speed and define what speed management measures have been installed-if needed.			
3.2 Diverted traffic damaging roads and endangering communities	3.2 A number of the subprojects parallel toll road and it has been observed that under these conditions, improvements to non-tolled roads results in truck traffic shifting to avoid tolls. To prevent that YHAB will install height barriers at both entrances to the affected roads	Where the road parallels expressways	Immediately before the improved roadway becomes operational					3.2 Confirm construction of the height barriers and report to YHAB			
3.3 Social and community-based enhancements in support of positive impacts	3.3 In support of positive impacts of reduced travel time and safer conditions due to installation of improvements, two enhancements will be considered by YHAB. These will be providing support to any private transport entity wanting to restore road transport services along subproject roads and secondly	Communities where enhancements are to be provided as decided by YHAB	Within 6 months of improved road being operational and continuing for 1 year					3.3 Conduct the survey as defined in 3.1 and report results in annual operating period report			

ANNEX 4
SAMPLE ENVIRONMENTAL CLAUSES FOR INCLUSION IN CONTRACT DOCUMENTS

1.1 ENVIRONMENTAL SAFEGUARDS
These clauses are to be used in conjunction with the Environmental Management Plan (EMP). In the event of duplication or overlap the clause defining the more stringent and applicable measure will take precedence.

1.1.1 Contractor's Understanding Of Safeguards
A. The Employer is committed to undertaking the construction of the Project in a manner that results in the least impact on the natural and social environment. The Contractor will confirm an understanding of the environmental impact that may occur due to construction activities and of the methods for preventing or mitigating these impacts; as identified in the clauses to follow and as directed by YPDOT/YHAB and/or its General and Maintenance Section Engineers and/or YHAB's Environmental, Social and Safety Unit (ESSU). The contractor will be require to provide the following sentence in the covering letter accompanying the bid and which is signed by a responsible contractor representative. *" We have read and understand the contents of all environmental clauses and conditions contained in the bid documentation and will abide by these requirements. Any non compliance, as identified by an inspector will be rectified at our cost within as few working days, and will not be included as charges to the Employer."*

B. The contractor will be required to attend YHAB environmental safeguards training course as defined by YHAB and be required to nominate at least two people to attend.

1.1.2 Compliance with All Laws, Regulations and Standards
The Contractor shall observe and comply with all National Laws, Government Regulations, Decrees, Provincial Decrees, as well as any special conditions issued by local authorities pertaining to environmental protection, pollution control, waste management and biodiversity protection. The Contractor shall take all necessary precautions to minimize environmental disturbance to the project area and surroundings and to prevent the escape of polluting substances into streams, water courses, and groundwater. The Contractor shall also utilize all necessary methods and devices as are available to prevent and otherwise minimize atmospheric emissions or discharges of air contaminants.

1.1.3 Waste Management and Pollution of Land and Water

A. All waste arising from the project is to be disposed of in a manner compliant with PRC regulations and standards and as approved by the Project Engineer. All vehicles and machinery employed in the execution of the works shall be regularly maintained to ensure that pollutant emission levels comply with the relevant requirements of current pollution control legislation. Vehicle maintenance and refuelling shall be carried out in such a fashion that spillage of fuels and lubricants lead to 0% contamination the ground or any watercourse. Vehicles and equipment must not be washed or driven into natural water bodies, unless approved by the Engineer. All used and collected petroleum products shall be disposed of in accordance with the relevant legislation. A step-by step spill cleanup plan, including names and numbers of officials to contact, should be available by the contractor for inspection by the employer.

B. Adequate sanitary waste control facilities shall be provided in site offices and workers camps, and sewage waste shall be collected regularly and disposed in accordance with relevant national and provincial environmental legislation.

C. In situations where the contractor must temporarily block or divert irrigations systems, prior consultation and agreement with owner/operators must be undertaken. A schedule agreeing to the start of work, duration of work, provision of temporary diversion in order to keep the water flowing, and reinstatement of the irrigation system suitable to the farmer (in relation to protection of crops) must be written down and filed with YHAB. The Contractor shall be responsible for maintaining the system to the satisfaction of the owners and all costs of maintaining the system shall be deemed to be included in the various rates and lump sum items for the works included in the priced Bill of Quantities.

1.1.4 Air Pollution

A. The Contractor shall take all necessary steps to minimize air pollution resulting from maintenance activities. Except where stipulated in these Specifications, the disposal of natural vegetation, organic materials from clearing operations and the disposal of waste materials, particularly oil and petroleum wastes, rubber, plastics and similar material by burning, will not be permitted. The Contractor shall take all steps necessary, and shall furnish all labour, equipment, materials and means, required to reduce dust nuisance from the Works, and to prevent dust originating from maintenance activities from damaging crops, orchards, cultivated fields, and dwellings; or causing a nuisance to persons. The Contractor shall be held liable for any damage resulting from dust originating from maintenance activities including on Government roads, rights-of-way or elsewhere. Dust levels, measured as total particulate matter, must be in compliance with relevant air quality standards specified in PRC law. Emission exceedences from the manufacture, handling and storage and handling of cement and of concrete aggregates will not be permitted and the Contractor shall use methods and equipment to prevent such dust the construction period. All truck loads of loose materials shall be covered during transportation.

1.1.5 Noise Pollution

A. All Works shall be carried out with reasonable controls over noise and disturbance levels. During routine servicing operations, the effectiveness of exhaust silencers must be checked and if found to be defective must be replaced. Notwithstanding this requirement, noise levels from any item of construction equipment must comply with the relevant PRC legislation and standards for levels of sound emission. Non compliant equipment will be removed from site. Operation of trucks and heavy vehicles will be restricted to hours of 0700-1800.

