World Bank Loan
Guizhou Cultural and Natural Heritage Protection and Development Project

Summary of Environmental Impact Assessment

Guiyang Hydropower Investigation Design & Research Institute
China Hydropower Engineering Consultation Group Corporation

September 18, 2008
CONTENTS

1 INTRODUCTION ............................................................................................................. 1
  1.1 Background of the Project ......................................................................................... 1
  1.2 Background of EA .................................................................................................... 1
  1.3 Policy and Legislative Context ................................................................................. 1

2 PROJECT DESCRIPTION ............................................................................................... 4
  2.1 Project Development Objective (PDO) ..................................................................... 4
  2.2 Background of the Project Components .................................................................. 4
    2.2.A Background ........................................................................................................... 4
    2.2.B Need for the Project ............................................................................................ 4
    2.2.C Development of the Proposed Project ............................................................... 5
  2.3 Proposed Project Components and Budget ............................................................. 5

3 ENVIRONMENTAL BASELINE CONDITIONS ......................................................... 11
  3.1 Physical Environment ............................................................................................. 11
    3.1.A Overview of Physical Environment .................................................................... 11
    3.1.B Surface Water .................................................................................................... 11
    3.1.C Air quality ......................................................................................................... 12
    3.1.D Solid Waste ....................................................................................................... 12
    3.1.E Acoustic Environment ....................................................................................... 12
  3.2 Bio-diversity ............................................................................................................ 13
  3.3 Socio-economic Conditions ..................................................................................... 13
    3.3.A Demographics and Population .......................................................................... 13
    3.3.B Ethnic Minorities ............................................................................................. 13
    3.3.C Economy ............................................................................................................ 13

4 CULTURAL AND NATURAL HERITAGE ................................................................. 14
  4.1 Overview ................................................................................................................ 14
  4.2 Heritage at Project Sites ......................................................................................... 14
    4.2.A Scenic Areas ....................................................................................................... 14
    4.2.B Geo-Parks .......................................................................................................... 18
    4.2.C Cultural Protection Units ................................................................................... 18
    4.2.D Ancient Towns .................................................................................................. 19
    4.2.E Intangible Heritage ............................................................................................. 20

5 IMPACT ASSESSMENT AND MITIGATION ............................................................. 23
  5.1 Overview of Predicted Impacts and Benefits .......................................................... 23
  5.2 Risks of Adverse Impact ......................................................................................... 23
  5.3 Specific Risks Likely in All Sites ............................................................................. 24
    5.3.1 Water Environment ............................................................................................ 24
    5.3.2 Ambient Air Quality .......................................................................................... 26
    5.3.4 Solid Waste ....................................................................................................... 28
    5.3.5 Ecology and Biodiversity ................................................................................ 29
  5.4 Potential Impacts to Specific Sites and Mitigation .................................................. 31
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5</td>
<td>Social-Economic Impacts</td>
<td>33</td>
</tr>
<tr>
<td>5.6</td>
<td>Land Acquisition and Resettlement and Social Impact Assessment</td>
<td>34</td>
</tr>
<tr>
<td>6.1</td>
<td>Reporting</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>ANALYSIS OF ALTERNATIVES</td>
<td>37</td>
</tr>
<tr>
<td>7.1</td>
<td>“Without Project” Situation</td>
<td>37</td>
</tr>
<tr>
<td>7.2</td>
<td>Safeguards Review of Sub-projects Proposals</td>
<td>37</td>
</tr>
<tr>
<td>7.3</td>
<td>Alternative of Project Locations</td>
<td>37</td>
</tr>
<tr>
<td>i.</td>
<td>Jiuzhou Tunpu Museum</td>
<td>37</td>
</tr>
<tr>
<td>ii.</td>
<td>Dingxiao Guizhou Dinosaur Museum</td>
<td>38</td>
</tr>
<tr>
<td>iii.</td>
<td>Tourism Information Center of Guizhou Normal University</td>
<td>38</td>
</tr>
<tr>
<td>8</td>
<td>PUBLIC CONSULTATION &amp; INFORMATION DISCLOSURE</td>
<td>39</td>
</tr>
<tr>
<td>8.1</td>
<td>Public Consultation</td>
<td>39</td>
</tr>
<tr>
<td>8.2</td>
<td>Information Disclosure</td>
<td>39</td>
</tr>
<tr>
<td>9</td>
<td>ENVIRONMENTAL MANAGEMENT PLAN</td>
<td>40</td>
</tr>
<tr>
<td>9.1</td>
<td>Objectives of EMP</td>
<td>40</td>
</tr>
<tr>
<td>9.2</td>
<td>Organizational Responsibilities for Environmental Management</td>
<td>40</td>
</tr>
<tr>
<td>9.2.1</td>
<td>Organizations for EMP Implementation and Supervision</td>
<td>40</td>
</tr>
<tr>
<td>9.2.2</td>
<td>Reporting and Supervision</td>
<td>40</td>
</tr>
<tr>
<td>9.2.3</td>
<td>Response and Corrective Measures</td>
<td>41</td>
</tr>
<tr>
<td>9.3</td>
<td>Environmental Monitoring Plan</td>
<td>41</td>
</tr>
<tr>
<td>9.4</td>
<td>Capacity Development and Training</td>
<td>i</td>
</tr>
<tr>
<td>9.5</td>
<td>Cost Estimate for EMP</td>
<td>i</td>
</tr>
<tr>
<td>10</td>
<td>REFERENCE</td>
<td>I</td>
</tr>
</tbody>
</table>
List of Appendices
Appendix A  EMP Tables

