Environmental Monitoring Report

2nd Semestral Report
Project Number: 46040-013
December 2016

PRC: Yunnan Pu'er Regional Integrated Road Network Development Project

Prepared by Pu'er Municipal Transport Bureau for the Yunnan Pu'er Municipal Government and the Asian Development Bank

Asian Development Bank

People's Republic of China

Yunnan Pu'er Regional Integrated Road NetworkDevelopment Project

ADB LOAN 3217 - PRC

Environmental Monitoring Report

#2 Semi-annual Report

For The Period Ending

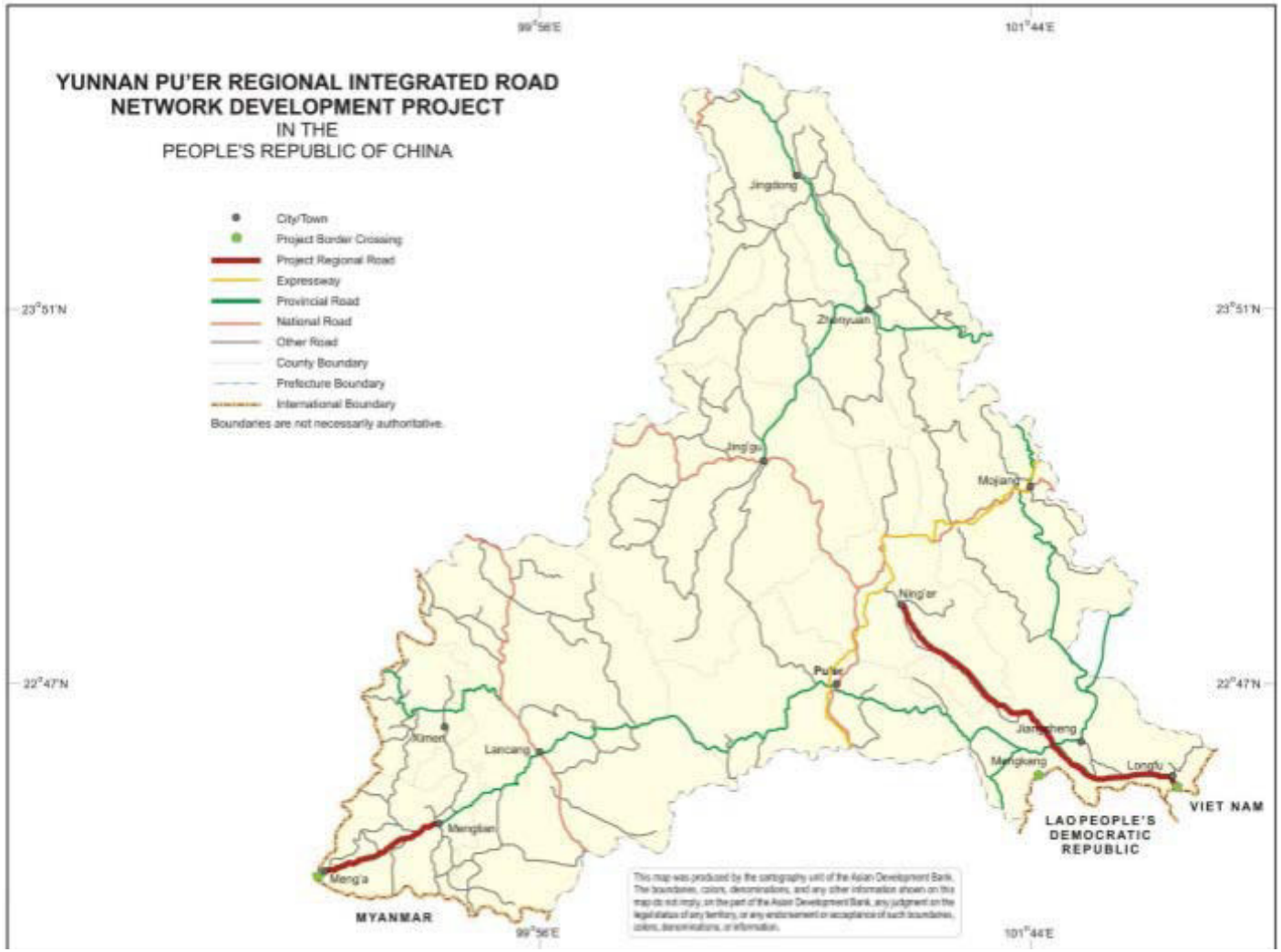
31 December 2016

Pu'er Municipal Government
Pu'er Municipal Transport Bureau

ABBREVIATIONS

ADB	Asian Development Bank
CO_2	Carbon Dioxide
COD_{Cr}	Chemical Oxygen Demand
DO	Dissolved Oxygen
dB(A)	Unit of the equivalent continuous sound level A(Decibel)
EA	Executing Agency
EARF	Environmental Assessment And Review Framework
EEMA	External Environmental Monitoring Agency
EHS	Environmental, Health & Safety
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMDP	Ethnic Minority Development Plan
EMP	Environmental Management Plan
FSR	Feasibility Study Report
GRM	Grievance Redress Mechanism
GTRI	Guangxi Transportation Research Institute
ha	Hectare
IA	Implementing Agency
ICB	International Competitive Bidding
km	Kilometre
L	Litre
LIEC	Loan Implementation Environmental Consultant
m^3	Cubic metre
mg	Milligrame
MMR	Menglian-Menga Road
MTC	Meng'A Material Transit Centre
NCB	National Competitive Bidding
NJFR	Ning'er-Jiangcheng-Longfu Road
NO_2	Nitrogen Dioxide
O&M	Operation And Maintenance
PEMS	Pu'Er Environmental Monitoring Station
PEPB	Pu'Er Environmental Protection Bureau
PMG	Pu'Er Municipal Government
PMTB	Pu'Er Municipal Transport Bureau
PPMO	Pu'Er Project Management Office
PRC	Project Completion Report
PRC	People'S Republic Of China
PS	Project Supervisor
PWRB	Pu'Er Water Resources Bureau
RP	Resettlement Plan
SO_2	Sulfur Dioxide
SS	Suspended Solid
SWCR	Soil And Water Conservation Repor
TPH	Total Petroleum Hydrocarbons
TSP	Total Suspended Particle
YEPB	Yunnan Environmental Protection Bureau
YNFY	Yunnan Fangyuan Technology Co., Ltd.

Map 1TheLocationg of Yunnan Pu'er Regional Integrated Road Network Development Project



Contents

I. INTRODUCTION

A. Report Purpose and Rationale

The purpose of the Environmental Monitoring Report （EMR） is to document the environmental management activities and compliance with the EMP.This report is 2nd semi-annual EMR for the period from August to December, 2016. As 2nd semi-annual EMR, it demonstrates compliance with the EMP for the design, bidding, and construction preparation stages.

The EMRcovers: (i) Implementation progress of the project; (ii) Implementation status of the *Environmental Management Plan*(EMP) and layout of the environmental supervisory institutions; (iii) Implementation of measures to lessen environmental impacts of the project; (iv) Findings of environmental monitoring; (v) Public consultation; (vi) Building and training of institutions; (vii) Major environmental problems during the current phase, countermeasures and suggestions.

The EMR is prepared by the External Environmental Monitoring Agency (Guangxi Transportation Research Institute, Yunnan Fangyuan Science and Technology Co., Ltd, Yunnan Jin Yu Ecological Engineering Consulting Co., Ltd, Kunming Longhui Engineering Design Consulting Co., Ltd). It based on the environmental supervision reports, the external environmental monitoring reports and theSoil Erosion Protection monitoring reports, submitted by the External Environmental Monitoring Agencies. Some information provided by the PPMO and other management departments. The field survey carried out by the PPMO.

B. Project Objective and Components

B-1.Project Scope and Objectives

The principal objective of the project is to improve rural transport situation in Pu'er and regional road network, and to strengthen regional integration of Pu'er and boarder areas of neighboring countries the trade development among them. The project is designed to accomplish these objectives through three discrete components.

Output 1: Regional roads development. This output comprises: (i) upgrading and new construction for a total of 228.078 km of Class III highway between Ning'er–Jiangcheng–Longfu; (ii) upgrading and new construction for the 44.739 km Menglian to Meng'a section of the existing Lancang–Menglian–Meng'a Class III / IV border road to a predominantly Class II road; (iii) the development of trade facilities at the MTC; and (iv) improving the safety of the roads by introducing safety measures determined by the ChinaRAP road safety design decision making tool.

Output 2: Rural access improvements. This output comprises: (i) the upgrading of about 600 km of village earthen or gravel roads to concrete Class IV standard; (ii) spot improvements on up to 1,200 km (or CNY24 million investment) of connecting lower level village roads; (iii) introduction of five new village bus service routes on a pilot basis, and (iv) a gender focused rural road maintenance program. The primary objective of the roads is to provide all weather access to administrative villages or to link with higher level roads.

Output 3: Institutional development. This output will address the limited implementation capacity of PMG. A project management consultant will be recruited to assist the PMG to implement and monitor the project in accordance with ADB procedures. The project will finance a 3-year training program ($400,000 for 40 person-months) for international and domestic training in financial and project management, road maintenance engineering, road maintenance practices, road safety, environmental management, social safeguards management, and wildlife trafficking and human and drugs trafficking enforcement.

B-2.Engineering Brief

Output 1: Regional Roads

Menglian-Meng'a Road： The Road starts from Menglian at K54+900， goes through Mengma, ends at Meng'a Port, chainage of K99+744.3. There are three broken chainages, so the actual length is 44.7km. The technical standard is highway Class II with design speed of 60 km/h. The standard width is 12m from K54+900 to K95+594.8, only at the end section from K95+585.04 to K99+744.29, ending at Meng'a Port the road width of 23m applies.

Ning'er–Jiangcheng–Longfu Road： The Road starts at Ningjing Highway K3+800, north side of Ning'er Township, Ning'er County, ends at Jiangcheng No.3 China-Vietnam border marker, 228.0km in length. The technical standard is highway Class III, with the design speed of 40 km/h, the width of 8.5m from the start point to Laozhaozhai, 25.136km in length, and the design speed of 30 km/h, the width of 7.5m from the Laozhaozhai to the end point, 202.9km in length (12m in width for the section of KM231+706.30～KM234+069.52).

Output 2: Rural Access Improvements

The rural access improvement plan is to provide all-weather Class IV, thirty-one paved rural roads, 600km in total length in seven counties in Pu'er municipality, and provide spot improvements on the village roads, 1200km in total length linking the remote villages with these rural roads. The latest adjustment has basically confirmed thatthirty rural roads, 537.12km in total length will receive the improvements, including three rural roads, 73.7km in total length in Mojiang County, two roads, 70.75km in Jinggu, seven roads, 126.94km in Zhenyuan, two roads, 56.3km in Jiangcheng, five roads, 59.65km in Lancang, six roads, 66.3km in Ximeng and five roads, 73.48km in Jingdong. Most of these rural roads will be paved with cement concrete. The site investigations on the village roads for the spot improvements will be conducted late; the scope will be finalized accordingly.

Table 1-1:The Engineering Features

Engineering Name		Menglian-Meng'a Road	Ning'er–Jiangcheng–Longfu Road	Rural Access Improvements
Total Length		44.7km	228.0km	537.12km
Road Class:		Class Ⅱ- 2 lanes, undivided; uncontrolled access	Class Ⅲ - 2 lanes, undivided; uncontrolled access	Class Ⅱ- 1 lane; uncontrolled access
Design Speed		60km/h	30、40km/h	20km/h
Loading Class		2	2	2
Earthquake Zone:		IX	VII,VIII	Ⅷ、IX
Design Flood		large bridge, 100 years, other 50 years; roadway 50 years	large and mediumbridge, 50 years, other 25 years; roadway 25 years	small bridge,50years
Subgrade Width		integrated 2 lanes 12 m, 23 m	integrated 2 lanes 7.5 m, 8.5 m	4.5～6.5m
Land area occupied		121.384 ha	147.949 ha	—
Terrain		mountain area	mountain area	mountain area
Horizontal alignment	**Curve**	90	1673	—
	Minimum radius	162.97m	15m	15m
	Curve length	59.67%	60.62%	—
Vertical alignment	**Steepest gradient**	6%	12%	9%
	Minimum	crest 2,200 m	crest 300m	—

	curve radius	sag 2,874.341 m	sag 300m	

C. Project Implementation Progress

Output 1: Regional Roads

Menglian - Meng'a Road：By 31 December2016,procurement of this subgrade contract package has been completed. The earthwork excavation for the whole line is under construction. The tree felling and surface clearing have been completed on K62+890~K63+150, and 40% earthwork excavation has been completed; the surface clearing on K56+910~K57+350 (beam factory and mixing station) has been completed, and the site leveling is under construction; earthwork excavation for subgrade on K84+200~K84+400 section is under construction; the construction for central mixing station at the location of K84+800 has been completed.Thebridge foundation of Nancha River (K56+803) andNanma River (K96+300）have started construction at November.The gravel-soil-taken field has not yet been enabled. Four spoil disposal areas have been enabled, therein, the retaining wall is under construction in three of them.

Ning'er - Jiangcheng - Longfu Road：By 31 December 2016,procurement of this subgrade ontract package has be completed. The project is on controllable construction stage, the whole line is divided into ten bid sections, the construction company has stationed into the site fully and the line retesting has been finished, the verification on location for spoil disposal area is under implementation currently, the subgrade excavation have been conducted on some sections.

Output 2: Rural Access Improvements

Procurement is underway. Construction is not commenced.

II. INSTITUTIONAL ORGANISATION AND RESPONSIBILITIES FOR EMP IMPLEMENTATION

A. Institutional responsibilities

The Pu'er Municipal Government is the Executing Agency (EA) who has overall responsibility for project implementation. The EA has established the Pu'er Project Management Office (PPMO), which has been delegated overall responsibility for day-to-day management of the project, supervising the implementation of the EMP, coordinating the project environmental grievance redress mechanism and reporting to ADB.

The Pu'er Municipal Transport Bureau(PMTB) is the Implementing Agency (IA) responsible for implementing project components, administering and monitoring contractors and suppliers, construction supervision, quality control and EMP implementation. The IA will prepare bid documents and ensure that bids are responsive to environmental requirements and budgets and contracts include environmental clauses from the EIA, and the full EMP.

The PPMO and the IA have both assigned environmental staff to manage, coordinate, oversee and verify EMP implementation.

Mitigation measures (including, road alignment avoiding sensitive or protected areas) have been built into the detailed design by theengineeing design consultants.

PMTB hascontracted the Yunnan Fangyuan Science and Technology Co., Ltd, Guangxi Transportation Research Institute, Kunming Longhui Engineering Design Consulting Co., Ltd, and Yunnan Jin Yu Ecological Engineering Consulting Co., Ltd, who shall carry out environmental monitoring at the construction stage according to the EMP .These four agencies are the External Environmental Monitoring Agency（EEMA）.

PMTB has contracted Yunnan Shengmeng Engineering Consulting Co., Ltd, Shandong Ping'an Road and Bridge Engineering Consulting Co., Ltd, and Yunnan Yuantu Engineering Supervision Co., Ltd, to supervise the construction of the Menglian-Meng'a Road and the Ning'er-Jiangcheng-Longfu Road, supervise the environment simultaneously during engineering supervision, and submit the environmental supervision report on monthly basis.

A Loan Implementation Environmental Consultant (LIEC) is included through the project Management Consulting services. They will assist the PPMO and the IA with EMP implementation including environmental training and reporting. The semi-annual EMRs will be preared by the External Environmental Monitoring Agency.

Contractors will be responsible for implementing the mitigation measures during construction under the supervision of PPMO through the Supervision Office, and LIEC.

In their bids, contractors are required to respond to the environmental management and monitoring requirements defined in the EMP. Each contractor is required to develop site specific EMPs and will assign a person responsible for environment, health and safety.

See the Appendix 1 for the environmental management institutions of the project.