B. All necessary measures, including the use of noise barriers, shall be used to protect schools, hospitals and other noise sensitive receptors close to the RoW.

1.1.6 Damage to Property, Crops and Vegetation

A. The Contractor shall preserve existing trees, plants and other vegetation that are to remain within or adjacent to the Works and shall use every precaution necessary to prevent damage or injury thereto. Trees or shrubs shall only be felled or removed where such obstruct directly the permanent works or necessary temporary works areas; and where such is approved by the local Forestry Department. Replanting of trees and bushes as specified by PRC standards shall be completed based on written plans agreed to between the local Forestry Dept. and the contractor. Two overarching criteria that must be considered are: i) replanting using indigenous vegetation and tree species and ii) replanting with a view of stabilizing soils as quickly as possible.

C. The Contractor shall be responsible directly to YPDOT/YHAB and the affected people for any excessive or unnecessary damage to crops or lands arising from any construction operation. Deductions will be made from the payment due to the Contractor to cover the cost of repairing such excessive or unnecessary damage, as determined by YPDOT/YHAB.

D. On completion of the Works all areas disturbed by the Contractor's construction activities shall be restored by the Contractor to their original condition, or as may be acceptable to YPDOT/YHAB and any necessary input from the local Forestry Bureau.

1.1.7 Borrow Materials

All borrow materials not taken from road cuts most be obtained from sites licensed by the relevant provincial agency. The contract will be wholly responsible for determine these requirements through consultation with YHAB office in the Maintenance Section responsible and any other local agency such as the prefecture level.

1.1.8 Soil Erosion and Sedimentation Control

All temporary sedimentation and pollution control works shall be deemed as incidental to the earthwork and other items of work and as such no separate payment shall be made for the same.

1.1.9 Plant and Equipment

During the day, plant and equipment working adjacent to traffic and having a projection beyond the normal width of the item, for example, a grader blade, shall have a fluorescent red marker attached to the outer end of the projection. During poor light conditions an additional traffic controller with an illuminated red wand shall direct traffic around such plant and equipment. At night, all construction equipment and materials shall be removed from the normal path of vehicles, to provide a lateral clearance of at least 6m where practicable, with a minimum clearance of 1.2m. Plant and equipment, within 6m of the normal path of vehicles, shall be lit by not less than two yellow steady lamps suspended vertically from the point of the obstruction nearest to a traffic lane, and one yellow steady lamp at each end of the obstruction on the side farthest away from the traffic lane.

1.1.10 Public Safety and Traffic Management

Special consideration shall be given in the preparation of the Traffic Control Procedure to assure that traffic continues to move efficiently during the construction activity and that an adequate and trained number (at least two) of traffic control officers are assigned to each construction site, where stop and start conditions will be required.

1.1.11 Occupational Health and Safety

A. Any construction operation where people work at a site for a number of days, the contract will provide i) adequate safety foot ware, hardhats and protective clothing and enforcement in their use; ii) location of medical assistance on site; iii) sanitary toilet facilities and a potable water supply; iv) safety protocol when operating heavy equipment such as reverse alarms; and, v) up-to- date record book of health and safety issues as well as accidents.

B. The contractor will provide adequate instructions to all workers transporting, handling and/or using hazardous materials such as herbicides, paints and fuels. These instructions need to be provided orally and with a label on each material.

C. The contractor will ensure that all workers are more than 16 years of age.

1.1.12 Health and Vector-borne Diseases

Given that all projects are in malaria and dengue mosquito zones and that construction sites have been shown to contribute very significantly to the rise in these insects locally through the creation

of water collection sites and depressions from heavy equipment use and stagnant water collected in used materials such as tires, an insect control program will be required at each construction site and any work camps. During the rainy season, contracts will be required to conduct checks once every two days to insure that construction work has not left small ponds and depressions where water has collected. Old tires and containers placed in open storage areas are favourite breeding grounds for mosquitoes. Any such stagnant water areas will need to be cleaned up immediately (dengue mosquito hatching from egg to insect takes only 6-7 days), with each check logged by the contractor.

1.1.13 Reporting

A. The Contractor shall maintain a record of all emissions and spills of liquid, solid and gaseous matter which occur at the site, whether into water courses, streams, on land, or into the air. This record shall be compiled daily and shall include details of date, time and nature of the event, along with details of the remedial and clean-up measures carried out. Copies of these records shall be given to YPDOT/YHAB monthly.

B. The Contractor shall also maintain a record of any complaints made by any Governmental or Community Organizations or by the public, regarding the operations. This record shall contain the date and time of receipt of the complaint, the name and address of the complainant and the action taken to remedy the situation. Copies of these records shall be given to the Employer monthly using a format acceptable to YHAB's engineer in charge.

1.1.14 Basis of Payment

Mandatory compliance with national law, decrees and regulations is a legal requirement and will not be compensated. The cost associated with the implementation of all environmental mitigation and monitoring measures as described in Sections 1.1 and in the EMP should be accounted for in the contractor's bid and as such no additional payments will be accepted. Payments will be further verified through the submission of timely inputs to the monthly project monitoring report program as well as quarterly and annual reports to ADB.