List of Figures
Figure 1-1 Guizhou Main Tourist Attraction Map .................................................................3
Figure 2-1 Guizhou Provincial Tourism Development Master Plan .........................................10
Figure 4-1 Shanmuhe Scenic Area .......................................................................................15
Figure 4-2 Huangping Jiuzhou Ancient Town ....................................................................15
Figure 4-3 Wangfenglin Montains ....................................................................................16
Figure 4-4 Liping Dong Village .........................................................................................16
Figure 4-5 Sanbao Thousand Households Dong Village ..................................................17
Figure 4-6 Tianlou Ancient Town ......................................................................................17
Figure 4-7 River in Longli Ancient Town .........................................................................17
Figure 4-8 Guanling National Geo-park ...........................................................................18
Figure 4-9 Guizhou Dinosaur ............................................................................................18
Figure 4-10 Sanmentang Ancient Building .....................................................................19
Figure 4-14 Dong Minority Chorus ..................................................................................21
Figure 4-15 Sister Rice Day .............................................................................................22

List of Tables
Table 2-1 A Summary of Project Components and Cost Estimate .....................................5
Table 3-1 Water Quality Monitoring Results in Project Areas .........................................11
Table 3-2 Ambient Air Quality Monitoring Results in Project Areas ...............................12
INTRODUCTION

This report is the Executive Summary of the Environmental Assessment (EA hereafter) for the Guizhou Cultural and Natural Heritage Development and Management Project (Project hereafter), partly funded by the World Bank. This document provides a general summary of the findings in the project Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP), including a description of the project components, legal and policy framework and applicable environmental standards, natural and cultural heritage, environmental baselines, impact and mitigation, heritage conservation plan, analysis of alternatives, public consultation and closure, and environmental management plan.

1.1 Background of the Project

Guizhou Province is the poorest province in China. However, the area has extremely rich tourism resources, some of which are of global significance. Guizhou’s natural and cultural heritage features spectacular landscapes, rich biodiversity and untouched ethnic minority culture. Development of sustainable tourism in Guizhou Province has been adopted as the main vehicle for economic growth. Figure 1-1 presents the main tourist attractions in Guizhou Province.

1.2 Background of EA

In accordance with the People’s Republic of China National Regulations and the World Bank OP/BP 4.01 related to Environmental Assessment, the EIA and EMP fall under the Category A project and, as such, were subjected to a full EA.