Table 2-1TheCompliance Status ofInstitutional Responsibilities for Eenvironmental Management

Responsible Entity	Project Stage	Environmental Responsibility	Compliance with EMP
PMG	**All Stages**	The Executing Agency (**EA**) for the project responsible for overall implementation and compliance with loan assurances and the EMP.	Being complied with
PPMO	**Project Preparation**	• Engage design institutes on FSR, EIR, RP and SWCR	• Complied with
	Engineering Detailed Design	• Engage design institutes • Review updated EMP, confirm that mitigation measures have been included in engineering detail design	• Complied with
	Tendering & Pre-construction	• Appoint at least one environmental specialist on staff	• Complied with
		• Incorporate EIA/EMP clauses in tender documents and contracts	• Complied with
		• Prepare EIAs for replacement rural roads according to the EARF and submit to ADB	• Being complied with
	Construction	• Supervise the effective implementation of the EMP	• Being complied with
		• Establish and operate the project public complaint s center and coordinate the project environment GRM.	• Being complied with
		• Prepare quarterly project progress reports and semi-annual environment monitoring reports and submit them to ADB	• Being complied with
		• Conduct information disclosure and public consultation	• Being complied with
		• Inspect implementation of mitigation measures.	• Being complied with
PMTB	**Tendering & Pre-construction**	• Manage the procurement process	• Complied with
		• Incorporate EIA/EMP clauses in tender documents and contracts	• Complied with
		• Appoint at least one environmental specialist on staff	• Complied with
		• Engage LIEC as part of the Loan Implementation Project Management Consulting Services	• Complied with
		• Engage EEMA for environmental monitoring	• Complied with
		• Engage EEMA for independent compliance monitoring	• Complied with
	Construction	• Supervise contractors and ensure compliance with the EMP	• Being complied with
		• Approve method statements	• Being complied with
		• Coordinate construction supervision and quality control	• Being complied with
		• Coordinate environmental monitoring according to the environmental monitoring program in the approved EMP	• Being complied with
		• Act as a local entry point for the project GRM	• Being complied with

Responsible Entity	Project Stage	Environmental Responsibility	Compliance with EMP
		• Submit quarterly monitoring results to PPMO, PEPB.	• Being complied with
Design institutes	**Project Preparation**	• Prepare project FSRs, EIRs, RPs, SWCRs	• Complied with
		• Conduct public consultation	• Complied with
	Engineering Detailed Design	• Incorporate mitigation measures defined in the EMP into engineering detail designs	• Complied with
		• Update the EMP in cooperation with the LIEC	• Being complied with
YEPD	**Project Preparation**	• Review and approve the project EIRs	• Complied with
PEPB/PWRB	**Construction**	• Conduct inspections of construction sites and activities to monitor compliance with PRC regulations and standards	• Being complied with
PPTA consultant	**Project Preparation**	• Provide technical assistance	• Complied with
		• Review EIRs	• Complied with
		• Prepare EIA report and EMP	• Complied with
LIEC	**Engineering Detailed Design**	• Review updated EMP, confirm that mitigation measures have been included in engineering detailed design	• Complied with
	Tendering & Pre-construction	• Review bidding documents to ensure that the EIA/EMP clauses are incorporated	• Complied with
		• Confirm project's readiness in respect of environmental management.	• Complied with
	Construction	• Advise on mitigation measures	• Being complied with
		• Provide technical support to PPMO and PMTB for environmental management	• Being complied with
		• Conduct environmental training	• Being complied with
		• Conduct semi-annual EMP compliance review	• Being complied with
		• Support PPMO in preparing quarterly project progress reports and semi-annual environmental monitoring reports.	• Being complied with
		• Review domestic environmental acceptance reports	• Being complied with
		• Prepare environmental completion report.	• To be complied with
Contractors	**Tendering & Pre-construction**	• Ensure sufficient funding and human resources for proper and timely implementation of required mitigation and monitoring measures in the EMP throughout the construction phase	• Complied with
	Construction	• Appoint an environment, health and safety (EHS) officer to oversee EMP implementation related to environmental, occupational health and safety on construction site	• Complied with
		• Ensure health and safety	• Being complied with
		• Implement mitigation measures	• Being complied with
		• Prepare method statements on the implementation of pollution control and mitigation measures listed in Table 2 of EMP,	• Being complied with

Responsible Entity	Project Stage	Environmental Responsibility	Compliance with EMP
		and submit to PMTB and EEMAfor review	
		• Act as a local entry point for the project GRM	• Being complied with
EEMA	**Construction**	• Undertake environmental monitoring according to the environmental monitoring program in the approved EMP (contracted by PMTB)	• Being complied with
		• Report monitoring data to PMTB monthly	• Being complied with
		• Conduct independent verification of project's environment performance and compliance with the EMP (contracted by PMTB)	• Being complied with
		• Review monthly monitoring data submitted and conduct compliance checking against applicable environmental standards	• Being complied with
		• Provide advice to contractors for resolving on-site environmental problems when monitoring data show non-compliance.	• Being complied with
		• Submit quarterly compliance monitoring results to PPMO, PMTB and PEPB	• Being complied with

B. Incorporation of Environmental Requirements into Project Contractual Arrangements

The main items of the EIA and all the contents of the EMP have been included in the bidding documents and construction contracts.

B-1. Output 1: Regional Roads

The environmental engineering is clearly defined as one of the main contents in the bidding documents for regional roads and all the requirements concerning environmental protection are included in the special terms of related contracts:

Menglian-Meng'a Road:

Table2-2: Environmental Requirements of Menglian-Meng'a Road Construction Contract

Terms	Environmental Requirements
4.18 Environmental Protection	The Contractor shall execute environmental monitoring procedures and mitigation measures to minimize adverse impacts of the project to the environment. The aforesaid mitigation measures shall cover the design, construction and management of the project and the maintenance and operation of equipments used here, and shall be implemented strictly. The Contractor shall guarantee that the emissions, disposed items and sewage generated during the construction of the project will not go beyond related limits defined by related laws and regulations. (1) For the purpose of protecting health of the construction workers, the Contractor shall, as for the control of noises generated by construction machinery and transport vehicles, observe the *Noise Pollution Control Law of the People's Republic of China* and the *Emission Standard of Environmental Noise within the Boundary of Construction Site* (GB12523-2011) and arrange the working machinery rationally so that to minimize the duration of exposure of workers in the intensive environmental noises, or arrange periodic intensive noise work, or provide protective devices (like safety shoes and helmets, goggles, breathing masks or take other effective measures, which including definitely, shorter work hours. Furthermore, importance shall be paid to maintain the machinery so that to minimize possible noises. For the purpose of protecting residents nearby, no night

Terms	Environmental Requirements
	construction activities shall be arranged, or earlier approval from the residents shall be obtained or use low-noise machinery if night construction is required. Loud-noise equipments, such as the stone breaker and the concrete mixer, shall be kept at least 1km away from the noise sensitive objects. (2) Pollutants during road construction mainly come from the lime-soil dust generated from the running and transportation of construction vehicles and machines. In this regard, effective measures shall be taken to mitigate air pollution on the construction site so that to protect health of the workers. These measures include: a. Choose sealed dustproof electronic equipments; b. Water the machines for channel building and the concrete mixing plants at regular intervals to lower the dust; c. For by-stage works, certain moisture shall be kept to avoid dust; d. Treat the sludge in the drilled pile with correct method when erecting bridges so that to prevent directly dumping the sludge into the rivers or farmlands; e. Spoils can be dumped only at approved site. (3) Reliable measures shall be taken to guarantee unblocked traffic, water supply for domestic use and irrigation, power supply, communication, and normal living and production conditions of nearby urban and rural resident. (4) The preparatory area for construction, work shed, storing area for fuel and other materials, and the fueling and maintenance areas shall be at least 500m away from the water source. (5) The Contractor shall comply with related national and local environmental laws and regulations to A) Set up an operating mechanism to control environmental impacts; B) Adopt and implement the environmental supervision, EIA and EMP. The Contract shall report the implementation of such environmental supervision, EIA and EMP to the Owner on quarterly or half-yearly basis. The Contractor shall comply with related national, provincial and local environmental laws and regulations and the EMP. In addition, the Contractor shall: (1) Set up the environmental impact control system; (2) include in the EIA and the EMP the measures to control and mitigate environmental impacts; (3) Distribute budget according to related requirements so that to guarantee implementation of related measures. The Contractor is required to report to the Owner the implementation of these measures on half-yearly basis. What's more, the Contractor shall comply with (i) The measures and requirements proposed in the EIA and the EMP, see the Appendix [2] for details; (ii) The Employer shall be always ready to monitor the implementation of the EMP and carry out all the correction or prevention presented in the security monitoring report. The Contractor shall follow these measures, requirements and actions to distribute the cost.
Work Contents	MM-Sub1: Roadbed, bridge and culverts, greening and environmental protection, etc; MM-Sub2: Roadbed, bridge and culverts, greening and environmental protection, etc;

Ning'er-Jiangcheng-Longfu Road:

Table2-3: Environmental Requirements of Ning'er-Jiangcheng-Longfu Road Construction Contract

Terms	Environmental Requirements
General terms 1.1 (36)	Work contents: NJL-Sub1: Roadbed, bridge and culverts, greening and environmental protection, etc ; NJL-Sub2: Roadbed, bridge and culverts, greening and environmental protection, etc; NJL-Sub3: Roadbed, bridge and culverts, greening and environmental protection, etc; NJL-Sub4: Roadbed, bridge and culverts, greening and environmental protection, etc;

Terms	Environmental Requirements
	NJL-Sub5: Roadbed, bridge and culverts, greening and environmental protection, etc;
General terms 2.3 (9)	Following documents are part of the contract: 1. Resettlement plan (RP); 2. Environmental Impact Assessment (EIA); 3. Environmental Management Plan (EMP); 4. Gender Action Plan (GAP); 5. Ethnic Minority Development Plan(EMDP);
Special terms 65	The Contractor shall comply with the national, provincial and local environmental laws and regulations; The Contractor shall: (a) Set up a running system for environmental impact management; (b) Take monitoring and mitigation measures over the EIA, EMP, RP and EMDP (focus on the environmental protection, the non-voluntary resettlement guarantee measures and indigenous people guarantee, during construction); (c) Comply with all the corrective and preventive measures, including: (i) the guarantee supervision report; or (ii) follow-up agreements between the Asian Development Bank and the People's Government of Pu'er; (d) Take all the necessary measures to minimize damage to religious trees and religious remains during construction; (e) Allcate budget for guarantee the implementation of all the above measures. The Contractor shall fulfill related responsibilities concerning the non-voluntary resettlement guarantee before settling the final payment. The Contractor shall submit to the IA reports on the implementation of all the above measures on quarterly basis.

B-2. Output 2: Rural Roads

The bidding documents of Rural Roads are under preparation.

III. COMPLIANCE WITH ENVIRONMENTAL PROTECTION TERMS OF AGREEMENTS CONCERNING THE PROJECT

Up to now, the EA and IA of the project have fully implemented or are implementing all the due environmental terms defined in the loan agreement, and have get well prepared to implement all the undue environmental terms. See the following table for compliance with environmental terms defined in Appendix B of the Loan Agreement.

Table3-1: Compliance with Environmental Protection Terms of Agreements

Environmental Relevant Covenant	Status of Compliance
2. PMG shall ensure or cause to ensure that the preparation, design,construction implementation, operation and decommissioning of the project and all project facilities comply with (a) all applicable laws and regulations of the Borrower relating toenvironment, health and safety; (b) the Environmental Safeguards; and (c) all measures and requirements set forth in the EIA, the EMP, and any corrective or preventative actions (i) set forth in a Safeguards Monitoring Report， or (ii) which are subsequently agreed between ADB and PMG.	The executing institution and the implementing institution have strictly taken measures and observed requirements defined in the EIA and the EMP. • Being complied with.
3. PMG shall ensure that permanent and temporary land take for the MenglianMeng'a Road shall avoid intact woodlands at road sections as specified and agreed in the EMP.	Design and current construction of the Menglian-Meng'a Road have avoided the whole forest land along the road. • Being complied with.
4. PMG shall ensure CO_2 emissions monitoring and annual reporting to ADB during the operation of the Project Rural Roads and Project Regional Roads up to year 2020, by conducting traffic counts annually and calculating CO_2 emissions, for comparison with ADB's CO_2 emission threshold of 100,000 tons annually for all the project roads combined.	• To be complied during operation
5. PMG shall ensure that the design of the project roads takes into consideration climate change adaptation recommendations from the ADB funded climate change assessment study.	• Complied with.
6. PMG shall ensure that the road section as specified and agreed in the EMP shall not traverse through Protection Zones 1 and 2 of the Wenquan Reservoir.	The location of Wenquanhe Reservoir have been changed. The section K25+200~K45+200 of Ning'er-Jiangcheng-Longfu Road don't cut through the runoff area of Wenquanhe Reservoir. This section don't need to be redesigned. • Complied with.
7. PMG shall ensure that there is no tree felling and siting of asphalt mixing and concrete batching station within the road section as specified and agreed in the EMP during its construction.	Up to now, the asphalt mixing and concrete batching stations have been located on the grassland and cropland. There is no tree felling. • Being complied with.
8. PMG shall ensure that the protected tree species at locations along the Ning'er-Longfu Road as specified under the EMP shall be marked, tagged and fenced off before commencement of the construction	• The contractors of Ning'er-LongfuRoadare marking and fencing off the protected tree species. • Being complied with;
9.PMG shall ensure that noise mitigation measures are implemented. Such measures shall include road side noise barriers and provision of double-glazed windows at locations specified in the approved domestic Environmental Impact	The corresponding noise reducing measures will be included in the engineering design;

Environmental Relevant Covenant	Status of Compliance
Assessment for the Menglian-Meng'a Road and the Ning'er-Longfu Road.	• To be complied at the late stage of construction.

IV. ENVIRONMENTAL MITIGATIONS AND COMPENSATION MEASURES IMPLEMENTED IN THE REPORTING PERIOD

Investigation is made on changes in the engineering contents during the current report period and results are as follows:

Adjustments have been made to 28 line positions along the Menglian-Meng'a Road, increasing the earthwork by 43,500m^3 and the requisitioned forest land by 5.2474ha.

According to the survey，The location of Wenquanhe Reservoir have been changed. The section K25+200~K45+200 of Ning'er-Jiangcheng-Longfu Road don't cut through the runoff area of Wenquanhe Reservoir. This section doesn't need to be redesigned.

A few sections ofMenglian-Meng'a Road and Ning'er-Jiangcheng-Longfu Road have been adjusted by unilateral vibration based on the original line positions. The stake number of sensitive points has been changed, and some sensitive points need to increase or decrease. The EMP will be updated.

The implementation status of measures to mitigate environmental impacts of the project up to now is listed below according to the EMP. During the current report period, measures to be implemented to mitigate the environmental impacts have been implemented.

Table4-1: Implementation Status of Measures to Mitigate Potential Environmental Impacts

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
A. Potential environmental impacts and countermeasures existing in and applicable to the Ning'er-Jiangcheng-Longfu Road, Menglian-Meng'a Road and rural roads					
The Design Stage					
Soil resources	Loss of land and topsoil and increased risk of erosion	➢ Minimize permanent and temporary land take for both highways, especially cultivated land and basic farmland. ➢ Retain/incorporate landscape features of interest in design. ➢ Optimize balance between cut and fill and avoid deep cuts and high embankments to minimize earthworks. ➢ Maximize reuse of spoil within the construction or adjacent construction works. ➢ Agree borrow and spoil disposal sites, management and rehabilitation plan with PEPB if these sites are different from those specified in the Soil and Water Conservation Report. ➢ Remove and store topsoil (10-30cm) for restoration works prior to main earthworks. ➢ Specify landscape species that serve a specific bioengineering function, are in keeping with natural habitats and landscape and of local provenance. ➢ Design appropriate retention and drainage systems for slopes to reduce soil erosion.	Design Institute	PPMO; PMTB	The dedicated *Design Proposal for Water and Soil Conservation* is prepared and this proposal will be followed for engineering construction here. ➢ Complied with
Extreme weather events due to climate change	Road surface cracking due to extreme hot or cold weather, landslide and flooding due to torrential rainfall	➢ Consider potential impacts from extreme weather events due to climate change in designing road subgrade, pavement, road-side slopes, drainage system, bridges and culverts. ➢ Adopt appropriate protective measures such as vegetation cover, geotextiles, settling basins, permeable paving, infiltration ditches, stepped slopes, riprap, crib walls, retaining walls and intercepting ditches to reduce the speed of surface run-off.	Design Institute	PPMO; PMTB	Potential impacts from extreme weather events are taken into consideration during the design stage. See the designed flood frequency set forth in Table 1-1 herein. ➢ Complied with
Water quality	Bridge construction across water	➢ All construction staging areas, construction camps, fuel and materials storage, re-fuelling and maintenance areas to be located at least 500m from watercourses.	Design Institute	PPMO; PMTB	All the designed interim facilities during construction stage of the project are far away from the surface

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
	bodies	➢ Design of these construction staging areas and construction camps must ensure proper collection and treatment of wastewater and site runoff.			water; sewage collection and treatment facilities are designed for all the construction areas and living quarters. ➢ Complied with
Health and safety	Promotion of pedestrian safety, protection of vulnerable road users	➢ Design must ensure public health and safety. ➢ Design must ensure safety of pedestrians and agricultural traffic. ➢ Adopt universal design principles for where appropriate.	Design Institute	PPMO; PMTB	Dedicated public health and safety design are made during design of the project ➢ Complied with
Air emissions	Construction transport emissions	Specify local materials from licensed providers that minimize transport distance.	Design Institute	PPMO; PMTB	Most of materials used for construction of the project are purchased from local markets according to the principle of "purchase nearby"; ➢ Complied with
GHG emissions	Energy efficiency	Consider energy efficient machinery and operational equipment	Design Institute	PPMO; PMTB	All the machines and equipments used for the project satisfy related energy efficiency standard of China. ➢ Complied with
Pre-construction Stage					
Institutional strengthening	Lack of environment management capacity within PPMO	➢ Appoint qualified environment specialist to PPMO staff. ➢ Include LIEC in loan implementation project management consulting services. ➢ LIEC to conduct environment management training for PPMO staff and environmental specialist.	PPMO, LIEC, PEPB	ADB	PPMO has appointed the environment specialist and the LIEC. Environment management trainingshave been included in the plan ➢ Being complied with
	Lack of environment management and monitoring capacity within PMTB	➢ Appoint qualified environmental specialist to PMTB staff. ➢ Contract EEMA to conduct environment monitoring ➢ Contract qualified EEMA to conduct external compliance monitoring and verification of EMP implementation ➢ LIEC to conduct environment management training for PMTB staff and their environmental specialist.	PMTB, LIEC, PEPB	PPMO, ADB	PMTB has appointed the environment specialist and signed a contract with the external environmental monitoring institutions to carry out legal compliance supervision for environmental monitoring and the EM. The LIEC hasn't organized related