Annex 5
Template for Public Consultation Meeting Record

MINUTE OF ENVIRONMENTAL PUBLIC CONSULTATION AND INFORMATION SESSION ON ADB TECHNICAL ASSISTANCE PROJECT_____

1. **Meeting location**:
2. **Meeting date:**
3. **Project:**
4. **List of Special Government Participants**:
5. **Presentation given by:**
6. **Environmental presentation content:**
7. **Comments of participants** (this can be a summary or individual comments-see example)
8. **Follow Up Actions**

Issue Raised: including real and perceived environmental issues	Approach to Addressing the Issue as suggested at Session; including *how, when* and by *whom*	Agreed to Action

9. Complete List of Attendees (including Name, home village/town and Occupation):

Agency Name or General Public	Name of Person	Title	Name Hometown or Village

Annex 6. Detailed Costing Spreadsheet Sample for S211 (EXCEL spreadsheet provided in Operations Manual)

	S211, Kunming GS: 16.8 km	Non Reoccuring							Reoccuring							
	Note: P=People	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
EMP No.	Mitigation and Monitoring Items As listed in the EMP	No. Cycles	No. Days /cycle	No. P. PRC	No. P Int'l.	Unit cost Int'l.	Unit Cost PRC.	Total Cost	No Cycles /Yr.	No Yrs	No. Days /cycle	No. P. PRC	No. P Int.	Unit cost Int'l.	Unit Cost PRC.	Total Cost
1	**Pre-Construction Period (6 mnths)**					760	175							760	175	
1.1	YHAB will organize, outfit and establish a staffed Environmental Safeguards Unit within YSRI.	Separate Fund				0	0		0	0	0	0	0	0	0	$0.00
1.2	YHAB will provide the successful contractor with the translated IEE , including the EMP and assistance with CEMP	1	3	1	0	760	175	$525.00	0	0	0	0	0	0	0	$0.00
1.3	Integration of EMP into bid documentation	1	4	1	0.25	760	175	$1,460.00	0	0	0	0	0	0	0	$0.00
1.4	YHAB design team to incorporate protection measures for roadside trees, care when rebuilding culverts and bridges, and a traffic management plan	1	7	1	0.25	760	175	$2,555.00	0	0	0	0	0	0	0	$0.00
	Other one-time costs															
	Provide training to contractor (2 days)	see below														$0.00
	Other Expenses (workshop materials, particip. Costs & per diems)	see below														
	Pre-construction Period Total							$4,540.00								$0.00
2	**Construction Period (8 months)**															
2.1	**Env. Doc. Not Distributed**															
2.1.1	Use materials provided by EBU to complete the CEMP	1	3	1	0	760	175	$525.00	0	0	0	0	0	0	0	$0.00
2.2	**Soil Earthworks and Erosion**															
2.2.1	Dust management program implemented and maintained	Construction Cost			0	760	175	$0.00	0	0	0	0	0	760	175	$0.00
2.2.3	Locate and prepare costed designs for remediation of three landslide areas and present to Maint. Section	Construction Cost			0	760	175	$0.00	0	0	0	0	0	760	175	$0.00
2.2.4	Inspection to insure against roadside borrowing and requiring immediate cessation and repair	0	0	0	0	760	175	$0.00	28	1	0.5	1	0	760	175	$2,450.00
2.2.5	Manage earthworks operations to keep noise,dust, traffice interference to a minimum	0	0	0	0	760	175	$0.00	Construction Cost				0	760	175	$0.00
2.2.6	Inspect work sites to confirm that no waste materials are side cast	0	0	0	0	760	175	$0.00	Part of 2.2.4					760	175	$0.00
2.3	**Poor Operation By Contractor**															
2.3.1	Maintain good housekeeping practices at contractor work sites, and rehabilitate it (them)once no longer used	0	0	0	0	760	175	$0.00	Construction Cost					0	0	$0.00
2.3.2	Inspect bitumen storage areas and confirm compliance with PRC standards	0	0	0	0	760	175	$0.00	Part of 2.2.4					0	0	$0.00
2.3.3	Install spill prevention measures for fueling as specified in EMP	Construction Cost			0	760	175	$0.00	0	0	0	0	0	0	0	$0.00
2.4	**Surface Water, Drainage, Water Pollution**															
2.4.1	When reconstruction of 12 culverts, prevent erosion and siltation by planing work during dry season and using filter fabric barriers and rapid waste materials clean up.	Construction Cost			0	760	175	$0.00	0	0	0	0	0	0	0	$0.00
2.4.2	Inspection of all culvert construction sites for clean up and obstruction removal	0	0	0	0	760	175	$0.00	Part of 2.2.4					0	0	$0.00
2.4.3	Inspect all slope stabilization and landslided repair sites to insure no sidecasting and excessive treee and vegetation removal takes place,and all exposed areas are erosion-proofed	0	0	0	0	760	175	$0.00	Part of 2.2.4					0	0	$0.00
2.5	**Air and Noise Pollution**															
2.5.1	Monitor PM10 at work site	0	0	0	0	760	175	$0.00	24	1	1	2	0	760	175	$8,400.00
2.5.1a	Install and operate dust control equip on asphalt milling machine	Construction Cost				760	175	$0.00	0	0	0	0	0	760	175	$0.00
2.5.1b	Implement and inspect Dust supression program along all haul roads and at work sites during construction	Construction Cost				760	175	$0.00	0	0	0	0	0	760	175	$0.00
2.5.2	Identify any sensitive receptors in work sites (hospitals, residential areas) and monitor noise levels	0	0	0	0	760	175	$0.00	24	1	1	1	0	760	175	$4,200.00
2.5.3	Implement measures to prevent dust being generated from materials storage areas	Construction Cost			0	760	175	$0.00	0	0	0	0	0	760	175	$0.00
2.6	**Flora and Fauna**															
2.6.1	rehabilitate all expose areas with vegetation and new plantings of native shrubs and trees	Construction Cost			0	760	175	$0.00	0	0	0	0	0	0	0	$0.00
2.7	**Cultural Sites and Local Communities**					760										
2.7.1	Conduct consultations with local communities re access restrictions during repaving operations and agree to a plan	0	0	0	0	760	175	$0.00	1	1	2	1	0	760	175	$350.00
2.7.2	prepare a traffic management plan and submit to Maint. Sect, and local police	Construction Cost			0	760	175	$0.00	0	0	0	0	0	760	175	$0.00
2.7.3	Inspect and confirm reestablishment of all roadside access removed during repaving work	0	0	0	0	760	175	$0.00	Part of 2.2.4					760	175	$0.00
2.8	**Occupational Health and Safety**															
2.8.1	Inspection of milling machine operations to insure that proper dust supression and dust masks are used	0	0	0	0	760	175	$0.00	Part of 2.2.4					760	175	$0.00
2.8.2	Inspect construction workforce safety equipment including hardhats, boots, ear protection and eye protection where required	0	0	0	0	760	175	$0.00	Part of 2.2.4					760	175	$0.00
2.8.3	Inspection of haz. Materials , i.e. petroilum, bitumen, handling and storage by contractor	0	0	0	0	760	175	$0.00	Part of 2.2.4					760	175	$0.00
2.8.4	Inspection of all worksites in insure sanitary facilities and first aid stations	0	0	0	0	760	175	$0.00	Part of 2.2.4					760	175	$0.00
2.8.5	Install safety equip. On heavy machinery such as reverse alarms etc.	Construction Cost			0	760	175	$0.00	0	0	0	0	0	760	175	$0.00
2.8.6	Confirm compliance with PRC child labour law	0	0	0	0	760	175	$0.00	Part of 2.2.4					760	175	$0.00
2.8.8	Confirm use of standard accident reporting system and record keeping	0	0	0	0	760	175	$0.00	Part of 2.2.4					760	175	$0.00
2.8.9	Confirm availability of potable water at all times	0	0	0	0	760	175	$0.00	Part of 2.2.4					760	175	$0.00
	Other Expenses															
	Transportation							$0.00								$600.00
	Communication							$0.00								$200.00
	Other Expenses							$0.00								$0.00
	Reporting and Report Production							$500.00								$500.00
	Construction Period Total							$525.00								$16,700.0
3	**Operating Period (1 year monitoring)**															
3.1	**Better Roads and Increased Speed and Accidents**	0	0	0	0	0	0	$0.00	0	0	0	0	0	0	0	$0.0
3.1.1	Install traffic calming and other safety related measures along project road	Construction Cost						$0.00								$0.0
3.1.2	Inspection to insure traffic calming measures and signage installed	Construction Cost						$0.00								$0.0
3.2	Inspect all work areas to insure culverts are clear of debris, no danger of flooding, erosion control measures functioning and all contractor work areas have been cleaned up							$0.00	Part of 2.2.4							$0.0
	Expenses							$0.00								$0.00