Guiyang Hydropower Investigation & Research Institute, CHECC (GHIDRI) conducted the EA studies for each project component with the assistance of DHI (Danish Hydraulic Institute). In parallel, Social Assessment (SA) and Resettlement Action Plans (RAP) were prepared by Guizhou Normal University.

1.3 Policy and Legislative Context

Guizhou Tourism Bureau (GTB) is responsible for the development and management of the tourism industry within the province. Guizhou Environmental Protection Bureau (GEPB) and local EPBs are responsible for environmental, health and safety management, while the Guizhou Administration of Cultural Heritage is responsible for the management of cultural assets in Guizhou.

All relevant regulation, policy and administrative requirements for Environmental Assessment of development projects in China, at the state, provincial and municipal levels were followed during the preparation and evaluation of environmental assessment, as were the World Bank’s ten safeguard policies.

A safeguard review of the project determined that the following Operation Policy and Bank Procedures be triggered:
- Environmental Assessment (OP/BP 4.01)
- Physical Cultural Resources (OP/BP 4.11)
- Indigenous Peoples (OP/BP 4.10)
- Involuntary Resettlement (OP/BP 4.12)
Figure 1-1 Guizhou Main Tourist Attraction Map
2 PROJECT DESCRIPTION

2.1 Project Development Objective (PDO)

Project development objectives are to achieve: (a) a higher level of livelihood productivity among residents of participating historical and cultural villages/districts in Guizhou Province; and (b) a high level of satisfaction among cultural and eco-tourists visiting participating sites. These objectives are to be achieved while effectively protecting the cultural and natural assets. This will require undertaking prioritized and sustainable investments in infrastructure, initiatives to enhance the income of the ethnic minority population, and a set of tourism industry interventions which pay special attention to the natural and cultural heritage of Guizhou, as well as capacity building in the tourism and protection sectors.

2.2 Background of the Project Components

2.2.A Background

The Guizhou Provincial Government has adopted policies to promote the province’s diverse natural and cultural heritage resources for the economic benefit of the people of Guizhou. Guizhou Provincial Tourism Development Master Plan, 2002 (MP hereafter), provides the official guidelines for tourism development in Guizhou. The MP emphasizes Guizhou’s pristine ethnic minority cultures and unique natural environments. Six integrated clusters and six featured clusters focusing on Environmental Tourism, Cultural Tourism, Rural Tourism, and developments were proposed as the key products for both the international and domestic markets. Figure 2-1 represents those six key featured tourism clusters.

In June 2006, the Guizhou Provincial Rural Tourism Development Plan (RTDP) was adopted as the strategic guidance for the development of Guizhou’s rural tourism sector with special emphasis on ethnic and cultural tourism. The RTDP proposes a model for the establishment of cultural and eco-museums at a number of pilot villages. Under this model, local communities would become shareholders in the tourism development company and would receive a share of economic benefits from the enterprise.

2.2.B Need for the Project

The primary objective of the project is to address poverty among the ethnic populations. The project will include measures to enhance incomes and create employment opportunities and improve the standard of living of the ethnic minority population in the participating Prefectures, using the area’s tourism resources as the primary vehicle to achieve this goal. It is necessary to balance the economic benefits from tourism development with environmental protection and heritage conservation.
2.2.C Development of the Proposed Project

It has been shown that development of the tourism sector has previously resulted in environmental degradation and socio-cultural impacts in Guizhou. While the provision of roads, hotels and utility infrastructure may improve the accessibility and amenity of tourism sites, inadequate management and planning may endanger the natural and cultural heritage assets that attract visitors in the first place.

2.3 Proposed Project Components and Budget

The Project components proposed to be included and supported by the World Bank loan are distributed in Guiyang city, Anshun city, Qiandongnan prefecture and Qianxinan prefecture. A summary of project components and cost estimate, organized by region, is provided in the below table.