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
					training activities yet. ➢ Being complied with
EMP update	-	➢ Review mitigation measures defined in this EMP and update as required to reflect detailed design. ➢ Submit to ADB/PPMO for approval and disclose updated EMP on ADB website. ➢ Prepare a revised environmental compliance monitoring plan as required to meet the environmental requirements in the updated EIA and EMP.	PMTB, LIEC	PPMO, ADB	Reviewing shows that the EMP is required to update ➢ Complied with
EIA for replacement rural roads		• Prepare EIA (including EMP) for replacement rural roads according to the EARF and submit to ADB	PPMO	ADB	The EIA for replacement rural roads has beenapproved.It will be submitted to the ADB. ➢ Being complied with
Air quality	Dust (TSP) impact to sensitive receptors	Put into tender documents dust suppression measures: ➢ Frequent watering of unpaved areas, backfill areas and haul roads to suppress dust; ➢ Erect hoarding around dusty activities to contain emissions; ➢ Manage stockpile areas with frequent watering or covering with tarpaulin; ➢ Minimize the storage time of construction and demolition wastes on site by regularly removing them off site; ➢ Do not overload trucks when transporting earth materials to avoid spilling dusty materials onto public roads; ➢ Equip trucks for transporting earth materials with covers or tarpaulin to cover up the earthy materials during transport; ➢ Install wheel washing equipment or conduct wheel washing manually at each exit of each works area to prevent trucks from carrying muddy or dusty substance onto public roads; ➢ Immediately cleanup all muddy or dusty materials on public roads outside the exits of the works areas; ➢ Sensibly plan the transport routes and time to avoid busy traffic and heavily populated areas when transporting earthy materials; and ➢ Immediately plant vegetation in all temporary land take areas	Design Institute	PPMO; PMTB	Some measures (see the special term 4.18) in the EMP are included in the tender documents for the Menglian-Meng'a Road; no detailed measures are included in the tender documents for the Ning'er-Jiangcheng-Longfu Road but the EIA and the EMP are included are part of the contract (General term 2.3 (9)). ➢ Being complied with

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
		upon completion of construction to prevent dust and soil erosion.			
	Fumes and particulate matter from asphalt mixing plant and concrete batching plant	Put into tender documents that • These plants must be enclosed and equipped with bag house filter or similar air pollution control equipment. • Locate asphalt mixing plants and concrete batching plants at least 300m downwind from residential areas and other sensitive receptors.	Design Institute	PPMO; PMTB	
Noise	Power mechanical equipment noise impact to sensitive receptors	Put into tender documents the following noise mitigation measures: ➢ Use quiet equipment; ➢ Adopt good O&M of machinery; ➢ Use temporary hoardings or noise barriers to shield off noise sources; ➢ Avoid nighttime construction between 2200 and 0600 hours; ➢ If nighttime construction needed, consult nearby residents beforehand for their consensus; ➢ If nighttime construction needed, avoid using noisy equipment; and ➢ Maintain continual communication with the schools along the road alignments to avoid noisy activities near the schools during examination periods.	Design Institute	PPMO; PMTB	
Water quality	Construction site wastewater impact on water bodies	Put into tender documents the following measures to treat wastewater and runoff from construction sites and to prevent pollution to nearby water channels:: ➢ All construction camps, fuel and materials storage, re-fuelling and maintenance areas to be located at least 500m from watercourses ➢ Provide portable toilets and small package WWTPs for workers and canteens; and ➢ Install sedimentation tanks on-site to treat process water and muddy runoff.	Design Institute	PPMO; PMTB	
Ecology	Protection of	Put into tender documents:	Design	PPMO;	

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
	flora and fauna	➢ All project personnel, including construction workers, are prohibited from catching or trading in flora or fauna ➢ Project personnel will immediately report to the PMTB and EEMA any fauna found trapped within project sites e.g. in ditches or pits	Institute	PMTB	
Solid waste	Disposal or storage of excavated spoil	Specify in tender documents the spoil disposal or storage sites and that only these sites could be used.	Design Institute	PPMO; PMTB	
Health & safety	Occupational health & safety of workers	Specify in tender documents the provision of personal safety and protective equipment such as safety hats and shoes, eye goggles, respiratory masks, etc. to all construction workers;	Design Institute	PPMO; PMTB	
Social and environmental	Handling and resolving complaints received during project implementation	➢ PPMO to establish a project Complaint Center with hotline ➢ PPMO to publicize local access points (contractors, PMTB) for the GRM ➢ PPMO to establish grievance redress mechanism procedures for resolving, documenting and reporting complaints according to the EMP	PPMO	ADB	PPMO has set up the GRM. ➢ Complied with
Traffic	Construction vehicles causing traffic congestion	Plan transport routes for construction vehicles and specify in tender documents to forbid vehicles from using other roads during peak traffic hours.	Design Institute, Local traffic police	PPMO; PMTB	It is clearly defined in the tender documents that the Contractors shall "take reliable measures to guarantee unblocked traffic". ➢ Complied with
Construction Stage					

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
Soil resources	Spoil disposal	➢ Strip and store topsoil in a stockpile for reuse in restoration. ➢ Use spoil disposal sites approved by PEPB and manage in accordance with approved plan. ➢ Avoid side casting of spoil on slopes. ➢ Co-ordinate with water resources bureau monitoring station on effectiveness of soil erosion prevention measures and any need for remedial action. ➢ Rehabilitate and restore spoil disposal sites in accordance with agreed plan. ➢ Conduct project completion audit to confirm that spoil disposal site rehabilitation meets required standard, contractor liable in case of non-compliance.	Contractor	PMTB; EEMA; LIEC	At present, the Ning'er-Jiangcheng-Longfu Road and the Menglian-Meng'a Road is at the stage of excavation and embankment work. The surface soil, spoils and waste are treated strictly according to the design and the EMP. ➢ Being complied with
	Soil erosion	• Implement soil erosion protection measures as defined in the Soil and Water Conservation Report • Confirm location of the borrow pits and spoil storage and disposal sites; if these are different from those specified in the Soil and Water Conservation Report. • Construct intercepting ditches and drains to prevent runoff entering construction sites, and diverting runoff from sites to existing drainage; • Construct hoardings and sedimentation ponds to contain soil loss and runoff from the construction sites • Limit construction and material handling during periods of rains and high winds; • Stabilize all cut slopes, embankments, and other erosion-prone working areas while works are ongoing; • Stockpiles shall be short-term, placed in sheltered and guarded areas near the actual construction sites, covered with clean tarpaulins when not in use, and sprayed with water during dry and windy weather conditions; • All cut areas shall be stabilized with thatch cover within 30 days after earthworks have ceased at the sites; • Immediately restore and landscape temporarily occupied land	Contractor	PMTB; EEMA; LIEC	At present, the Ning'er-Jiangcheng-Longfu Road and the Menglian-Meng'a Road is at the stage of excavation and embankment work. Measures proposed in the SWCRare implemented in the road sections under construction now and monitoring on thesoil erosion protection is carried out. ➢ Being complied with

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
		upon completion of construction works. • Unauthorized extraction or disposal at other sites would be subject to penalties.			
	Soil contamination	➢ Properly store petroleum products, hazardous materials and wastes on an impervious surface. ➢ Develop spill response plan. Keep a stock of absorbent materials (e.g. sand, earth or commercial products) on site to deal with spillages and train staff in their use. ➢ If there is a spill take immediate action to prevent entering drains, watercourses, unmade ground or porous surfaces. Do not hose the spillage down or use any detergents. Use oil absorbent materials and dispose at a licensed waste management facility. ➢ Record any spill events and actions taken in environmental monitoring logs and report to LIEC. ➢ Properly store petroleum products, hazardous materials and waste in clearly labeled containers on an impermeable surface in secure and covered areas, preferably with bund and/or containment tray for any leaks. ➢ Remove all construction waste from the site to approved waste disposal sites.	Contractor	PMTB; EEMA; LIEC	At present, the Ning'er-Jiangcheng-Longfu Road and the Menglian-Meng'a Road is at the stage of excavation and embankment work. Petroleum products on the road under construction are all kept according to related regulations. All hazardous substances and waste materials are treated appropriately without leakage. Construction wastes are delivered to designated place for disposal. ➢ Being complied with
Air quality	Dust (TSP) during construction	➢ Frequent watering of unpaved areas, backfill areas and haul roads to suppress dust. ➢ Pave frequently used haul roads ➢ Limit the speed of vehicles travelling on unpaved areas and haul roads ➢ Pay particular attention to dust suppression near sensitive receptors such as schools, hospitals, residential areas and natural areas. ➢ Erect hoarding/screens around dusty activities such as demolition. ➢ Manage stockpile areas to avoid mobilization of fine material, cover with tarpaulin and/or spray with water. ➢ Do not overload trucks transporting earth materials.	Contractor	PMTB; EEMA; LIEC	At present, the Ning'er-Jiangcheng-Longfu Road and the Menglian-Meng'a Road is at the stage of excavation and embankment work.One watering truck is provided for the each section contractor; the watering truck waters once per three non-rainy days. No excess load is found on any haulage truck and all the trucks are covered during transportation. Traffic rush hours and areas with intensive population are avoided. No wheel-washing facilities

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
		➢ Equip trucks transporting earth materials with covers or tarpaulin to cover loads during transport. ➢ Install wheel washing equipment or conduct wheel washing manually at each exit of each works area to prevent trucks from carrying muddy or dusty substance onto public roads. ➢ Immediately cleanup all muddy or dusty materials on public roads outside the exits of the works areas. ➢ Plan the transport routes and time to avoid busy traffic and heavily populated areas when transporting earthy materials. ➢ Immediately plant vegetation in all temporary land take areas upon completion of construction to prevent dust and soil erosion.			are configured at the exit of the construction area. ➢ Being complied with
	Fumes and particulate matter from asphalt mixing plant, concrete batching plant and other equipment and machinery	➢ Locate asphalt mixing plants and concrete batching plants at least 300m downwind from residential areas and other sensitive receptors. ➢ Enclose these plants and equip them with bag house filter or similar air pollution control equipment. ➢ Regularly inspect and certify vehicle and equipment emissions and maintain to a high standard.	Contractor	PMTB; EEMA; LIEC	The central mixing station of Menglian-Meng'a Road at K84+800 has been completed. The location is far from residential areas and other sensitive receptors. This station has been equiped the air pollution control equipments. The other asphalt mixing and concrete batching stations haven't started construction yet. ➢ To be complied with
Noise	Noise from power mechanical equipment and vehicles	➢ Sensibly schedule construction activities, avoid noisy equipment working concurrently. ➢ Select advanced quiet equipment and construction method, and tightly control the use of self-provided generators. ➢ Comply with local requirements in areas with sensitive receptors very close by, ➢ Avoid construction works, particularly noisy activities such as piling and compaction from 22:00 to 06:00 hr. ➢ If nighttime construction needed, consult nearby residents beforehand for their consensus. ➢ If nighttime construction needed, avoid using noisy	Contractor	PMTB; EEMA; LIEC	At present, the Ning'er-Jiangcheng-Longfu Road and the Menglian-Meng'a Road is at the stage of excavation and embankment work.All the contractors comply with related requirements to reduce noises. Noise within the boundary of construction site meets GB12523-2011 and no adverse impacts are generated to local residents.

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
		equipment ➢ If necessary, set up temporary noise barriers. ➢ Control speed of bulldozer, excavator, crusher and other transport vehicles travelling on site. ➢ Specify equipment and machinery that conforms to PRC noise standard GB12523-90 and ensure regular maintenance. ➢ Adopt noise reduction devices and measures for works in proximity to sensitive noise receptors to ensure required standards are maintained. ➢ Locate sites for rock crushing, concrete mixing and other noisy activities at least 1km away from sensitive noise receptors. ➢ Limit the speed of vehicles travelling on site and on haul roads (less than 8 km/hr). ➢ Minimize the use of whistles and horns. ➢ Maintain continual communication with schools along the road alignments to avoid noisy activities near the schools during examination periods and other noise-sensitive activities.			➢ Being complied with
Water quality	Management of works in and adjacent to watercourses	➢ If possible, carry out bridge pier construction during the dry season. ➢ Erect berms or sandbags during bridge foundation works if necessary to contain runoff polluting the rivers. ➢ Maintain adequate flood flow during the rainy season. ➢ All construction camps, fuel and materials storage, refueling and maintenance areas to be located at least 500m from watercourses. ➢ Take all necessary measures to prevent construction materials and waste from entering drains and water bodies.	Contractor	PMTB; EEMA; LIEC	At present, the Ning'er-Jiangcheng-Longfu Road and the Menglian-Meng'a Road is at the stage of excavation and embankment work. All the interim facilities are far away from the water source. The water environment protection measures and flood control measures have been taken on the under construction bridge. ➢ Being complied with
Water quality	Construction site wastewater	➢ All construction wastewater to be treated to appropriate PRC standard prior to discharge. ➢ Ensure timely cleanup of scattered materials on site,	Contractor	PMTB; EEMA; LIEC	At present, the Ning'er-Jiangcheng-Longfu Road and the Menglian-Meng'a Road is at the

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
	discharge	stockpiles must adopt measures to prevent being washed into water bodies by rain water. ➢ Reuse equipment and wheel wash wastewater for dust suppression.			stage of excavation and embankment work. All the sewage from construction is treated according to related requirements. ➢ Being complied with
Solid waste	Construction site refuse	➢ Prepare a waste management plan including waste minimization and re-use ➢ Prepare a spill management plan for hazardous materials on construction sites ➢ Set up centralized domestic waste collection point and transport offsite for disposal at licensed municipal waste facility; ➢ Prohibit burning of waste.	Contractor	PMTB; EEMA; LIEC	At present, contractors of all road sections haven't prepared the *Waste Management Plan* and the *Spillage and Leakage Control Plan* yet. All the construction wastes are treated jointly according to related regulations. ➢ Partially compliant
Ecology	Protection of vegetation and fauna, and restoration of disturbed areas	➢ Demarcate the construction working area to prevent encroachment and damage to adjacent areas. ➢ Ensure sufficient aftercare for landscape planting to maximize survival. ➢ Agree compensation planting for any forestry losses in line with PRC forestry laws. ➢ All project personnel, including construction workers, are prohibited from catching or trading in flora or fauna ➢ Project personnel will immediately report to the PMTB and EEMA any fauna found trapped within project sites e.g. in ditches or pits	Contractor	PMTB; EEMA; LIEC	At present, the Ning'er-Jiangcheng-Longfu Road and the Menglian-Meng'a Road is at the stage of excavation and embankment work. All the construction areas are within the boundary and no hunting or picking of plants are founded. ➢ Being complied with
Physical cultural resources	Destruction of cultural relics in river bed and soil	Contractor must comply with PRC's Cultural Relics Protection Law and Cultural Relics Protection Law Implementation Regulations if such relics are discovered, stop work immediately and notify the relevant authorities, adopt protection measures and notify the local Cultural Bureau to protect the site.	Contractor	Cultural Relics Bureau; PMTB; EEMA; LIEC	At present, the Ning'er-Jiangcheng-Longfu Road and the Menglian-Meng'a Road is at the stage of excavation and embankment work. No historical relics are found in the construction area. ➢ Complied with
Occupational health and safety	Construction site sanitation	➢ Effectively clean and disinfect the site. ➢ During site formation, spray with phenolated water for disinfection.	Contractor	PMTB; EEMA; LIEC	The layout of the living quarters on the construction site is irrational, no disinfection work or cleaning work is

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
		➢ Disinfect toilets and refuse piles and ensure timely removal of solid waste; ➢ Exterminate rodents on site at least once every 3 months, and exterminate mosquitoes and flies at least twice each year; ➢ Provide public toilets in accordance with the requirements of labor management and sanitation departments in the living areas on construction site, ➢ Appoint designated staff responsible for cleaning and disinfection.			carried out. ➢ Being complied with
	Occupational safety	➢ Appoint Environment, Health and Safety Officer to develop and implement environmental, health and safety management plan, maintain records concerning health, safety and welfare and regularly report on accidents, incidents and near misses. ➢ Train all construction workers in general health and safety matters and on emergency preparedness and response procedures. ➢ Provide personal protective equipment (hard hats, shoes and high visibility vests) to all construction workers and enforce their use. ➢ Provide goggles and respiratory masks to workers doing asphalt road paving. ➢ Provide ear plugs to workers working near noisy powered mechanical equipment (PME), especially during piling of bridge foundations. ➢ Ensure safe handling, transport, storage and application of explosives for tunnel construction. ➢ Implement special measures to ensure worker safety in confined spaces during tunnel construction. ➢ Provide a clean and sufficient supply of fresh, potable water for all camps and work sites. ➢ Provide an adequate number of latrines and other sanitary arrangements at the site and work areas and ensure that	Contractor	PMTB; EEMA; LIEC	The contractors have prepared corresponding environmental health and safety control plan and carried out related training. Personal protective appliances are distributed to some but not all the construction workers. Safe drinking water is available on the construction site. WC (with ordinary sanitary conditions) and waste collecting facilities are made available. There is no child labor. ➢ Being complied with