	S211, Kunming GS: 16.8 km	Non Reoccuring							Reoccuring							
	Note: P=People	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
EMP No.	Mitigation and Monitoring Items As listed in the EMP	No. Cycles	No. Days /cycle	No. P. PRC	No. P Int'l.	Unit cost Int'l.	Unit Cost PRC.	Total Cost	No Cycles /Yr.	No Yrs	No. Days /cycle	No. P. PRC	No, P Int.	Unit cost Int'l.	Unit Cost PRC.	Total Cost
	Operation Period Total							$0.00								$0.00
	Unusual Expenses	No. P	Unit Cost													
	Provision of Training Workshop	Estimated as separate cost per tranche						$0.00								$0.00
	Noise and PM 10 monitoring equipment	For use by General Section						$2,500.00								$0.00
	Total Unusual Expenses							$2,500.00								0.00
	Totals: Non Reoccuring and Reoccuring							$7,565.00								16,700.00
	All MITIGATION AND MONITORING		Totals													
	Pre Construction Period		$4,540													
	Construction		$17,225													
	Operating Period		$0													
	Total		$21,765													
	Contingency Costs @ 6% of total		$1,306													
	Grand Total		$25,571													

Assumption:

This estimate assumes a fee for a national specialist at USD175/day. Changing that number on the top row of the spreadsheet will adjust all rows and totals

ANNEX 7. Construction Environmental Workplan (CEWP) Template

Environmental Issue	Mitigation Measures	Location[2]	Time Frame	Responsibility		Months															
				Implementation	Supervision	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
2. CONSTRUCTION PERIOD																					
2.1 Environmental Documentation not in hand																					
2.1.1 Contractor fails to retain an environmental expert to prepare the CEWP and to implement all mitigation and monitoring measures, leading to a failure to implement the EMP	2.1.1 Contractor will be required to retain an expert with environmental assessment experience to prepare the CEWP and obtain all relevant permits. The contractor will not be permitted to mobilize the workers without an approved CEWP and the appropriate permits in place. This is applicable only to projects with IEEs or EIAs	Prior to the start of the construction work.	NA																		
2.2 Soils, Earthworks & Erosion																					
2.2.1 Improper management of earthworks, topsoil, material transport and storage procedures, cleaning activities; leading to dust and air pollution	2.2.1 Large volumes of quarry rock, aggregate and sand may be transported and stored in the work sites. These operations and storage areas will be constantly exposed to the elements and will create primarily dust during the dry season. Dust will be managed by daily use of watering trucks. All topsoil needs to be collected and reused to rehabilitate/revegetate the areas disturbed.	Throughout the construction period	Anywhere where there is material moved, earthworks cutting and filling																		
2.2.2 Inadequate erosion control and slope stabilization leading to land slip and chronic erosion at cuts and water crossings.	2.2.2 Contractor will be required to know the subsoil materials that are being cut into and excavated and have ready appropriate plans to stop land slippage and erosion, . At water crossings where structures are to be upgraded, careful replacement and use of gabions with culverts and bioengineering methods for rapid revegetation and slope stabilization will be used. Bioengineering approaches to be explored	Based on an analysis of soils conditions by contractor and consultation with the General Sections hydrology expert	Throughout the construction period																		
2.2.3 Slope slippage and landslide zones, due to previous errors, left unaddressed	2.2.3 In any road sections where maintenance takes place and where there is a history of landslides and slope slippage, the contractor will be required to report any such conditions (if not already known) to the Maintenance. Section and propose a costed remedial action, then undertake this work to stabilize the road and reduce risk of failure; including bioengineering solutions, metal netting and other proven methods	Roadsides	Prior to the start of maintenance work in that road section																		
2.2.4	2.2.4	During	Throughout the																		

Environmental Issue	Mitigation Measures	Location[2]	Time Frame	Responsibility		Months															
				Implementation	Supervision	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
Side borrow operations leading to erosion, landslide and destruction of landscape	Any need for borrow material outside of the RoW will be subject to local environmental approvals and procedures and should also be carried out in consultation with ADB. Mitigation measures will consider bioengineering approaches	construction period along any stretches where road will be raised and fill is needed, particularly in areas with long visual distances and landscapes of value.	construction period																		
2.2.5 Side casting of waste by Contractor degrading down-slope area and blocking/ contaminating water body	2.2.5 Side casting of waste earthen materials is not permitted and a side cast waste materials cannot be easily stabilized and prevented from eroding during a rain even	On all Project Roads	Throughout the construction period																		
2.2.6 Inadequate handling, treatment and disposal of contaminated construction waste materials	2.2.6 Should past landuse of excavation sites suggest contamination and these materials need to be excavated; the contractor must treat these soils as hazardous materials, seek proper disposal permits and get expert advice on how to decontaminate and dispose of these soils.	Any road shoulders where excavation is planned	Prior to any road shoulder excavation or clearing																		
2.3 Poor Contractor Operating Procedures																					
2.3.1 Failure to adhere to construction related good housekeeping practices, including solid and sanitary waste management	2,3,1 Contractors will adhere to standard good housekeeping practices as defined in the contract Terms & Conditions and Contract Specifications. Special considerations will be given to 1. management of construction waste and water 2. equipment lubricants and fuel, including management and collection of waste oils and fuel particularly related to refuelling depots, maintenance areas and diesel generator sets 3. Sewage will require latrines or chemical toilets with complete clean up after the construction is complete. 4. Solid waste will be collected and properly disposed of after recycling and sorting, This work will be completed in accordance with PRC, regulations and standards which the contractor will be expected to know and will receive training on as part of the mandatory training session delivered by the ESSU. Also, the contractor shall orient all construction workers in basic sanitation and health care issues and on the specific	All active work areas, haulage routes, camps, construction maintenance yards and any other areas operated by the contractor and involved in the project	Throughout the construction period																		

Environmental Issue	Mitigation Measures	Location[2]	Time Frame	Responsibility		Months															
				Implementation	Supervision	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
	hazards of their work and will need to certify to that effect at the start of the construction period. 5. Once the site is no longer needed the contractor must fully decommission it, with special emphasis on waste removal and clean up of any spills or hazardous materials plus any necessary revegetation; then provide written confirmation to YHAB.																				
2.3.2 Failure of contractor to manage bitumen/asphalt and concrete production facilities leading to leakage, dust and air pollution for community in vicinity	2.3.2 If new facilities are required, siting and operation of the mobile asphalt and concrete batch plants will require permits, including information on sighting and environmental controls. The contractor will be required to locate an asphalt plants at least 1 km from any existing or old water course and at least 3 km away from any residential or commercial dwelling, preferable down-wind. Concrete batch plants will have the same limits and must have dust suppression equipment installed. Operating periods for such facilities will be daily between 0700-1800.	At bitumen storage area, particularly at mobile asphalt plants where bitumen is loaded into boiler and heated for mixing	At all times																		
2.3.3 Management of petroleum products such as fuel, lubricants and bitumen, as well as pesticides and paints, leading to spill and contamination.	2.3.3 Contractor will be required to have the following spill prevention measures in place at all work sites: 1. All fuelling to be done on a concrete surface provided with spill catch tank that can be cleaned and all spilled fuel recovered and recycled based on discussions with fuel supplier. 2. All repair and maintenance work must either be done on a concrete surface with oil spill catch basin or oil catch pans must be provided at all service areas and training provided to all 'operatives. 3. All fuel use areas where spills and leakage is possible, e.g. the generator, must have drip basins installed to prevent any leakage. These recovered materials must be recycled. 4. A fuelling areas must be equipped with proper fuel nozzles 5. All fuel tanks must have means for containment of accidental spills. 6. During bitumen handling materials to be prevented from leaking to the ground, including transfer areas and any areas where bitumen is transported in drums. 7. Bitumen drums must be stored in a dry covered secure place where no leakage to water or	At active work areas, work camps, maintenance yards and any other areas that the contractor uses or subcontractor use during the construction period	At all times																		