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
		they are cleaned and maintained in a hygienic state. ➢ Provide adequate waste receptacles and ensure regular collection and disposal. ➢ Ensure that Contractors have adequate worker and third party insurance cover. ➢ No children (less than 14 years of age) to work on any contract.			
	Food safety	➢ Inspect and supervise food hygiene in cafeteria on site regularly. ➢ Cafeteria workers must have valid health permits. ➢ Once food poisoning is discovered, implement effective control measures immediately to prevent it from spreading	Contractor	PMTB; EEMA; LIEC	At present, the food and sanitary conditions of the dining hall on the construction site are good; however, some workers in the dining hall have no related health permits. No food poisoning events have taken place during the report period. ➢ Being complied with
	Disease prevention and safety awareness	➢ Construction workers must have physical examination before start working on site. ➢ If infectious disease is found, the patient must be isolated for treatment to prevent the disease from spreading. ➢ From the second year onwards, conduct physical examination on 20% of the workers every year. ➢ Establish health clinic at location where workers are concentrated, which should be equipped with common medical supplies and medication for simple treatment and emergency treatment for accidents. ➢ Specify the person responsible for health and epidemic prevention responsible for the education and propaganda on food hygiene and disease prevention to raise the awareness of workers. ➢ Regularly inspect works to ensure there are no areas of stagnant water that could provide breeding grounds for malaria, encephalitis and dengue fever mosquitoes.	Contractor	PMTB; EEMA; LIEC	Annual health checks are required by Chinese regulate. All cons construction workers have been examined. No infectious diseases have been reported during the report period. ➢ Complied with

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
Community health and safety	Temporary traffic management	➢ A traffic control and operation plan will be prepared together with the local traffic management authority prior to any construction. The plan shall include provisions for diverting or scheduling construction traffic to avoid morning and afternoon peak traffic hours, regulating traffic at road crossings with an emphasis on ensuring public safety through clear signs, controls and planning in advance. ➢ As much as possible, schedule delivery of construction materials and equipment during non-peak hours.	Contractor, local traffic police	PMTB; EEMA; LIEC	The contractors have prepared traffic control and implementation plan.Specific workers are appointed to guide the traffic at road intersections and signboards are erected. ➢ Complied with
	Information disclosure	Residents and businesses will be informed in advance through publicity about the construction activities and provided with the dates and duration of expected disruption and alternative routes, as required.	Contractor, PMTB	PPMO, LIEC	Bulletin boards are set up at the construction area of each section to publicize information concerning construction of the project. ➢ Complied with
	Access to construction sites	➢ Clear signs will be placed at construction sites in view of the public, warning people of potential dangers such as moving vehicles, hazardous materials, excavations and raising awareness on safety issues. ➢ All sites will be made secure, discouraging access by members of the public through fencing or security personnel, as appropriate.	Contractor	PMTB; EEMA; LIEC	Safety warning boards are set up at the construction area of each section. ➢ Complied with
	Utility services interruptions	➢ Assess construction locations in advance for potential disruption to services and identify risks before starting construction. ➢ If temporary disruption is unavoidable, develop a plan to minimize the disruption in collaboration with relevant local authorities such as power company, water supply company and communication company. ➢ Communicate the dates and duration in advance to all affected people.	Contractor, local service providers	PMTB; EEMA; LIEC	All the electrical power, telecommunication and water supply facilities within the construction site are relocated when the contractors move in. No interruption or adverse impacts to the public service facilities have taken place during the report period. ➢ Complied with
Social & environmental	Handling and resolving complaints	● Appoint a GRM coordinator within PPMO. ● Brief and provide training on GRM access points (PMTB, contractors). ● Disclose GRM to affected people before construction begins	PPMO, PMTB, Contractor	ADB	PPMO has set up the GRM. Specific workers at all the road sections are appointed to handle and solve complaints and announcement will be

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
		at the main entrance to each construction site. ● Maintain and update a Complaints Register to document all complaints and their resolution. Report on GRM in quarterly project progress reports and semi-annual environmental monitoring reports..			made on the construction site. No related complaints are reported during the report period. ➢ Complied with
Operational Stage					
Traffic	Road condition	Regularly inspect and maintain the road surface, drains and verges.	O&M units	PPMO	➢ To be complied at operational stage
	Road safety and traffic accidents	Strictly enforce traffic law to improve road safety and reduce traffic accidents.	Pu'er Traffic Police	PMG	➢ To be complied at operational stage
	Collisions with wildlife	Monitor incidence and type of wildlife fatality and install warning signs or other preventative measures, as required.	O&M units	PPMO/PMG	➢ To be complied at operational stage
B.Specific potential impacts and mitigation measures for Ning'er-Jiangcheng-Longfu Road					
Detailed Design Stage					
Drinking water source – Wenquan Reservoir	Alignment near the reservoir at section K25+200 to K45+200.	● Alignment design of road section K25+200 to K45+200 must not traverse through Protection Zone 1 of the Wenquan Reservoir ● Drainage design of road section K25+200 to K45+200 traversing through Protection Zone 2 of the Wenquan Reservoir must have collection, containment and treatment systems for the road runoff.	Design Institute	PPMO; PMTB	The location of Wenquanhe Reservoir have been changed. The section K25+200~K45+200 of Ning'er-Jiangcheng-Longfu Road don't cut through the runoff area of Wenquanhe Reservoir. This section don't need to be redesigned. ➢ Complied with
Social, environmental health	Traffic noise impact to sensitive receptors	➢ Design road side noise barriers at the following 6 locations as indicated in the domestic EIR: ■ Banhai Village – 2.5 m high x 100 m long ■ Manlian Village – 2.5 m high x 90 m long ■ Sanjia Village – 2.5 m high x 50 m long ■ Longtangba – 2.5 m high x 50 m long ■ Xishitou Village – 2.5 m high x 100 m long ■ Baozang Township – 2.5 m high x 250 m long	Design Institute	PPMO; PMTB	The road side noise barriers at the following 6 locations are designing. ➢ Complied with
Pre-construction Stage					
Trees	Damage to	Trees at the following locations shall be tagged, conspicuously	PMTB	PPMO	At present, contractors of detailed

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
native to Yunnan	protected tree species native to Yunnan by construction workers and machinery	marked and fenced off prior to commencement of construction activities ➢ *Panaxzingiberensis* 姜状三七: 20 trees in Liming Township along chainage K80 to K85 ➢ *Phoebe nanmu* 滇楠: 3 trees in Liming Township approximately 200 m to the right of road center line at chainage K85+100 and in Qushui Township approximately 55 m to the right of road center line at chainage K200+800 ➢ *Dalbergiaretusa* 黑黄檀: 1 tree in Mengxian Township approximately 100 m to the left of road center line at chainage K48+800. ➢ *Aesculuswangii* 云南七叶树: 5 trees in Qushui Township approximately 50 m to the right of road center line at chainage K215+800.	environmental specialist		sections have moved in. They will mark and separate the protected plants with fences after the location of the trees are confirmed by the local forestry authorities. ➢ To be complied with
C.Specific potential impacts and mitigation measures for Menglian-Meng'a Road					
Detailed Design Stage					
Social, environmental health	Traffic noise impact to sensitive receptors	Design road side barrier at the following one location as indicated in the domestic EIR: Menghai Primary School – 3 m high x 200 m long	Design Institute	PPMO; PMTB	Menghai Primary School has been changed to the local rehab. And the route of this section has been adjusted to 150m from the building. The road side barrier hasn't need to design. ➢ Complied with
Landscape	Preservation of trees and woodlands	Permanent and temporary land-take to avoid intact woodlands at sections K55+200-K65+500、K70+100-K72+300、K75+300-K77+200	Design Institute	PPMO; PMTB	The whole forest land along the line is avoided during design of the Menglian-Meng'a Road. ➢ Being complied with
Operational Stage					
Social, environmental health	Traffic noise impact to sensitive receptors	Install 140 m^2 of double-glazed windows on first row of non-commercial buildings facing the road at the following 3 locations as indicated in the domestic EIR (CNY1,000/m^2). Total cost = $23,000 • Mengma Township at K79+800 • Manglang at K95+200	PPMO	PMG, PEPB	➢ To be complied during the operation stage

Impact Factor	Potential Impacts and/or Issues	Mitigation Measures defined in the EMP	Implementing Entity	Supervising Entity	Implementation status and compliance with EMP
		• Anma at K97+350			

V. SUMMARY OF ENVIRONMENTAL MONITORING

A. Monitoring Plan and Responsibilities

This Environmental Monitoring Report is prepared by the External Environmental Monitoring Agency (Guangxi Transportation Research Institute, Yunnan Fangyuan Science and Technology Co., Ltd, Yunnan Jin Yu Ecological Engineering Consulting Co., Ltd, Kunming Longhui Engineering Design Consulting Co., Ltd). It based on the environmental supervision reports, the external environmental monitoring reports and theSoil Erosion Protection monitoring reports, submitted by the External Environmental Monitoring Agencies. Some information provided by the PPMO and other management departments. The field survey carried out by the PPMO and EEMA. This Report covers for the period from August to December, 2016.

For the regional roads, the monitoring plan during the construction period is defined in the EMP. Environmental monitoring on Menglian - Meng'a Road in construction period is undertaken by Guangxi Transportation Research Institute, and soil erosion protection monitoring is undertaken by Yunna Jin Yu Ecological Engineering Consulting Co., Ltd. Environmental monitoring on Ning'er - Jiangcheng - Longfu Road in construction period is undertaken by Yunnan Fangyuan Technology Co., Ltd., and water conservation monitoring is undertaken by Kunming Longhui Engineering Design Consultation Co., Ltd.

Through field verification by EMMA, this report has corrected the stake number of all monitoring points and replaced a few of monitoring points which is far away from the project, but not modified the monitoring frequency and durationwhich have been confirmed by EMP.

Table 5-1:Monitoring Plan during Construction Period for the Regional Roads

Item	Monitoring Parameter	Monitoring Location	Monitoring Frequency & Duration	Implementing Entity	Supervising Entity
Menglian-Meng'a Road					
Construction Stage					
Air quality	TSP; (SO_2& NO_2 only if there is asphalt mixing within 500 m)	10 locations that are within 20 m of the alignment: 1. Pajingchachang(K64+500) 2. Hegelaozhai (K68+300) 3. Hegexinzhai (K71+400) 4. Health center of Mengma(K79+900) 5. Hehaxinzhai (K83+100) 6. Guangsan (K87+700) 7. Bingsuo (K89+300) 8. Manglang (K92+400) 9. Anma (K97+350) 10. Menga(K98+700)	1 day (24-hr) per month (Monitor only when road section has construction activities within 500 m)	GXTRI	PMTB, PPMO
Noise	L_{Aeq}	10 locations that are within 20 m of the alignment: 1. Pajingchachang(K64+500) 2. Hegelaozhai (K68+300) 3. Hegexinzhai (K71+400) 4. Health center of Mengma(K79+900) 5. Hehaxinzhai (K83+100) 6. Guangsan (K87+700) 7. Bingsuo (K89+300) 8. Manglang (K92+400) 9. Anma (K97+350)	2 times per day (daytime and nighttime); 1 day per month (Monitor only when road section has construction activities within 500 m)	GXTRI	PMTB, PPMO

Item	Monitoring Parameter	Monitoring Location	Monitoring Frequency & Duration	Implementing Entity	Supervising Entity
		10. Menga(K98+700)			
Water quality	DO, SS, TPH	3 locations during bridge construction at the following road sections: 1. Nancha River(K56+803) 2. Nanma River(K74+950) 3. Nanma River(K96+300) Set up 2 stations for water quality monitoring at each of the 3 locations as follows: 1. Control station: 50 m upstream of the bridge alignment 2. Impact station 100m downstream of the bridge alignment (Note: if downstream impact station data > 130% of upstream control station data (DO <130%), mitigation measures are needed)	1 time per day; 1 day per month during bridge construction	GXTRI	PMTB, PPMO
Ning'er-Jiangcheng-Longfu Road					
Construction Stage					
Air quality	TSP; (SO_2& NO_2 only if there is asphalt mixing within 500 m)	11 locations that are within 20 m of the alignment 1. Dazhai(K1+350) 2. Xishitou (K21+160) 3. MengxianPrimary School(K47+900) 4. Anning (K54+100) 5. Xuande (K60+600) 6. Xianren(K92+900) 7. Liming Township (K109+900) 8. BaozangTownship (K140+300) 9. Banhe Primary School(K152+300) 10. Qiyiqiao (K159+450) 11. Niuluohe (K183+500)	1 day (24-hr) per month (Monitor only when road section has construction activities within 500 m)	YNFY	PMTB, PPMO
Noise	L_{Aeq}	11 locations that are within 20 m of the alignment 1. Dazhai(K1+350) 2. Xishitou(K21+160) 3. Mengxian Primary School(K47+900) 4. Anning (K54+100) 5. Xuande (K60+600) 6. Xianren (K92+900) 7. Liming Township (K109+900) 8. Baozang Town ship(K140+300) 9. Banhe Primary School(K152+300) 10. Qiyiqiao (K159+450) 11. Niuluohe (K183+500) [*Note: nighttime monitoring not needed at the school locations*]	2 times per day (daytime and nighttime); 1 day per month (Monitor only when road section has construction activities within 500 m)	YNFY	PMTB, PPMO
Water quality	DO, SS, TPH	7 rivers during bridge construction at the following road sections:	1 time per day; 1 day per month	YNFY	PMTB, PPMO

Item	Monitoring Parameter	Monitoring Location	Monitoring Frequency & Duration	Implementing Entity	Supervising Entity
		1. Mengxian River (K58+875) 2. Manxian River (K95+200) 3. Manbangtian River (K109+405) 4. Mengye River (K139+340) 5. Lahu River (K194+700) 6. Longdong River (K221+400) 7. Shili River (K227+240) Set up 2 stations for water quality monitoring at each of the 7 rivers as follows:: 1. Control station: 50 m upstream of the bridge alignment 2. Impact station 100m downstream of the bridge alignment (Note: if downstream impact station data > 130% of upstream control station data (DO <130%), mitigation measures are needed)	during bridge construction		

B. Environmental Quality Objectives and Sampling Analysis Method

B-1. Environmental quality objectives

The environmental monitoring results of the project are evaluated according to the environmental quality objectives defined in the EMP. In which, the latest GB3095-2012 is adopted for the *Ambient Air Quality Standard*. See the table below for applicable standards.

Table 5-2: Applicable Standards for Monitoring Indexes

Period	Indicator	Standard
Construction	TSP	*Ambient Air Quality Standard* (GB3095-2012)Class Ⅱ
	Fume from asphalt mixing plant (SO_2, NO_2)	*Integrated emission standard of air pollutants*(GB 16297-1996)
	Noise limits of PME at boundary of construction site	Emission standard of environment noise for boundary of construction site(GB 12523-2011)
	Discharge of wastewater from construction sites	*Integrated Wastwater Discharge Standard*(GB 8978-1996)Class Ⅰ
	DO, SS and TPH levels in river during bridge construction works	SS and TPH at downstream impact station <130% of the upstream control station. DO at downstream impact station >70% of the upstream control station and must not be < 2mg/L
Operation	Traffic noise at sensitive receptor within 35 m of road red line	*Environmental Quality Standard for Noise* (GB3096-2008) Category 4a Functional Area
	Traffic noise at sensitive receptor beyond 35 m of road red line	*Environmental Quality Standard for Noise* (GB3096-2008) Category 1 and Category 2 Functional Areas

B-2. Sampling analysis method

The sampling analysis methods of monitoring parameters are subject to related national standards. See the following table for details.

Table5-3:SamplingAnalysis Methods of the Indicators

Indicator	Sampling analysis method	Detection Limit
COD_{Cr}	*Water Quality-Determination of the Chemical Oxygen Demand-Dichromate Method* (GB11914-89)	10 mg/L
SS	*Water Quality-Determination of Suspended Substance-Gravimetric Method* (GB11901-89)	4 mg/L
TPH	*Water Quality-Determination of Petroleum Oil, Animal and Vegetable Oils-Infrared Photometric Method* (HJ637-2012)	0.04 mg/L
DO	*Water Quality-Determination of Dissolved Oxygen-Iodometric Method* (GB 7489-1987)	0.2mg/L
Noise(L_{Aeq})	*Environmental Quality Standard for Noise* (GB3096-2008)	/
TSP	*Ambient Air-Determination of Total Suspended Particulates--Gravimetric Method* (GB/T15432-1995)	0.001mg/m^3

C. Monitoring Results

C-1. Project Implementation Progress at Environmental Monitoring Points

Menglian - Meng'a Road: Table 5-4 shows project implementation progress at each monitoring points of Menglian - Meng'a Road by 31 December, 2016.

Table 5-4:Project Progress at Monitoring Points of Menglian - Meng'a Road

S/N	Monitored Objects	Stake No.	Name of the Monitoring Point	Progress of works
1	Noise	K64+500	Pajingchachang	Subgrade works in progress
2		K68+300	Hegelaozhai	Subgrade works in progress
3		K71+400	Hegexinzhai	Subgrade works in progress
4		K76+100	Health center of Mengma	Subgrade works not in progress
5		K83+100	Hehaxinzhai	Subgrade works in progress
6		K87+700	Guangsan	Subgrade works in progress
7		K89+300	Bingsuo	Subgrade works in progress
8		K92+400	Manglang	Subgrade works in progress
9		K94+600	Anma	Subgrade works not in progress
10		K98+700	Menga	Subgrade works not in progress
1	Ambient air quality	K64+500	Pajingchachang	Subgrade works in progress
2		K68+300	Hegelaozhai	Subgrade works in progress
3		K71+400	Hegexinzhai	Subgrade works in progress
4		K76+100	Health center of Mengma	Subgrade works not in progress
5		K83+100	Hehaxinzhai	Subgrade works in progress
6		K87+700	Guangsan	Subgrade works in progress
7		K89+300	Bingsuo	Subgrade works in progress
8		K92+400	Manglang	Subgrade works in progress
9		K94+600	Anma	Subgrade works not in progress
10		K98+700	Menga	Subgrade works not in progress
1	Surface water	K56+803	Nancha River	River-crossing bridge works have started at November
2		K74+950	Nanma River	River-crossing bridge works have not started yet

3		K96+300	Nanma River	River-crossing bridge works have started at November

Ning'er - Jiangcheng - Longfu Road： Table 5-5 shows theproject progress at each monitoring points of Ning'er - Jiangcheng - Longfu Road by 31 December, 2016**.**

Table 5-5: Project Progress at Monitoring Points of Ning'er-Jiangcheng-Longfu Road

S/N	Monitored Objects	Stake No.	Name of the Monitoring Point	Progress of works
1	Noise	K1+350	Dazhai	Subgrade works not in progress
2		K21+160	Xishitou	Subgrade works not in progress
3		K47+900	Mengxian Primary School	Subgrade works in progress
4		K54+100	Anning	Subgrade works not in progress
5		K60+600	Xuande	Subgrade works not in progress
6		K92+900	Xianren	Subgrade works not in progress
7		K109+900	Liming Township	Subgrade works not in progress
8		K140+300	Baozang Township	Subgrade works not in progress
9		K152+300	Banhe Primary School	Subgrade works in progress
10		K159+450	Qiyiqiao	Subgrade works in progress
11		K183+500	Niuluohe	Subgrade works in progress
1	Ambient air quality	K1+350	Dazhai	Subgrade works not in progress
2		K21+160	Xishitou	Subgrade works not in progress
3		K47+900	Mengxian Primary School	Subgrade works in progress
4		K54+100	Anning	Subgrade works not in progress
5		K60+600	Xuande	Subgrade works not in progress
6		K92+900	Xianren	Subgrade works not in progress
7		K109+900	Liming Town	Subgrade works not in progress
8		K140+300	Baozang Town	Subgrade works not in progress
9		K152+300	Banhe Primary School	Subgrade works in progress
10		K159+450	Qiyiqiao	Subgrade works in progress
11		K183+500	Niuluohe	Subgrade works in progress
1	Surface water	K58+875	Mengxian River	River-crossing bridge works have not started yet
2		K95+200	Manxian River	River-crossing bridge works have not started yet
3		K109+405	Manbangtian River	River-crossing bridge works have not started yet
4		K139+340	Mengye River	River-crossing bridge works have not started yet
5		K194+700	Lahu River	River-crossing bridge works have not started yet
6		K221+400	Longdong River	River-crossing bridge works have not started yet
7		K227+240	Shili River	River-crossing bridge works have not started yet

C-2. Monitoring Results of Noise

Menglian - Meng'a Road：

From August to December2016, a whole-day monitoring was conducted monthly at seven sensitive sites:Pajingchachang(K64+500), Hegelaozhai (K68+300), Hegexinzhai (K71+400), Hehaxinzhai (K83+100), Guangsan (K87+700), Bingsuo (K89+300), Manglang (K92+400.But a part of road section has no construction activities, There are three monitoring points,Health center of Mengma(K79+900), Anma (K97+350) and Menga(K98+700), only conducted once environmental background monitoring at August. Table 5-6 shows monitoring results.

Table 5-6 shows that from August to December2016, the overall qualified rate for monitoring data of noise at ten monitoring points is 100% within requirements. The monitoring values at these points range from 54.4 dB (A) to 58.5 dB (A) at daytime which satisfies the limit value given in GB3096-2008. All project sections haven't constructed at nighttime, so all monitoring points haven't monitored the noise of nighttime, but have once environmental background monitoring at August. The background value of nighttime range from 45.7 dB (A) to 49.3 dB (A) which satisfies the limit value given in GB3096-2008.

Ning'er - Jiangcheng - Longfu Road：

From August to December 2016, a whole-day monitoring was conducted monthly at four sensitive sites: Mengxian Primary School(K47+900), Banhe Primary School(K152+ 300), Qiyiqiao(K159+450), Niuluohe(K183+500). But the most of road section has no construction activities, the other seven monitoring points only conducted once environmental background monitoring at August. Table 5-7 shows monitoring results.

Table 5-7 shows that from August to December 2016, the overall qualified rate for monitoring data of noise at eleven monitoring points is 100% within requirements. The monitoring values of daytime at these points range from 51.8 dB (A) to 58.7 dB (A) which satisfies the limit value given in GB3096-2008. All project sections haven't constructed at nighttime, so all monitoring points haven't monitored the noise of nighttime, but have once environmental background monitoring at August (except the schools). The background value of nighttime range from 44.2 dB (A) to 45.3 dB (A) which satisfies the limit value given in GB3096-2008.

Table5-6: Noise Monitoring Results in Construction Period of Menglian - Meng'a Road Unit: dB (A)

Name of the Monitoring Point	Monitoring Time	Standard Limit	Monitoring Results									
			August		September		October		November		December	
			Sampling Date	Monitoring Value	Sampling Date	Monitoring Value	Sampling Date	Monitoring Value	Sampling Date	Monitoring Value	Sampling Date	Monitoring Value
Pajingchachang (K64+500)	Daytime	70	22	57.2	19	57.6	16	58.5	14	56.8	17	57.4
	Nighttime	55	23	48.6	/	/	/	/	/	/	/	/
Hegelaozhai (K68+300)	Daytime	70	22	57.9	19	55.5	16	58.5	14	56.8	17	57.9
	Nighttime	55	23	47.8	/	/	/	/	/	/	/	/
Hegexinzhai (K71+400)	Daytime	70	22	57.3	19	58.4	16	57.8	14	57.4	17	56.8
	Nighttime	55	23	46.2	/	/	/	/	/	/	/	/
Health center of Mengma(K79+900)	Daytime	60	22	57.2	/	/	/	/	/	/	/	/
	Nighttime	50	23	49.3	/	/	/	/	/	/	/	/
Hehaxinzhai (K83+100)	Daytime	70	22	57.6	19	56.7	16	57.2	14	57.5	17	58.2
	Nighttime	55	23	48.4	/	/	/	/	/	/	/	/
Guangsan (K87+700)	Daytime	70	22	58.0	19	57.5	16	57.8	14	57.3	17	58.0
	Nighttime	55	23	45.7	/	/	/	/	/	/	/	/
Bingsuo (K89+300)	Daytime	70	22	56.0	19	55.4	16	56.7	14	56.8	17	56.9
	Nighttime	55	23	47.7	/	/	/	/	/	/	/	/
Manglang (K92+400)	Daytime	70	22	58.2	19	57.8	16	58.3	14	57.6	17	58.4
	Nighttime	55	23	45.7	/	/	/	/	/	/	/	/
An'ma (K97+350)	Daytime	70	22	55.4	/	/	/	/	/	/	/	/
	Nighttime	55	23	47.7	/	/	/	/	/	/	/	/
Menga(K98+700)	Daytime	70	22	58.2	/	/	/	/	/	/	/	/
	Nighttime	55	23	48.3	/	/	/	/	/	/	/	/

Table 5-7：Noise Monitoring Results in Construction Period of Ning'er - Jiangcheng - Longfu Road Unit: dB (A)

Name of the Monitoring Point	Monitoring Time	Standard Limit	Monitoring Results									
			August		September		October		November		December	
			Sampling Date	Monitoring Value	Sampling Date	Monitoring Value	Sampling Date	Monitoring Value	Sampling Date	Monitoring Value	Sampling Date	Monitoring Value
Dazhai (K1+350)	Daytime	60	25	57.1	/	/	/	/	/	/	/	/
	Nighttime	50	26	45.3	/	/	/	/	/	/	/	/
Xishitou (K21+160)	Daytime	60	26	57.2	/	/	/	/	/	/	/	/
	Nighttime	50	27	44.2	/	/	/	/	/	/	/	/
MengxianPrimary School (K47+900)	Daytime	60	27	58.1	11	57.7	14	55.8	15	55.8	18	52.5
	Nighttime	/	/	/	/	/	/	/	/	/	/	/
Anning (K54+100)	Daytime	60	27	57.3	/	/	/	/	/	/	/	/
	Nighttime	50	28	45.1	/	/	/	/	/	/	/	/
Xuande (K60+600)	Daytime	60	27	58.1	/	/	/	/	/	/	/	/
	Nighttime	50	28	44.8	/	/	/	/	/	/	/	/
Xianren (K92+900)	Daytime	60	28	58.4	/	/	/	/	/	/	/	/
	Nighttime	50	29	45.1	/	/	/	/	/	/	/	/
Liming Town (K109+900)	Daytime	60	28	58.7	/	/	/	/	/	/	/	/
	Nighttime	50	29	44.3	/	/	/	/	/	/	/	/
Baozang Town (K140+300)	Daytime	60	29	58.4	/	/	/	/	/	/	/	/
	Nighttime	50	20	44.7	/	/	/	/	/	/	/	/
Banhe Primary School(K152+300)	Daytime	60	29	56.4	12	56.1	15	54.9	16	58.6	19	51.8
	Nighttime	50	/	/	/	/	/	/	/	/	/	/
Qiyiqiao (K159+450)	Daytime	60	29	57.8	12	57.1	15	57.1	16	56.8	19	55.7
	Nighttime	50	30	45.2	/	/	/	/	/	/	/	/
Niuluohe (K183+500)	Daytime	60	30	56.7	13	57.7	16	53.7	17	57.4	20	52.6
	Nighttime	50	31	44.8	/	/	/	/	/	/	/	/

C-3. Monitoring Results of Ambient Air Quality

Menglian - Meng'a Road：

From August to December2016, Guangxi Transportation Research Institute monitored the TSP concentration in ambient air at seven sensitive sites monthly. They are Pajingchachang(K64+500), Hegelaozhai (K68+300), Hegexinzhai (K71+400), Hehaxinzhai (K83+100), Guangsan (K87+700), Bingsuo (K89+300), Manglang (K92+400, etc. The other three sensitive sites only conducted once environmental background monitoring at August. Table 5-8 shows monitoring results.

During the period from August to December 2016, as show in Table 5-8 that the monitoring results of all monitoring points is 100% within requirements. The TSP daily mean value of these seven monitoring points,wheresubgrade works have been under construction, ranges from 0.152 to 0.258mg/m^3, which satisfie the limit of Class II in *Ambient Air Quality Standard* (GB3095-2012). The TSP daily mean background value of the other three sensitive sites, ranges from 0.082 to 0.104 mg/m^3, which also satisfie the limit of Class II in *Ambient Air Quality Standard* (GB3095-2012).

Ning'er - Jiangcheng - Longfu Road：

From August to December 2016, Yunnan Fangyuan Technology Co., Ltd. monitored the TSP concentration in ambient air at four sensitive sites. They are Mengxian Primary School(K47+900), Banhe Primary School(K152+ 300), Qiyiqiao(K159+450), Niuluohe(K183+500), etc. The other seven sensitive sites only conducted once environmental background monitoring at August. Table 5-9 shows monitoring results.

During the period from August to December 2016, as show in Table 5-9 that the monitoring results of all monitoring points is 100% within requirements. The TSP daily mean value of these four monitoring points, where subgrade works have been under construction, ranges from 0.119 to 0.177mg/m^3, which satisfy the limit of Class II in *Ambient Air Quality Standard* (GB3095-2012). The TSP daily mean background value of the other seven sensitive sites, ranges from 0.086 to 0.102 mg/m^3, which also satisfie the limit of Class II in *Ambient Air Quality Standard* (GB3095-2012).

Table 5-8: Ambient Air Quality Monitoring Results in Construction Period of Menglian - Meng'a Road Unit: mg/m^3

Location of the Monitoring Point	Standard Limit	Monitoring Results									
		August		September		October		November		December	
		Sampling Date	Monitoring Value	Sampling Date	Monitoring Value	Sampling Date	Monitoring Value	Sampling Date	Monitoring Value	Sampling Date	Monitoring Value
Pajingchachang(K64+500)	0.3	22	0.200	19	0.179	16	0.235	12	0.205	15	0.219
Hegelaozhai (K68+300)	0.3	22	0.210	19	0.206	16	0.185	12	0.194	15	0.212
Hegexinzhai (K71+400)	0.3	22	0.243	19	0.248	16	0.221	12	0.242	15	0.251
Health center of Mengma (K79+900)	0.3	23	0.097	/	/	/	/	/	/	/	/
Hehaxinzhai (K83+100)	0.3	23	0.176	20	0.184	17	0.154	13	0.177	16	0.162
Guangsan (K87+700)	0.3	24	0.231	20	0.243	17	0.232	13	0.258	16	0.241
Bingsuo (K89+300)	0.3	24	0.174	21	0.184	18	0.182	14	0.173	17	0.204
Manglang (K92+400)	0.3	24	0.179	21	0.222	18	0.152	14	0.191	17	0.172
An'ma (K97+350)	0.3	25	0.104	/	/	/	/	/	/	/	/
Menga (K98+700)	0.3	25	0.082	/	/	/	/	/	/	/	/

Table5-9: Ambient Air Quality Monitoring Results in Construction Period of Ning'er - Jiangcheng - Longfu Road Unit: mg/m³

Location of the Monitoring Point	Standard Limit	Monitoring Results									
		August		September		October		November		December	
		Sampling Date	Monitoring Value	Sampling Date	Monitoring Value	Sampling Date	Monitoring Value	Sampling Date	Monitoring Value	Sampling Date	Monitoring Value
Dazhai (K1+350)	0.3	25	0.094	/	/	/	/	/	/	/	/
Xishitou (K21+160)	0.3	26	0.102	/	/	/	/	/	/	/	/
MengxainPrimary school (K47+900)	0.3	27	0.163	11	0.174	14	0.164	15	0.149	18	0.119
Anning (K54+100)	0.3	27	0.095	/	/	/	/	/	/	/	/
Xuande (K60+600)	0.3	27	0.101	/	/	/	/	/	/	/	/
Xianren (K92+900)	0.3	28	0.092	/	/	/	/	/	/	/	/
Liming Townshiip (K109+900)	0.3	28	0.098	/	/	/	/	/	/	/	/
Baozang Township (K140+300)	0.3	29	0.086	/	/	/	/	/	/	/	/
Banhe Primary School(K152+300)	0.3	29	0.177	12	0.143	15	0.120	16	0.132	19	0.123
Qiyiqiao (K159+450)	0.3	29	0.157	12	0.172	15	0.126	16	0.134	19	0.134
Niuluohe (K183+500)	0.3	30	0.145	13	0.147	16	0.134	17	0.130	20	0.140

C-4. Monitoring Results of Surface Water

Menglian - Meng'a Road：

By 31 December, 2016, the two bridge works along Menglian - Meng'a Road have been constructed at November, the stake number are K56+803 and K96+300. At August 2016, Guangxi Transportation Research Institute monitored water background quality in river reach near three river-crossing bridges along the project，and monitored the water monthly quality in river reanch near the two constructing bridges from November. Table 5-10 shows monitoring results.

According to evaluation for monitoring results, three background monitoring indexes of river reaches near Nancha River K56+803 and Nanma River K77+800, K99+200, COD_{Cr}, DO and petroleum at August 2016 can satisfy the water quality standard of category III in *Environmental Quality Standard for Surface Water* (GB3838 - 2002). For suspended solids (SS), no up-to-standard evaluation is performed because no corresponding water environmental quality standard exists in China at present.

The monitoring results of Nancha River K56+803 and Nanma River K99+200 at November and December shows that the bridges construction didn't have a significant impact on water quality.Theimpact station（100m downstream of the bridge alignment） dates(COD_{Cr}, SS and TPH) aren't more than 130% of control station （50m upstream of the bridge alignment）datas(the dates of DO aren't less than 130%).All dates can satisfy the water quality standard of category III in *Environmental Quality Standard for Surface Water* (GB3838 - 2002).

Table5-10: Surface Water Monitoring Results and Evaluation in Construction Period of Menglian - Meng'a Road Unit: mg/L

River Name and Stake Number	Sampling Date	Sampling stations	Monitoring Results			
			COD_{Cr}	DO	SS	TPH
Environment Quality Standard of Surface Water (GB3838—2002) Class III			≤20	≥5	—	≤0.05
Nancha River K56+803	22 Aug	Control station	<10	7.8	136	<0.04
		Impact station	<10	7.4	128	<0.04
	Sep	Control station	/	/	/	/
		Impact station	/	/	/	/
	Oct	Control station	/	/	/	/
		Impact station	/	/	/	/
	12 Nov	Control station	<10	7.5	4	<0.04
		Impact station	<10	7.4	<4	<0.04
	15 Dec	Control station	<10	7.9	5	<0.04
		Impact station	<10	7.4	<4	<0.04
Nanma River K74+950	22 Aug	Control station	16	7.7	8	<0.04
		Impact station	14	7.9	7	<0.04
	Sep	Control station	/	/	/	/
		Impact station	/	/	/	/
	Oct	Control station	/	/	/	/
		Impact station	/	/	/	/
	Nov	Control station	/	/	/	/

River Name and Stake Number	Sampling Date	Sampling stations	Monitoring Results			
			COD_{Cr}	DO	SS	TPH
		Impact station	/	/	/	/
	Dec	Control station	/	/	/	/
		Impact station	/	/	/	/
Nanma River K96+300	22 Aug	Control station	<10	8.0	14	<0.04
		Impact station	<10	7.6	17	<0.04
	Sep	Control station	/	/	/	/
		Impact station	/	/	/	/
	Oct	Control station	/	/	/	/
		Impact station	/	/	/	/
	13 Nov	Control station	<10	8.0	<4	<0.04
		Impact station	<10	7.8	4	<0.04
	15 Dec	Control station	10	7.9	<4	<0.04
		Impact station	<10	7.4	4	<0.04

Ning'er - Jiangcheng - Longfu Road：

By 31 December, 2016, all the bridge works along Ning'er - Jiangcheng - Longfu Road has not been constructed. At August 2016, Yunnan Fangyuan Technology Co., Ltd.monitored water bacngroundquality in seven crossed river, Mengxian River (K58+875), Manxian River (K95+200), Manbangtian River (K109+405), Mengyejiang (K139+340), Lahu River (K194+700), Longdong River (K221+400), Shili River (K227+240) etc. The bridge construction of Ning'er - Jiangcheng - Longfu Road had not started, therefore, the water quality monitoring results of monitoring points between 50m upstream(control station) and 100m downstream(impact station) have not been compared and evaluated. However, up-to-standard evaluation is mainly performed for water quality at monitoring points. Table 5-11 shows monitoring results.