Environmental Issue	Mitigation Measures	Location[2]	Time Frame	Responsibility		Months															
				Implementation	Supervision	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
	ground is possible. Drums must be recycled at least 1X/yr. 8. Any spills must be cleaned up according to PRC regulations and standards within 24 hours of the occurrence, with contaminated soils and water treated according to PRC regulations and standards, with a spill clean up report submitted to the Prefecture EPB.																				
2.3.4 Overloading of construction vehicles leading to damage to existing roads	Contractor to provide waybills—or record book entries of materials hauled as required by Maintenance Section and/or ESSU inspector(s)	All materials haul roads	At all times																		
2.3.5 No or inadequate consideration for recycling and reuse of construction 'wastes' by the contractor	2.3.5 The contractor will need to demonstrate that an attempt has been made to reuse, recycle, convert by composting construction wastes such as asphalt, wooden materials, plant materials and other benign organic matter	At construction sites were spoils exist	Throughout construction																		
2.4 Surface Water, Drainage and Water Pollution																					
2.4.1 Modification of surface drainage during culvert and bridge replacement and raising of horizontal road alignment without repair and rehabilitation after construction is finished	2.4.1 When modifying or interfering with surface drainage of any sort the contractor will have to undertake the following: 1. All culverts must be sized at or larger than the one being replaced and with careful consideration of slope and erosion protection at inflow and outflow. All construction materials in the channel must be removed so as not to provide any obstruction. Culvert removal and replacement will be done when there are low flows or no water in the channel and during the dry months of the year. 2. Bridges will be repaired and widened and as such there will be machinery at least at the water edge. Maximum care is needed to avoid degradation of the river, stream shore and to undertake excessive excavation at the shore and in the water (at least not when there is water in the stream). Demolition must be done in a way that prevents large junks of material from falling into the river. Stabilization of disturbed crossing banks must take place as part of the construction work and include filter fabric, gabions and preferably bioengineering techniques. 3. Where horizontal alignments are raised to	1. At all existing culvert sites and where new culverts are specified in the design drawings 2. At all bridges which will need widening and repair 3. Along any road sections where	Throughout the construction period																		

Environmental Issue	Mitigation Measures	Location[2]	Time Frame	Responsibility		Months															
				Implementation	Supervision	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
	reduce flooding, extra care is needed to be sure that all drainage channels convey water properly. To achieve this, the contractor must undertake a surface drainage inventory of the future raised road sections and map out where existing and needed new culverts are to go. There may be cases where old culverts need to be relocated. 4. When modifying the existing drainage system through culvert replacement, the contractor must minimize flood risk by carefully confirming that all works to be undertaken will not flood roadside properties due to improper design or construction practices. All culverts must be checked to confirm that there are no blockages due to construction debris. The contractor will be required to fully rehabilitate property damaged due to flooding.	vertical alignments are to be raise via the addition of fill material. 4. At any site where road drainage works are being maintained																		
2.4.2 Contaminated construction site drainage water discharging into water course or contaminating local water supplies	2.4.2 Where drainage from a construction site involving more than 20 linear meters of roadway, contractor(s) will provide drainage channel into a grassed area or other detention area allowing suspended sediment and minor contaminants to settle out before the water is discharged.	At all construction sites	Throughout the construction period																		
2.4.3 Leakage into surface and groundwater sources from bitumen and fuel storage and diesel generators.	2.4.3 All bitumen and fuel storage sites must be checked daily for leaks and held in an impervious site where spilled material can be collected.	At all storage areas operated/used by the contractor	Daily, throughout the construction period																		
2.5 Air and Noise Pollution																					
2.5.1 Excessive construction-period emissions of air pollutants, greenhouse gases, noise and vibration	2.5.1 Emissions will be kept to a minimum by: 1. Ensuring that the contractor's fleet of vehicles are properly maintained according to manufacturer's specifications and 2. Using acceptable fuel and haul loads within specified limits & equipment specifications. 3. Vehicle idling time limits to no more than 2 minutes and 4. Equipment maintenance specifications will be imposed through construction inspection and regular reporting, 5. Dust control at the construction site will be	Anywhere at construction sites where vehicles of the contractor or under the contractors control (including paying for services), such as subcontracted trucks hauling materials	Throughout the construction period																		

Environmental Issue	Mitigation Measures	Location[2]	Time Frame	Responsibility		Months															
				Implementation	Supervision	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
	particularly stringently controlled by watering, setting strict speed limits of no more than 30kph in or near settled areas, controlling dust from stockpiled materials such as topsoil, and clean up of paved haul roads. 6. Equipment such as the diesel generator will be included in the emission control program and will be and regularly tuned to prevent excessive particulate matter pollution. 7. Noise in settlement areas and near hospitals and structures sensitive to noise must be kept within PRC standards for sensitive locations																				
2.5.2 Dust and Noise from Road Milling Machine	2.5.2 Due to respirable silica dust from cutter heads, contractor needs to have water spray nozzles on milling machine a) directed at the point of cutting and the drum, one nozzle every 30-40 cm and b) nozzles along the conveyor on both sides every ½ meter. Average water flow should be around 24L/min. The option is to provide dust masks for all operators and workers around the milling machine(s).	At any site where asphalt milling to take place	Throughout the construction period																		
2.5.3 Managing dust, noise and drainage associated with earthworks and haul roads.	2.5.3 Mitigation will involve 1. enforcing a speed limit of 30 kph within 500m of any village and the use of chemical dust suppressants at least on road for 500m on either side of a village, Same approach is to be taken if the other site is used 2. restricting operating hours through roadside villages and settlements to between hours of 0800 and 1800.	1. All access roads and haul routes for materials movement, particularly through settlement areas, villages and towns 2. Define restricted locations as anywhere within a 1 km distance of a settlement area, with a preference for sites downwind of settlements.	Throughout the construction period																		
2.5.4 **Air pollution**	2.5.4 TPM, NO2 and SO2 will be monitored once a month. Two samples will be taken (one during the morning traffic peak, and one when construction has stopped for the day) at each of six stations along the road.	G320a, X214, S211 and S 321	Two samples will be taken (one during the morning traffic peak, and one when construction has stopped for the day) at each of six stations along the road.																		