According to evaluation for monitoring results, the background monitoring resultsCOD_{Cr}, DO and petroleum at August 2016 can satisfy the water quality standard of Class III or Ⅳ in *Environmental Quality Standard for Surface Water* (GB3838 - 2002). For suspended solids (SS), no up-to-standard evaluation is performed because no corresponding water environmental quality standard exists in China at present.

Table 5-11: Surface Water Monitoring Results before Construction of Ning'er - Jiangcheng - Longfu Road Unit: mg/L

River Name and Stake Number	Sampling Date	Sampling Station	Monitoring Results			
			COD_{Cr}	DO	SS	TPH
Environment Quality Standard of Surface Water (GB3838—2002) ClassⅢ			≤20	≥5	—	≤0.05
1.Mengxian River K58+875	27 Aug	Control station	<10	7.2	24	<0.04
		Impact station	10	6.7	27	<0.04
6.Longdong River K221+400	31 Aug	Control station	<10	7.7	<4	<0.04
		Impact station	<10	7.9	4	<0.04
7.Shili River K227+240	31 Aug	Control station	<10	7.7	15	<0.04
		Impact station	<10	7.5	19	<0.04
Environment Quality Standard of Surface Water (GB3838—2002) Class Ⅳ			≤30	≥3	—	≤0.5

2.Manxian River K101+986	28 Aug	Control station	<10	7.7	10	<0.04
		Impact station	<10	7.6	11	<0.04
3.Manbangtian River K126+353	29 Aug	Control station	<10	7.7	4	<0.04
		Impact station	<10	7.2	<4	<0.04
4.Mengye River K153+643	29 Aug	Control station	<10	7.9	24	<0.04
		Impact station	<10	7.8	20	<0.04
5.Lahu River K207+253	31Aug	Control station	<10	7.9	<4	<0.04
		Impact station	<10	7.3	<4	<0.04

D. Monitoring Result of Soil Erosion Protection

D-1. Menglian - Meng'a Road

（1）Monitoring situation

Yunnan Jin Yu Ecological Engineering Consulting Co., Ltd. accepted the monitoring commission for soil and water conservation of highway works for Langcang, Pu'er City - Menglian - Meng'a in November 2013, and its monitoring of soil and water conservation for highway works in Lancang - Menglian - Meng'a started from March 2014. The *Monitoring Report for Soil and Water Conservation of Highway Works in Canglan, Pu'er - Menglian - Meng'a* was submitted quarterly. However, the construction of Menglian - Meng'a section had not started, therefore no soil and water conservation monitoring has been applied to Menglian - Meng'a Road.

In May 2016, to satisfy the requirements of EMP, the supplemental agreement attached to monitoring contract of water and soil conservation was signed by and between Pu'er Transportation Investment Group Co., Ltd. and Yunnan Jin Yu Ecological Engineering Consulting Co., Ltd. In June 2016, workgroup of water and soil conservation monitoring made a site survey and data collection along the whole Menglian - Meng'a Road and developed a monitoring plan for water and soil conservation along Menglian - Meng'a Road on the basis of original *Monitoring Design and Implementation Plan for Water and Soil Conservation of Highway Works in Pu'er City along Canglian - Menglian - Meng'a*. In 19~20 August and 19~20 December 2016,The monitoring team conducted twice filed monitorings.

20August, 2016

19November, 2016

（2）Monitoring Results in this Phase

Main project area: the earthwork excavation procedure is under construction, the tree felling and surface clearing have been completed on K62+890~K63+150, and 40% earthwork excavation has been completed; the surface clearing on K56+910~K57+350 (beam factory and mixing station) has been completed, and the site leveling is under construction; earthwork excavation for subgrade on K84+200~K84+400 section is under construction; the construction for central mixing station at the location of K84+800 has been completed;

Gravel-soil-taken field: it has not yet been enabled.

Spoil disposal area: Four spoil disposal areas have been enabled , therein, the retaining wall is under construction in three of them.

Construction site area: Seven construction site areas are under construction.

Construction camp area: Four construction camps to be planned have been fully used now.

Construction detour area: 2.2 km is planned to be constructed during the project, the construction is undergoing along with construction demand;

Topsoil piling area: Topsoil piling area is not used since the topsoil is to be piled up beside the spoil disposal area. Implementation of soil and water conservation measures.

According to the analysis of on-site conditions, the project is at peak stage. The construction company mainly adopted slope protection, drainage, slope greening and some other measures for heavily excavated and deeply filled road sections; drainage and blocking measures have been implemented at spoil disposal areas and the ones after use have been recovered greening; slurry masonry fencing, hardening, greening and other soil and water conservation measures have been implemented at the construction site.

	
Fencing is under construction for 1# spoil disposal area at K80+000	Fencing is under construction for 2# spoil disposal area at K83+000

（3）Existing Problems and Suggestions

According to this on-site monitoring, NJL Road project is under construction in the peak period, the implementation degree of soil and water conservation measures to be strengthened, soil and water conservation measures to be further improved.

Combined with the "three simultaneous" principle of soil and water conservation in development and construction projects, , now on the existing soil and water conservation issues of NJL Road project, the recommendations are made to the construction company：

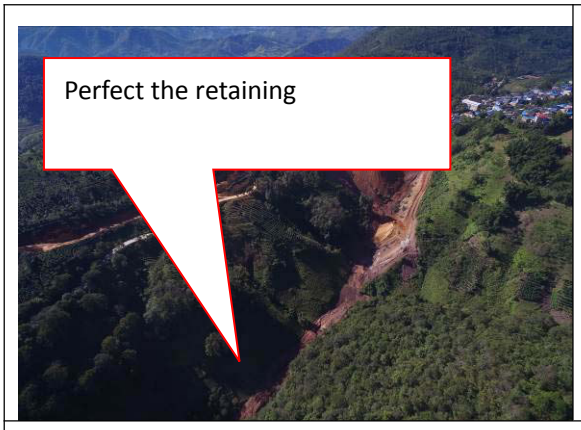
1） the earthwork excavation procedure is under construction.

The suggestions of improvement: improve the periphery interception of water measures and process timely greening recovery, plant climbing vine vegetation on the slope surface for effect recovery.

	
K54+500 subgrade excavation	K76+000 subgrade

2) 7# spoil disposal area,Since the retaining, water intercepting and drainage measures lack, the severe water and soil loss condition occurs under water scouring for muck;

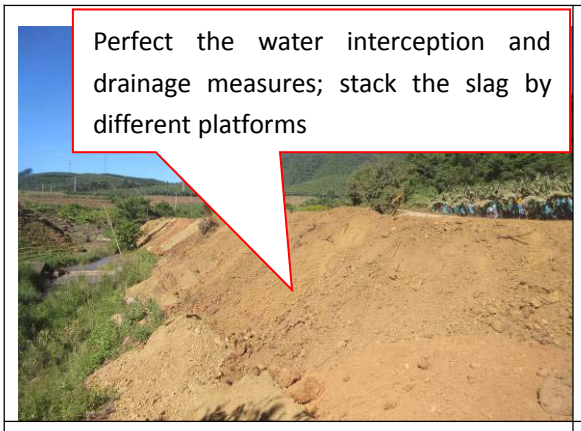
Suggestions on perfection: observe "Firstly retaining secondly discarding" principle for spoil disposal area; timely perfect the retaining, intercepting and drainage measures; stack the slag according to the requirements of design specification.



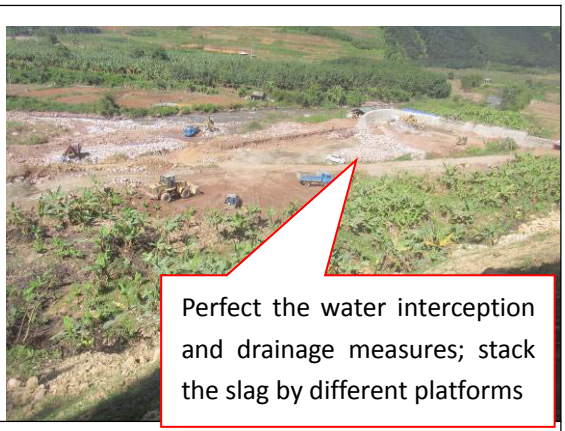
Paliang Village Committee 7# spoil disposal area at K61+620 of Bid 1

3) 2# spoil disposal area and spoil disposal area in the vicinity of K75+000 for NJL road is flood land stacking slag, the blocking has been constructed, the address selection rationality is required to be verified for flood land to avoid producing the occupation for riverway management scope so as to influence the condition of flood running in the riverway.

Suggestions on perfection: communicate with local water administrative competent authority and verify whether these two spoil disposal areas occupy the riverway management scope. The occupation for riverway management scope is forbidden in the riverway management stipulations, influencing the rivers' flood running capability; perfect relevant measures according to design requirement and specify the slag stacking.



spoil disposal area in the vicinity of K75+000



2# spoil disposal area at K83+000

4) **Other recommendations:**

①The above problems are typical of the project site and given recommendations, and the similarities not mentioned in the project please refer to the implementation;

② It is constructed during dry season currently, implement the dust lowering by watering on the construction road section;

③ spoil disposal area, temporary stacking site and borrow pit involved in the construction of reservation and used for construction land, make up the temporary land transfer procedures as soon as possible for the follow-up acceptance in preparation, no construction during this period. Drainage and greening measures shall be implemented timely to reduce the soil erosion and water loss.

④ The spoil disposal area shall be in substation piled up; the built block and drainage measures shall be managed and protected timely; the muck stability shall put into consideration in slag stacking and measures implementation.

⑤ During construction, the condition that the local villagers borrow the earthwork towards this project to backfill the construction and utilization, please implement the earth borrowing agreement and define the attribution on prevention responsibilities;

⑥ Please focus on following up of the temporary drainage, temporary block and the grass planting on slope in the construction areas.

⑦ Greening recovery shall be processed in a timely manner in the borrow pit.

⑧ Avoid the spoil behavior with potential safety hazard and handle the hidden dangers timely.

⑨ The guarding is required to be strengthened on the construction road section along the river to avoid producing the condition that the muck flows into river, clearing the muck adjacent to the river on the side slope and timely implementing the greening and recovering.

D-2. Ning'er - Jiangcheng - Longfu Road：

（1）Monitoring situation

Kunming Longhui Engineering Design Consulting Co., Ltd. undertakethemonitoring work of water and soil conservation for construction project along Ning'er - Jiangcheng - Longfu Road in May 2016.After receiving the task, our company has organized and established the soil and water conservation monitoring team and carried out the monitoring preparatory work of the project in25~29May, 2016. The monitoring will use the survey, patrol inspection and other monitoring methods to conduct monitoring for comprehensive understanding and data collection over the currently actual construction situations of the route. Currently, the monitoring team has carried out the preparation work of the Soil and water conservation Monitoring Implementation Plan of the Pu'erNing'er County-Jiangcheng - Sino-Vietnam No.3 Boundary Monument Highway Project according to the actual site situation and the relevant information collected.

In 19~20 August, 2016, the monitoring team conducted the second time filed monitoring, the project is in the construction preparation period, the current situation is the original landform, the Construction company entered into the site to conduct route resurvey, and the entire line was not disturbed.

From 13 to 17November, 2016, the monitoring team entered into the site for monitoring, the project is on controllable construction stage, the whole line is divided into 10 bid sections, the construction company has stationed into the site fully and the line retesting has been

finished, the verification on location for spoil disposal area is under implementation currently, the earthwok excavation procedure has been conducted on partial road sections.

（2）Monitoring Results in this Phase

Disturbed surface area： the project is on controllable construction period, currently, the earthwok excavation procedure has been conducted on partial bid sections, the accumulated disturbance area is 79.93ha.

Spoil and slag： Three of 40 spoil disposal areas planned in the *Soil and Water Conservation Scheme* have been put into use. Waste slag in accumulation is about 60,000m^3.

Road area： the whole line of this project is on controllable construction stage, partial road sections on Bid Section 6-10 have been disturbed to implement the earthwok excavation procedure. Through comparison onsite investigation by monitoring team, the water and soil restriction factors don't exist on this project construction line.The soil erosion and water loss in the road area mainly occurs in the construction period. Earth-rock excavation along the line causes large area of exposed surface; rainfall may cause large amount of soil erosion and water loss.

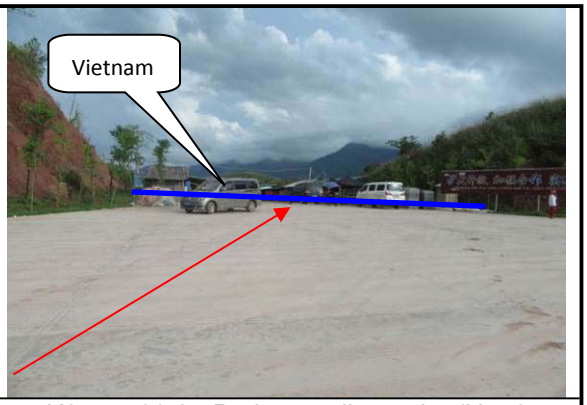
<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>Status of the origin of Ning'er-Jinggu Highway K3+800</td><td>K4+400 Banhai status</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>K10+000 Longtangba status</td><td>K12+000 Ximenyanzi status</td></tr>
</table>

	
K18+000 Ning'er Loop Line	K19+700 status
	
K23+847 LaoxuStockaded Village 2# Bridge status	K26+000 Dalutang status
	
K45+300 Shanshen Temple Pass	K50+000 Mengxian Township
	
K60+000 Xuande status	K65+500 Lanniqing status

	
K75+000 Tiechanghe Status	K80+000 Caizidi Pass status
	
K90+000 Xianren Commune status	K110+000 Liming status
	
K115+000 MuhuaStockaded Village road status	K125+000 Baka (Nanyin River) status
	
K138+000 Nanyin River status	K141+000 Baozang Township Status

	
K150+000 Banhe Township status	K161+000 Qiyi Bridge status
	
K171+000 Lahu River status	K181+000 Road status
	
K187+000 Niuluo River status	K202+000 Mingzi Mountain status
	
K211+000 Dazhupeng Status	K227+000 Longfu Status

K230+000 status



K244+799.25 Project ending point (No. 3 Sino-Vietnam Boundary Monument)

Sand stocking field：According to the site survey by the monitoring team, since the Project is currently in on controllable construction stage, there is no disturbance and the sand quarries have not been put into use.

Gravel-soil-taken field: According to the site survey by the monitoring team, since the current project is on controllable construction stage, the gravel-soil-taken area have not been put into use.

Spoil disposal area: According to the site survey of the monitoring team, since the current project is on controllable construction stage, 3 spoil disposal areas have been enabled. Since loose stacking is generally applied in spoiling process, the soil erosion and water loss in spoil disposal areas is caused. If preventive measures are not taken, serious gully erosion may be caused in case of rainstorm or drainage of upstream catchments due to poor structure of the spoil, loose texture and great porosity.

K2+200 Right 1# Spoil disposal area

K16+100 Right 4# Spoil disposal area

K43+500 Left 7# Spoil disposal area	K65+700 Left 10# Spoil disposal area
	
K85+900 Right 14# Spoil disposal area	K130+000 Left 21# Spoil disposal area
	
K151+800 Right 23# Spoil disposal area	K172+600 Right 26# Spoil disposal area
	
K212+700 Right 32# Spoil disposal area	K243+900 Right 37# Spoil disposal area
	

Sino-Vietnam connecting line K3+500 right side 13m 38# Spoil disposal area	Sino-Vietnam connecting line K12+600 right side 3m 40# Spoil disposal area

Construction site area: According to the site survey of the monitoring team, since the current project is on controllable construction stage, the construction site is under construction. The soil erosion and water loss on the site is mainly caused by site clearing, levelling will cause damage to the vegetation and topsoil within the scope to some degree, which may create conditions for the occurrence and intensification of soil erosion and water loss. Soil erosion and water loss will be caused under unfavorable weather conditions.

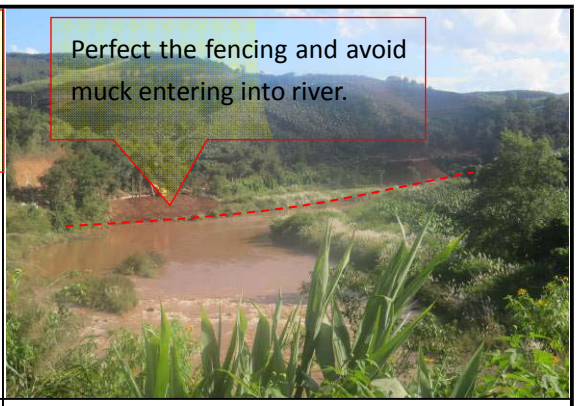
Construction camp area: According to the site survey of the monitoring team, each construction company enters into the site to arrange the construction site now. The soil erosion and water loss on the site is mainly caused by site clearing, levelling will cause damage to the vegetation and topsoil within the scope to some degree, which may create conditions for the occurrence and intensification of soil erosion and water loss. Soil erosion and water loss will be caused under unfavorable weather conditions.

Construction road area: According to the site survey of the monitoring team, since the current project is on controllable construction stage, the construction detour is constructed according to demand. The soil erosion and water loss in the area is mainly caused by surface disturbance and damage of vegetation in the process of roadbed excavation and filling. If preventive measures are not taken, severe soil erosion and water loss may be caused under unfavorable weather conditions.

Topsoil piling area: According to the site survey of the monitoring team, since the current project is on controllable construction stage, and the topsoil pilling area has not been put into use.

（3）Existing Problems and Suggestions

Currently, the controllable construction is implemented only for road sections with construction conditions, during construction, the condition that the muck isn't stockpiled reasonably for subgrade excavation exists, and such conditions as lagging for water retaining, intercepting and drainage measures, unreasonable slag stacking technology, greater slag stacking area gradient, easy generation for water and soil loss due to rainwater erosion and no beneficial slag body stability.

	
Road section in the vicinity of K127+000	Road section in the vicinity of K155+560

K212+000~K234+069.52 road section

Suggestions on perfection: the waste slag must be transported into spoil disposal area for stockpiling; the construction technology is required to be optimized and the fencing is strengthened on the road section along the river to avoid muck inflowing into river, all slag discarding behaviors on occupation for riverway management scope are strictly forbidden.

The controllable construction stage is only conducted on the road sections with construction conditions in the project currently. The following suggestions are hereby put forward to better carry out Ningjiang Road soil and water conservation and make the Project up to the requirements of relevant specifications on soil and water conservation and finally meet acceptance requirements:

1) To carefully organize and implement "three-simultaneous" system in accordance with the approval of water conservation scheme;

2) To follow the principle of "blocking first and then spoiling" in spoil disposal area;

3) To avoid spoiling behavior with hidden dangers;

4) To implement topsoil stripping, collection and reutilization;

5) To optimize the construction process and strengthen the guarding for construction along the river to prevent residue from entering the river and forbid all spoiling behavior that occupying the scope for river course management.

6) To pay attention to the follow-up of temporary measures (temporary drainage ditch, woven bag filling, temporary blocking by inserting piles and temporary cover, etc.)

7) In the actual construction process, spoil disposal areas may be adjusted from time to time due to the impacts of such factors as land occupation and construction conditions. According to Article 3 of 3.1.1 of the Technical code on soil and water conservation of development and construction projects (GB50433-2008), the spoil should be comprehensively utilized; spoil that cannot be utilized should be stacked at special place of storage, with blocking measures taken on the principle of "blocking first and then spoiling". According to relevant requirements, spoil disposal areas shall not be arranged in the scope of rivers, slopes and built reservoir and the scope of river management. The monitoring team suggests the Employer to timely improve and adjust the spoil disposal areas under requirements; local administrative departments should be timely asked for opinions on the selection and planning of new spoil disposal areas. The suggestions on the selection and arrangement of new spoil disposal areas should comply with the Technical code on soil and water conservation of development and construction projects (GB50433-2008); the selection of spoil disposal areas shall comply with the following provisions:

① Bring no harm to the safety of the surrounding utilities, industries and enterprises and residential sites.

② For the spoil disposal areas near the river course, the Project shall conform to the planning of soil and water conservation and rules for flood control and flood discharge without soil (rock and spoil) disposal areas arranged within the river and lake management scope.

③ The arrangement of spoil disposal areas in regions, where significant impacts may be imposed on important infrastructure, the safety of people's lives and property and flood flowing safety, shall be forbidden.

④ It is not suitable to arrange them in the ditches with large flow rate, or else, flood control demonstration shall be carried out.

⑤ Waste gully, concave ground or branch ditch shall be selected in hilly areas and concave ground or wasteland on plains; wind gap or the places where wind erosion may easily happen shall be avoided in sandy area.

VI. PUBLIC CONSULTATION

The EMP has defined the public consultation plan during the construction and operation stage of the project. The EMP consists of public participation in the following aspects: (i) Monitor the impacts and countermeasures during the construction and operation stage; (ii) Assess the environmental and economic benefits and social influences; and (iii) have interview with the public after completion of the project. The following types of public participation are included in the EMP: field survey, seminar, investigation into problems, interview and public hearings, etc. The following table details implementation of the public consultation plan.

Table 6-1:Public Consultation Plan

Organizer	Format	No. of Times	Subject	Attendees
Construction Stage				
PPMO	Public consultation & site visit	4 times: 1 time before construction commences and 1 time each year during construction	Adjusting of mitigation measures, if necessary; construction impact; comments and suggestions	Residents adjacent to project sites, representatives of social sectors
PPMO, PMTB	Expert workshop or press conference	As needed based on public consultation	Comments and suggestions on mitigation measures, public opinions	Experts of various sectors, media

The public consultation before construction of the project has been implemented at the EIA stage. In the EIA stage, field investigation and questionnaire are organized and carried out among local residents by the responsible body to carry out the EIA. The results of public consultation before the construction of each sub-project is included in the EIA report of such sub-project.

Public consultation during the construction stage (annual): Menglian-Meng'a Road has only several sections starting earthwork but including no road sections involving in residents. Therefore, the once-per-year public consultation during the construction period hasn't started. The first public consultation during the construction period is expected to be organized in the first half of 2017. As for the Ning'er-Jiangcheng-Longfu Road and the rural roads, no construction has started. Therfore, no public consultation during the construction period is carried out. Consultation will be carried out according to the construction schedule.

VII. INSTITUTIONAL STRENGTHENING AND TRAINING

According to EMP，The capacity of the PPMO, PMTB and contractors' staff responsible for EMP implementation and supervision will be strengthened. All parties involved in implementing and supervising the EMP must have an understanding of the goals, methods, and practices of project environmental management. The project will enhance capacity and expertise in environmental management through (i) institutional capacity building and (ii) training.

A. Institutional strengthening

The EMP defines corresponding measures concerning the development of environmental management ability of the executing institution (PPMO) and the implementing institution (PMTB) of the project. The implementation status of these measures is listed below.

Table7-1:Implementation status of Institutional strengthening

Implementing Entity	Mitigation Measures defined in the EMP	Supervising Entity	Implementation status and compliance with EMP
PPMO	➢ Appoint qualified environment specialist to PPMO staff. ➢ Include LIEC in loan implementation project management consulting services. ➢ LIEC to conduct environment management training for PPMO staff and environmental specialist.	ADB	PPMO has appointed the environment specialist and LIEC. No related training activities have yet been done by LIEC. ● Partly complied with
PMTB	➢ Appoint qualified environmental specialist to PMTB staff. ➢ Contract EEMA to conduct environment monitoring ➢ Contract qualified EEMA to conduct external compliance monitoring and verification of EMP implementation ➢ LIEC to conduct environment management training for PMTB staff and their environmental specialist.	PPMO、ADB	PMTB has appointed the environmental specialist and contractedEEMA to conduct environment monitoring. PMTB hascontractedEEMA to conduct external compliance monitoring and verification of EMP implementation. LIEC hasn't organized related training activities,but there is training plan on the March 2017. ➢ Partly complied with

B. Training

According to EMP，The PPMO, PMTB, contractors and O&M units will receive training in EMP implementation, supervision, and reporting, and on the Grievance Redress Mechanism. Training will be facilitated by the LIEC with support of other experts (e.g. the Engineers of EEMA) under the loan implementation project management consulting services.

Table7-2: Implementation status of Training Plan

Training	Attendees	Contents	No. of Times	Implementation Status	Plan
EMP adjustment and implementation	PPMO, PMTB, contractors	Development and adjustment of the EMP, roles and responsibilities,	Once prior to	The Menglian-Meng'a Road has carried out training on the environmental management in April 2016 by the	Official training is planned to be carried out after coming of the loan and environmental

Training	Attendees	Contents	No. of Times	Implementation Status	Plan
		monitoring, supervision and reporting procedures, review of experience (after 12 months)		supervisory institution; Party have been implemented	consultant
			once after one year of project	To be implemented	Will be organized in May 2017 as scheduled.
Grievance Redress Mechanism	PPMO, PMTB, contractors, PEPB	Roles and responsibilities, procedures, review of experience (after 12 months)	Once prior to	To be implemented	Trainings will be done afterLIEC assume office
			once after one year of project	To be implemented	Will be organized in May 2017 as scheduled.
Environmental technologies and processes	PPMO, PMTB, contractors, O&M units	Engineering and pollution control technologies, equipment selection and procurements,	Once (during project implementation)	To be implemented	Trainings will be done after LIEC assume office
Environmental quality monitoring	PPMO, PMTB, contractors, O&M units	Monitoring methods, data collection and processing, reporting systems	Once (at beginning of project construction)	To be implemented	Trainings will be done after LIEC assume office
Roads and traffic	PMTB, O&M units	Traffic management and traffic safety	Once (during project implementation)	To be implemented	Trainings will be done after LIEC assume office
	Customs Bureau	Wildlife trafficking	Once (during project implementation)	To be implemented	Trainings will be done after LIEC assume office

VIII. Key Environmental Issues

A. Key Issues Identified

By 31 December 2016, the subgrade of most sections and two brdges ofMenglian-Meng'a Road have been under construction. The contractorsof ten bid sections on Ning'er - Jiangcheng - Longfu Road has stationed into the site fully, and the line retesting has been finished, the verification on location for spoil disposal area is under implementation, the subgrade excavation have been conducted on some sections, but the construction of all bridge foundation haven't started. During this monitoring period, the environmental monitoring has been carried out on the sensitive points along the road according to the project construction progress.

According to the monitoring results, the environmental background quality of Menglian-Meng'a Road and Ning'er-Jiangcheng-Longfu Road satisfy the requirements of the corresponding environmental quality standards. The project construction have not obvious impact on theenvironmental quality ofsensitive sites along the roads，and haven't led the environmental quality to exceed the corresponding standards.

During this reporting period, the following key environmental issues have been identified.

(1) A few sections of Menglian-Meng'a Road and Ning'er-Jiangcheng-Longfu Road have been adjusted. The stake number of sensitive points have been changed, and some sensitive points need to increase or decrease.In addition, the location of Wenquanhe Reservoir have been changed. The section K25+200~K45+200 of Ning'er-Jiangcheng-Longfu Road don't cut through the runoff area of Wenquanhe Reservoir, and don't need to be redesigned. But the relevant contents of EMP haven't yet been updated.

(2) Some construction sections of Ning'er-Jiangcheng-Longfu Road haven't sprinkled water for dust control in accordance with EMP.

(3) The spoil of subgrade excavation isn't stockpiled reasonably at some sections. In some spoil disposal area, soil erosion protection measures have lagged behind the project progress, and the stocking mode of spoil is unreasonable.

(4)Some spoil have obstructed the local rural road.

(5) The building material aren't stocked reasonably at some sections, and haven't coverage immediately.

(6) The contractors have provided personal protective equipment to construction workers, but some workers haven't worn as required.

B. Solutions and Actions

The above issues have been reported to PPMO, the project headquarters and the corresponding contractors. PPMO and the project headquarters have supervised and urged the corresponding contractors to improve. According to the key environmental issues have been identified, the following suggestions and measures have been put forward.

(1) PPMO needs to update EMP as soon as possible, according to the project actual situation of design and construction.

(2) The project headquarters shall supervise and urge the contractors to euiped with sprinkler for dust control, and regularly sprinkle water on the construction area.

(3) The project headquarters shall supervise and urge the contractors to strictly implement the soil erosion protection measures, and forbid dumping the spoil at will.

(4) The project headquarters shall supervise and urge the contractors to clean and remove the spoil to the designated area, and ensure the unimpeded traffic of the local rural road.

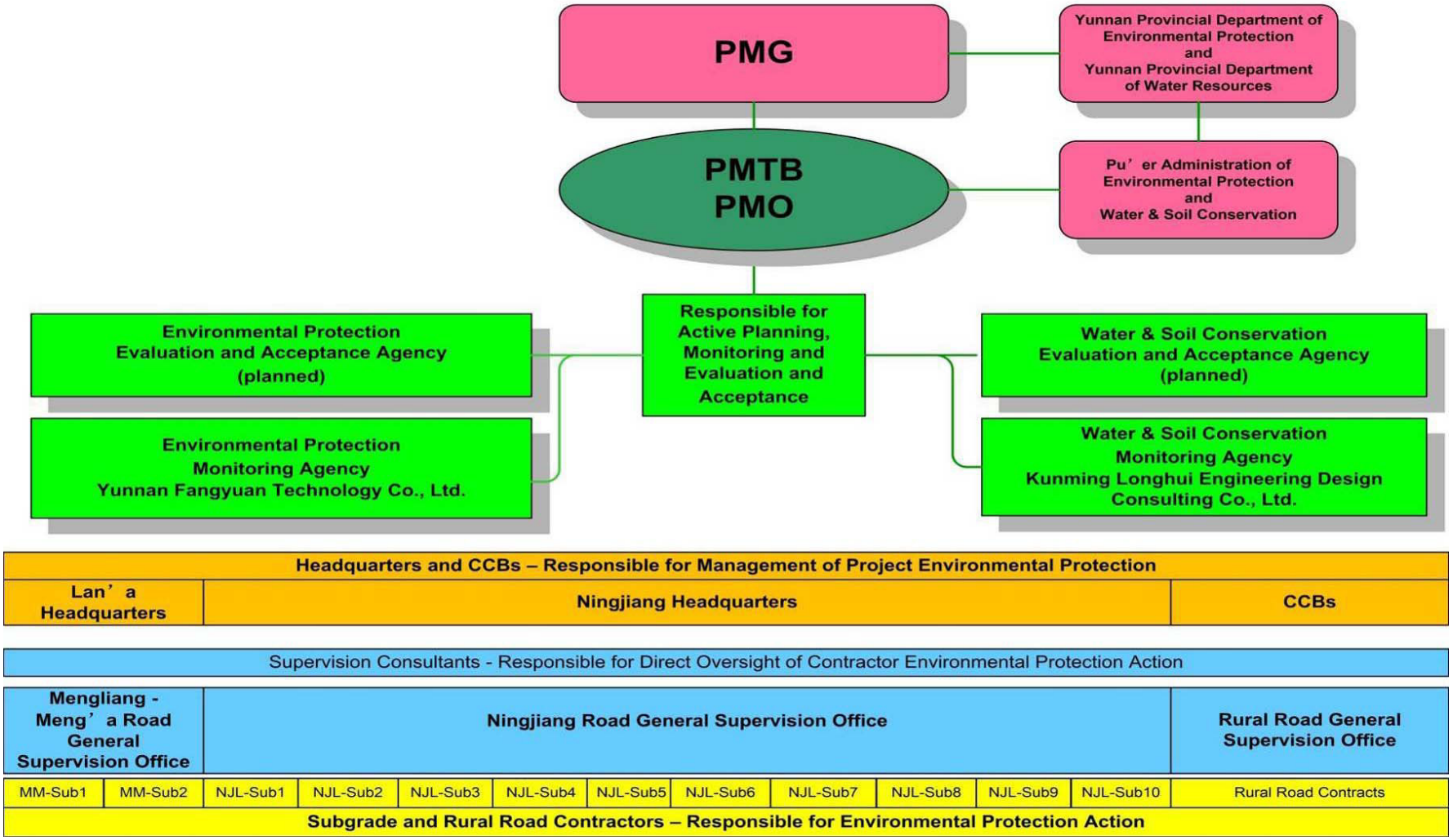
(5) The project headquarters shall supervise and urge the contractors to stock in the designated area，and coverage immediately.

(6) The project headquarters shall supervise and urge the contractors to enhance the management and education of construction workers, and enforce them to usepersonal protective equipment.

IX. Appendices

Appendix 1 Environmental Impact Mitigation and Monitoring Structure Diagram
Appendix 2 The Qualifications of the External Environmental Monitoring Agencies
Appendix 3 Proposed Grievance Redress Mechanism (GRM)
Appendix 4 Responsible Person and Complaints Hotline of GRM Access Points
Appendix 5 Environmental Management Training Record

Appendix 1 Environmental Impact Mitigation and Monitoring Structure Diagram



Appendix 2 The Qualifications of the External Environmental Monitoring Agencies

检验检测机构

资质认定证书

证书编号：152512050004

名称：云南方源科技有限公司

地址：云南省昆明经开区经开路3号科技创新园2A8-23室（650031）

检测地址：云南省昆明市五华区昆师路2号

经审查，你机构已具备国家有关法律、行政法规规定的基本条件和能力，现予批准，可以向社会出具具有证明作用的数据和结果，特发此证。资质认定包括检验检测机构计量认证。

检验检测能力及授权签字人见证书附表。

你机构对外出具检验检测报告或证书的法律责任由云南方源科技有限公司承担。

许可使用标志

CMA

152512050004

发证日期：2015 年 08 月 28 日

有效期至：2021 年 08 月 27 日

发证机关：

本证书由国家认证认可监督管理委员会监制，在中华人民共和国境内有效。

无效

此扫描件复印

The Qualification of Yunnan Fangyuan Science and Technology Co., Ltd.