Environmental Issue	Mitigation Measures	Location[2]	Time Frame	Responsibility		Months															
				Implementation	Supervision	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
2.5.5 **Excessive Noise**	2.5.5 At the same locations and times that air quality is tested, noise measurements will be completed, but with site variations focused on sensitive receptors such as schools, residential areas and health care facilities. Measurement frequency will be the same as for air quality	G320a, X214, S211 and S321	Two samples will be taken (one during the morning traffic peak, and one when construction has stopped for the day) at each of six stations along the road.																		
2.6 Flora and Fauna																					
2.6.1 **C**ontractor undertakes an excessive and unnecessary roadside natural vegetation cover removal, wetland draining or filling, or tree removal program damaging roadside habitats , the old trees and shelter belt plantings along roadsides	2.6.1 For each section of the road, contractors are required to develop a sketch map of the location number and species of trees along the roadside that are located within the area likely to be cleared. In areas where there are large trees creating a treed/shaded corridor, designers will be contacted and alternative designs, such as narrowing the carriageway and transforming this area into a roadside rest area should discussed and an option found that requires the minimum tree loss. Any tree removed will be replaced by replanting several (>2) young trees of the same species. No areas beyond the RoW are to be disturbed. This includes vegetated roadside habitat. wetland areas, providing potential habitat for wildlife	Along any section of the road were trees and other vegetated roadside habitat could be disturbed as part of cleared for widening	Prior to any clearing taking place																		
2.6.2 Selection of landscape species and management of plantings	2.6.2 Specify native species of local provenance that are appropriate for the local setting for any new areas of landscaping. Ensure that any invasive species cleared during landscape works are managed in accordance with PRC regulations and standards. Consider opportunities for establishing composting facilities at General Maintenance Sections, to enable recycling of green waste.	Along any section of the road were trees and other vegetated roadside habitat could be disturbed as part of cleared for widening	Ongoing throughout the construction period																		
2.7 Cultural Sites and Local Communities																					
2.7.1 Loss of Cultural/Archaeological Heritage, including cemeteries and roadside graves	2.7.1 Since all the work is within existing RoWs and in previously disturbed soil, the risk of loss of historical or cultural relics is highly unlikely. However when widening roads in villages and towns, contractors will have to meet with local mayor to consult about any possible past relics or foundations of old buildings along the road. Contractor will also need to consult the database on archaeological sites in Yunnan, retained with the Prov. Cultural Relics Department as well as the County Cultural Relics Bureau. Any finds during works must be reported to the	At any suspected heritage site (particularly in minority people territory). Particularly, within 200m of any town or village along a project road.	During the construction period and ahead of excavation at any such site Prior to earth moving in these																		

Environmental Issue	Mitigation Measures	Location[2]	Time Frame	Responsibility		Months															
				Implementation	Supervision	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
	Maintenance Section Head and all construction work stopped until authorities have inspected the site.		areas																		
2.7.2: Loss of Access For Roadside Residents	2.7.2 The Contractor shall provide safe and convenient passage for vehicles and pedestrians to and from side roads and property accesses connecting the project road/area. Work that affects the use of side roads and existing accesses shall not be undertaken without provision of adequate alternate routes; to the prior satisfaction of the Engineer in charge. The works shall not interfere unnecessarily with access to, and use of public roads and any other access footpaths to or from properties whether public or private.	Along any project roads—where residences, businesses, etc. lead directly onto road where maintenance is taking place	Throughout the construction period.																		
2.7.3 Inadequate traffic diversions and access road dust management	2.7.3 If traffic delays are short, lane closures should be the first course of action thereby reducing the need to affect other landuses. Temporary bypasses will be constructed where there is a need for closures with the approval of the Engineer in charge. The temporary traffic detours shall be adequately signed and kept free of dust by frequent sweeping or application of water.	As defined by the YHAB representative on the job	Throughout the construction period.																		
2.7.4 Spread of Vector-Born Diseases	2.7.4 Contractors will be required to conduct rigorous inspections of the work sites to be sure that there are no stagnant waters. This will include removal of all old tires with water in them, drums containing stagnant water and filling in of any ponded areas created as part of the construction presence where water could collect and stagnate. These are all breeding grounds for malaria, encephalitis and dengue fever mosquitoes	All construction sites, particularly these were excavation has taken place .	Within 5 days of any rain event capable of leaving ponded water- Throughout the construction period.																		
2.7.5 Inadequate community safety	In order to protect the safety of communities on the construction zone contractors will need to provide appropriate traffic management, lighting, management of excavations, and make communities aware of any particular hazards.	All construction sites involving a larger work area and period of more than or equal to 7 days	Prior to start of a construction activity																		
2.7.6 Hiring locally	2.7.6 Contractors will be encouraged to hire at least unskilled labour locally	For all work contracts	Immediately after contractor mobilization																		
2.7.7	2.7.7	Communities	At least 2 weeks																		

Environmental Issue	Mitigation Measures	Location[2]	Time Frame	Responsibility		Months															
				Implementation	Supervision	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
Work outside the RoW	Construction activities may, in rare instances, be necessary outside the RoW. Where this becomes necessary, the use of land outside the RoW must be planned and agreed with owners of the affected land and properties prior to the start of the construction	and/or owners affected	prior to start of work																		
2.8 Occupational Health And Safety																					
2.8.1 Inadequate safety footwear and protective Clothing provided, plus not adequate training in its use and	2.8.1 a) Contractor must provide vests, hard hats and protective footwear for all workers handling heavy materials, and working with caustic and hazardous materials such as concrete and asphalt, on bridges, etc. b) Contractor must provide protective masks to milling machine operators, and anyone working in the area of the milling machine dust- with masks of a micron size, capable of capturing dust down to 2 microns. c) The contractor must take the time to show how protective equipment is used, when it must be worn and that penalties including lost work days on site could result if such equipment is not used.	All work sites at all times	a)-b) At start of construction and work and available throughout the construction period. c) at the start of a contract where workers will be involved with heavy equipment and in active traffic areas																	
2.8.2 Access to medical assistance facility on site	2.8.2 Contractor must have first aid services available to all staff and workers at all times; Contractor must have at least one emergency treatment specialist on call at all times and available for emergency treatment as required and have knowledge of the location and distance to nearest hospital. Contract workers to be made aware of availability and location of first aid, via a written and oral description.	All construction sites	All the time																		
2.8.3 Storage, handing and use of hazardous materials	2.8. .3Handling of all caustic and petroleum based materials must be done, wearing protective footwear and clothing as well as protection against fugitive dust, herbicides, asphalt and fresh concrete. Storage of such materials must be protected from the weather and safe from potential tampering and theft.	For all construction operations	At any time during the construction period																		
2.8.4 Provision of sanitary toilet facilities at all times	2.8.4 Contractor must provide sanitary toilet facilities for all full-time workers on the construction site and make sure it is serviced at intervals required to maintain standards of hygiene. Contractor must provide sanitary and private, shower/washing areas for all work camp staff	All work sites operated by contractor and without existing facilities	At all times during the construction period																		