资质认定

计量认证证书

证书编号：2014 20 2396 U

名称：广西交通环境监测中心站

地址：广西南宁市高新区高新2路6号(邮政编码：530001)

经审查，你机构已具备国家有关法律、行政法规规定的基本条件和能力，现予批准，可以向社会出具具有证明作用的数据和结果，特发此证。

检测能力见证书附表。(*凡涉及相关法律法规设定许可的检验检测项目，应在获得相应许可后方可开展检验检测工作*)

准许使用标志

CMA

发证日期：2014年12月16日

有效期至：2017年12月15日

换证申请日期：2017年07月16日前

发证机关：广西壮族自治区质量技术监督局

本证书由国家认证认可监督管理委员会制定，在中华人民共和国境内有效

The Qualification of Guangxi Transportation Research Institute

生产建设项目水土保持监测资质证书

（副 本）

单 位 名 称：昆明龙慧工程设计咨询有限公司

法定代表人：罗松

资 质 等 级：乙级

资 质 证 号：水保监资证 乙 字第 408 号

有 效 期：自 2012 年 12 月

至 2017 年 12 月

发证机关：

二〇一二年十二月十二日

说 明

1、本证为从事生产建设项目水土保持监测活动的合法凭证。

2、持证单位应当按照《生产建设项目水土保持监测资质管理办法》规定的范围从事监测活动。

3、甲级资质单位，可以承担由各级人民政府水行政主管部门审批水土保持方案的生产建设项目的水土保持监测工作；乙级资质单位，可以承担由县级以上地方人民政府水行政主管部门审批水土保持方案的生产建设项目的水土保持监测工作。

4、资质证书有效期届满需要延续的，应当按照《关于规范生产建设项目水土保持监测资质申请和延续工作程序的通知》办理延续手续。

5、持证单位应当妥善保管资质证书，如有遗失或损坏，应及时办理补证手续。

中华人民共和国水利部制

生产建设项目水土保持监测资质证书

（正 本）

单 位 名 称：昆明龙慧工程设计咨询有限公司

法定代表人：罗松

资 质 等 级：乙级

资 质 证 号：水保监资证 乙 字第 408 号

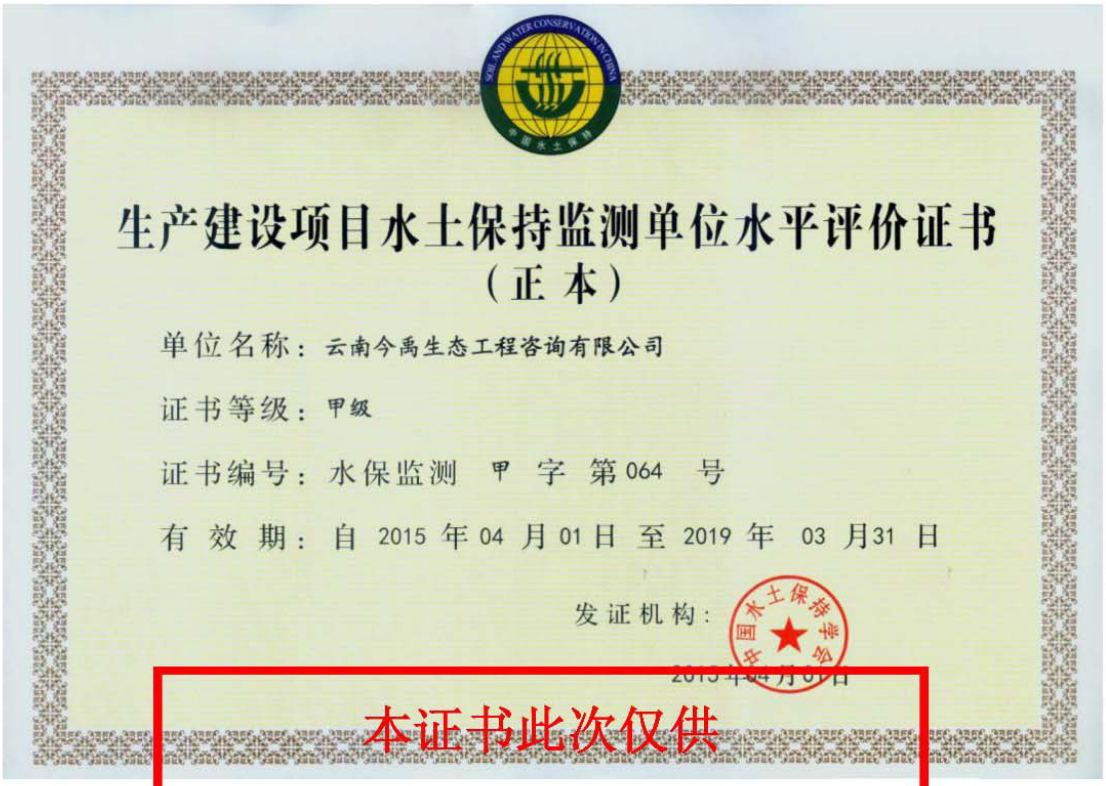
有 效 期：自 2012 年 12 月至 2017 年 12 月

发证机关：

二〇一二年十二月十二日

中华人民共和国水利部制

The Qualification of Kunming Longhui Engineering Design Consulting Co., Ltd.



生产建设项目水土保持监测单位水平评价证书
（正本）

单位名称：云南今禹生态工程咨询有限公司

证书等级：甲级

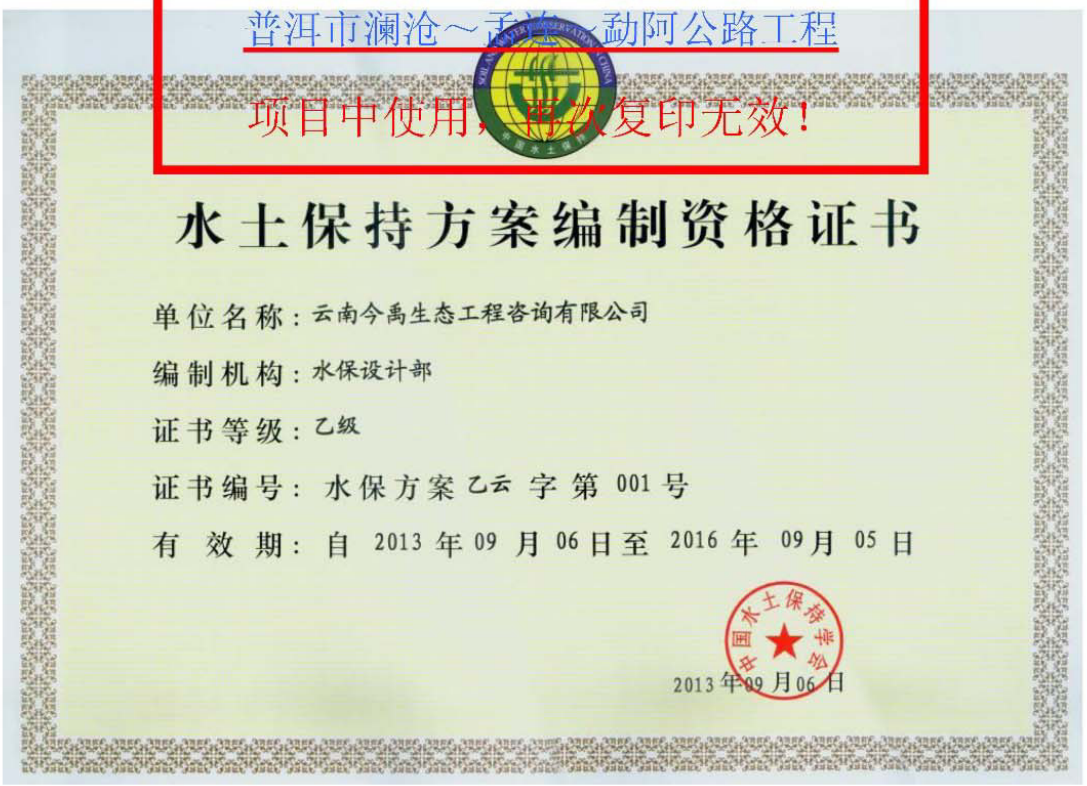
证书编号：水保监测 甲 字 第064 号

有 效 期：自 2015 年 04 月 01 日 至 2019 年 03 月31 日

发证机构：

2015年04月01日

本证书此次仅供
普洱市澜沧～孟连～勐阿公路工程
项目中使用，再次复印无效！



水土保持方案编制资格证书

单位名称：云南今禹生态工程咨询有限公司

编制机构：水保设计部

证书等级：乙级

证书编号：水保方案乙云 字 第 001 号

有 效 期：自 2013 年 09 月 06 日至 2016 年 09月 05 日

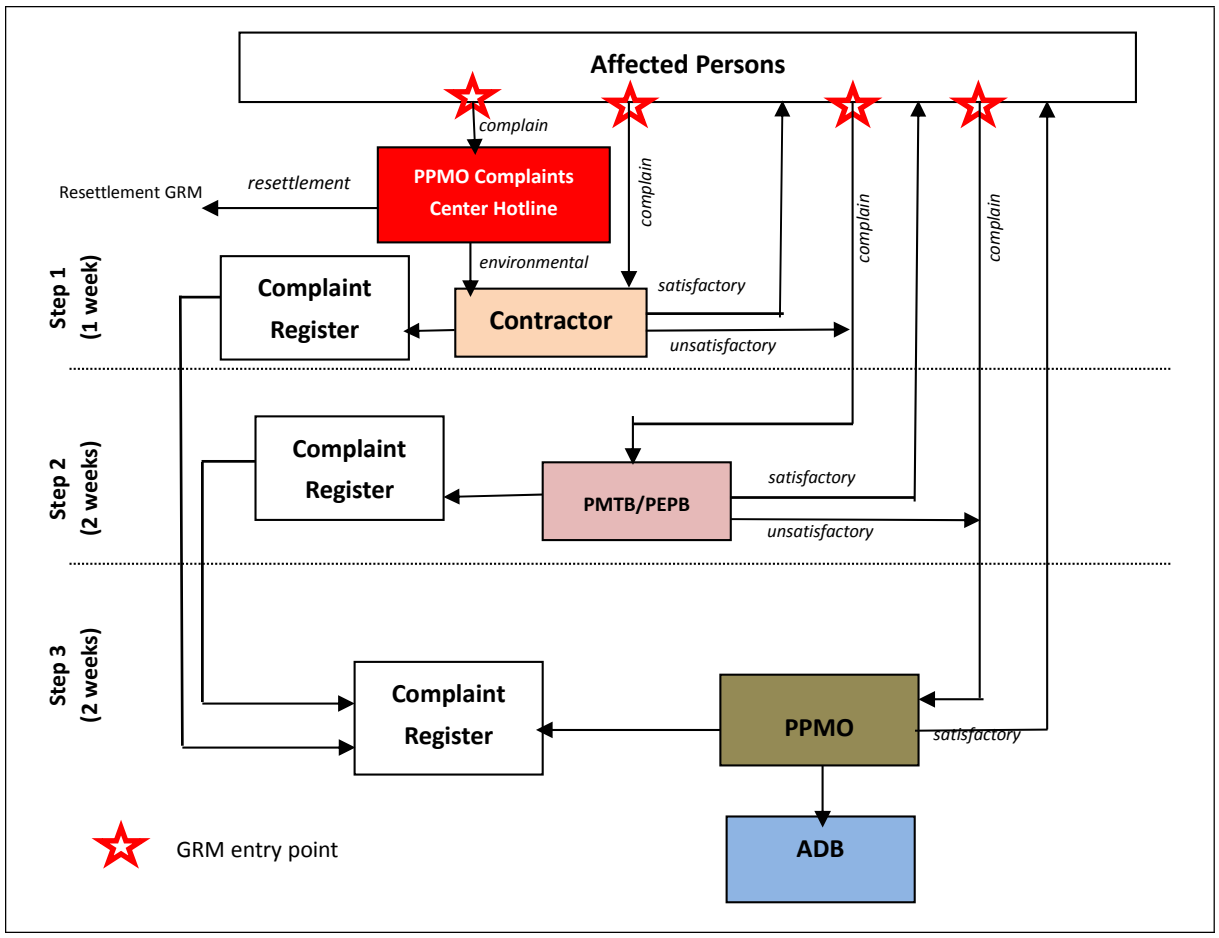
2013年09月06日

The Qualification of Yunnan Jin Yu Ecological Engineering Consulting Co., Ltd.

The Engineers' Qualifications of the External Environmental Monitoring Agencies

The Agency	The Engineers for the Project	The Engineers' Qualification
Yunnan Fangyuan Science and Technology Co., Ltd.	He Yan （The Project Leader）	Engineer of Environmental Monitoring
	Wang Runtian	Engineer of Environmental Monitoring
	Cha Jianqiang	Engineer of Environmental Monitoring
	Zhu Ronggang	Engineer of Environmental Monitoring
	Xu Yanbo	Assistant Engineer of Environmental Monitoring
	BaoChengfei	Assistant Engineer of Environmental Monitoring
	Lei Fengliang	Assistant Engineer of Environmental Monitoring
Guangxi Transportation Research Institute	Huang Guangyu （The Project Leader）	Senior Engineer of Environmental Monitoring
	ZhongGuang	Senior Engineer of Environmental Monitoring
	Pan Changwei	Engineer of Environmental Monitoring
	Huang Rui	Engineer of Environmental Monitoring
	Ma Zengxing	Engineer of Environmental Monitoring
	Ding Xiaojuan	Assistant Engineer of Environmental Monitoring
	Su He	Assistant Engineer of Environmental Monitoring
Kunming Longhui Engineering Design Consulting Co., Ltd.	Hu Yufang （The Project Leader）	Senior Engineer of Water and Soil ConservationMonitoring
	Wang Zhi	Engineer of Water and Soil ConservationMonitoring
	Yin Qidong	Engineer of Water and Soil ConservationMonitoring
	DuanXiaoli	Engineer of Water and Soil ConservationMonitoring
	Lu Yanli	AssistantEngineer of Water and Soil ConservationMonitoring
	Wang Haoran	Assistant Engineer of Water and Soil ConservationMonitoring
Yunnan Jin Yu Ecological Engineering Consulting Co., Ltd.	Zhang Jiabing （The Project Leader）	Engineer of Water and Soil Conservation Monitoring
	Wang Bin	Senior Engineer of Water and Soil Conservation Monitoring
	Zhou Xiang	Senior Engineer of Water and Soil Conservation Monitoring
	Wang Shigui	Engineer of Water and Soil Conservation Monitoring
	Huang Jiajian	Assistant Engineer of Water and Soil Conservation Monitoring
	Wang Yong	Assistant Engineer of Water and Soil Conservation Monitoring

Appendix 3 Proposed Grievance Redress Mechanism



Appendix 4 Responsible Person and Complaints Hotline ofGRM Access Points

Implementing Entity		Responsible Person	Complaints Hotline
PPMO		Zhou Tianshuangni	+86 879 2819198
PMTB		Zhao Shifa	+86 879 2163793
PEPB		Pu'er Municipal Environmental Monitoring Detachment	+86 879 12369
Menglian - Meng'a Road：			
MM-Sub1	CCCC Fourth Highway Engineering Co., Ltd.	Zhang Wenbo	+86 18002139751
MM-Sub2	Yunnan Highway & Bridge Co., Ltd.	Zhou Jian	+86 18587156683
MM-Pav1	Contract not awarded yet	Not yet specified	Not yet specified
Ning'er-Jiangcheng-Longfu Road			
NJL-Sub 1	Liaoning Communication Construction Engineering Co., Ltd.	Huang Shukai	+86 13577111275
NJL-Sub 2*	Sheng Di Communication Engineering Co., Ltd.	Wu Daoyong	+86 13888777822
NJL-Sub 3*	Yunnan Jin'guang Construction Engineering Co., Ltd.	DuanLinsheng	+86 13577201605
NJL-Sub 4*	ShenmuYuliang Construction Engineering Co., Ltd.	Wang Zenghai	+86 13908794917
NJL-Sub 5*	Jiangxi Hongfa Road & Bridge Construction Engineering Co., Ltd.	Wang Yongneng	+86 15877731185
NJL-Sub 6	HeiLongjiangHualong Construction Co., Ltd.	Wang Rongbo	+86 15812040596
NJL-Sub 7	Maoming Transport Construction Engineering Co., Ltd.	Zhou Tiejun	+86 15987969999
NJL-Sub 8	Dongxiang County GanDongLuqiao Engineering co., LTD.	Deng Qichang	+86 13896153403
NJL-Sub 9	Jiangxi province Guyue Engineering Co., Ltd.	Yuan Lin	+86 18187947739
NJL-Sub 10	Hunan foreign Construction group co., LTD.	Huang Jinchang	+86 13888391612
NJL-Pav1	Contract not awarded yet	Not yet specified	Not yet specified
NJL-Pav2	Contract not awarded yet	Not yet specified	Not yet specified
NJL-Pav3	Contract not awarded yet	Not yet specified	Not yet specified

Appendix 5 Environmental Management Training Record

Topic	Trainer(s)	Attendees		Date
ADB financed project management & implementation	ADB	PMTB	1	2014-3-31～4-3
ADB financed project management & implementation	Chuxiong PMO Longrui PMO	PMTB	4	2015-3-24～3-26
Project management	PMG	PMTB	1	2015-4-29
Disbursement & financial management, procurement, social safeguards, and environmental management (Shangxi Xi'an)	ADB	PMTB	3	2015-9-23～9-25
Disbursement & financial management, procurement, social safeguards, and environmental management (Yunnan Mangshi)	DehongTransportBureau	PMTB	3	2016-1-13～14
Disbursement & financial management, procurement, social safeguards, and environmental management (Yunnan Pu'er)	ADB	PMTB & CTB	100	2016-4-11～13
Environmental supervision training	MMR General Supervision Office	Supervision Engineer	13	2016-4