Environmental Issue	Mitigation Measures	Location[2]	Time Frame	Responsibility		Months															
				Implementation	Supervision	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
2.8.5 Control of movement of large equipment and handling of construction items	2.8.5 Large vehicles and machinery should be equipped with safety features such as reverse alarms and lights. All movements of large vehicles and machinery on a construction site must be directly supervised by an appointed competent person at all times	The entire construction operation	At all times throughout the construction period																		
2.8.6 Child Labour	2.8.6 No Children (less than 16 year of age) can work on any contract	Everywhere the contractor is involved	At all times																		
2.8.7 Records of Safety and Health	2.8.7 The Contractor shall maintain records and make reports concerning safety, health, and welfare of persons and damage to property available for inspection as the Engineer in charge may from time to time prescribe.	Everywhere the contractor is involved	At all times																		
2.8.8 Reporting of Accidents	2.8. 8The Contractor shall report to the Engineer details of any accident or incident as soon as possible after its occurrence. In the case of any fatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means	For all work sites	Weekly																		
2.8.9 Provision of Potable Water	2.8.9 The contractor shall provide potable water to all staff working on the worksite and at all times	All work sites	At all times																		
2..8.10 Working into the night and disturbing communities	2.8.10 Generally contractors will be restricted to work only during the daylight hours. However consultation and agreement with local communities will allow for modifications. Contractor consultation with subproject corridor communities will be important	All construction sites within 500 m of a community or sensitive facility such as hospital or school	All the time																		

ANNEX 8
Selecting the Best Bioengineering Solution
(Table From Howell, 1999, Figure 1.12)

Start(a)	➔ (b)	➔ (c)	➔ (d)	➔ (e)	➔ (f)	➔ (g)
Slope angle	**Slope length**	**Material drainage**	**Site moisture**	**Previous/potential problems**	**Functions required**	**Technique(s)**
> 45º	> 15 metres	Good	Damp	Erosion, slumping	Armour, reinforce, drain	**Diagonal grass lines**
			Dry	Erosion	Armour, reinforce	**Contour grass lines**
		Poor	Damp	Slumping, erosion	Drain, armour, reinforce	1 **Downslope grass lines and vegetated stone pitched rills** or 2 Chevron grass lines and vegetated stone pitched rills
			Dry	Erosion, slumping	Armour, reinforce, drain	**Diagonal grass lines**
	< 15 metres	Good	Any	Erosion	Armour, reinforce	**1 Diagonal grass lines** or 2 Jute netting and randomly planted grass
		Poor	Damp	Slumping, erosion	Drain, armour, reinforce	1 **Downslope grass lines** or 2 Diagonal grass lines
			Dry	Erosion, slumping	Armour, reinforce, drain	1 **Jute netting and randomly planted grass** or 2 Contour grass lines or 3 Diagonal grass lines
30º - 45º	> 15 metres	Good	Any	Erosion	Armour, reinforce, catch	1 **Horizontal bolster cylinders and shrub/tree planting** or 2 Downslope grass lines and vegetated stone pitched rills or 3 Site grass seeding, mulch and wide mesh jute netting
		Poor	Any	Slumping, erosion	Drain, armour, reinforce	1 **Herringbone bolster cylinders & shrub/tree planting** or 2 Another drainage system and shrub/tree planting
	< 15 metres	Good	Any	Erosion	Armour, reinforce, catch	1 **Brush layers of woody cuttings** or 2 Contour grass lines or 3 Contour fascines or 4 Palisades of woody cuttings or 5 Site grass seeding, mulch and wide mesh jute netting
		Poor	ny	Slumping, erosion	Drain, armour, reinforce	1 **Diagonal grass lines** or 2 Diagonal brush layers or 3 Herringbone fascines and shrub/tree planting or 4 Herringbone bolster cylinders & shrub/tree planting or 5 Another drainage system and shrub/tree planting
< 30º	Any	Good	Any	Erosion	Armour, catch	1 **Site seeding of grass and shrub/tree planting** or 2 Shrub/tree planting
		Poor	Any	Slumping, erosion	Drain, armour, catch	1 **Diagonal lines of grass and shrubs/trees** or 2 Shrub/tree planting

Start(a)	➔ (b)	➔ (c)	➔ (d)	➔ (e)	➔ (f)	➔ (g)
Slope angle	**Slope length**	**Material drainage**	**Site moisture**	**Previous/potential problems**	**Functions required**	**Technique(s)**
	< 15 metres	Any		Erosion	Armour, catch	**Turfing and shrub/tree planting**
	Base of any slope			Planar sliding or shear failure	Support, anchor, catch	1 **Large bamboo planting** or 2 Large tree planting