Table 2-1 A Summary of Project Components

<table>
<thead>
<tr>
<th>Region</th>
<th>Sub-projects</th>
<th>Construction sites</th>
<th>Construction contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anshun city</td>
<td>Tianlong fortress cultural heritage protection</td>
<td>Tiantaishan Tianlong fortress of Tianlong town, Pinba county</td>
<td>Pathway, drainage system, garbage collection and transport station, power facility, folk house maintenance and protection, demonstration folk house construction, tourist information center, fortress culture exhibition hall, intangible cultural heritage protection and training.</td>
</tr>
<tr>
<td></td>
<td>Jiuzhou fortress cultural heritage protection</td>
<td>Yunshan village, Benzai village and Jiuixi village of Qiyanqiao town, Xixiu district</td>
<td>Pathways, car park, fire fighting system, drainage pipes, garbage collection and transport station, public toilet, river clean-up, public signage, folk house maintenance and protection, demonstration folk house construction, museum, tourist information center, ancient building repair, tangible cultural heritage protection and training.</td>
</tr>
<tr>
<td></td>
<td>Guanling national geological park heritage protection</td>
<td>Tanshan of Xinpu village, Guanling county</td>
<td>Ancient site exhibition facilities, exhumation site exhibition, triassic ichthyosaur exhibition hall, green areas in triassic park, scientific work station, tourist information center, public signage, exhibition pathway, car park, garbage collection system, public toilet, training and education.</td>
</tr>
<tr>
<td>Region</td>
<td>Sub-projects</td>
<td>Construction sites</td>
<td>Construction contents</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Qiandongnan prefecture</td>
<td>Biasha village cultural heritage protection</td>
<td>Biasha village, Congjiang county</td>
<td>Pathway, car park, sewage treatment station, drainage system, fire fighting facility, garbage collection system, protection and repair of Lusheng area, tree planting, power supply alteration, protection of Miao folk houses</td>
</tr>
<tr>
<td></td>
<td>Duliujiang Dong cultural heritage protection</td>
<td>Zenchong village and Xiaohuang village, Congjiang county</td>
<td>Pathway, car park, water supply facility, drainage system, sewage treatment station, fire fighting facility, water environment improvement, garbage collection and transport system, public toilet, planting trees, protection of Dong folk houses, Xiaohuang traditional culture exhibition center, public signage, intangible culture protection.</td>
</tr>
<tr>
<td></td>
<td>Danzai Miao cultural heritage protection</td>
<td>Shiqiao village, Danzai county</td>
<td>Pathway, car park, water supply facility, drainage system, fire fighting facility, garbage collection system, public toilet, water environment improvement, village environment improvement, paper manufacturing workshop site protection, protection of familial paper manufacturing workshop, folk hotel construction, ancient village gate repair, public signage, tourist information and service center.</td>
</tr>
<tr>
<td></td>
<td>Jiuzhou ancient city heritage protection</td>
<td>Jiuzhou town, Huangping county</td>
<td>Ancient street rehabilitation, drainage system, sewage treatment facility, garbage collection and transport system, folk and ancient building maintenance, fire fighting facility, public signage, intangible cultural heritage protection and training.</td>
</tr>
<tr>
<td></td>
<td>Yangasha national cultural region heritage</td>
<td>Wubao village, Balang village and Wenquan village of Guanme town,</td>
<td>Pathway, car park, water supply and drainage system, weather bridge, sewage treatment facility, fire fighting facility, garbage collection system, public toilet,</td>
</tr>
<tr>
<td>Region</td>
<td>Sub-projects</td>
<td>Construction sites</td>
<td>Construction contents</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>protection</td>
<td>Raohao village of Nanzai town,</td>
<td>folk houses and village gate repair, village environment repair, village environment improvement, planting trees, stannous embroidery exhibition center.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Liuji village of Nanjia town,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jianhe county</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Longli ancient city of Longli</td>
<td>Pathway, drainage system, sewage treatment facility, fire</td>
<td>Pathway, drainage system, sewage treatment facility, fire fighting facility, folk house repair, water environment protection.</td>
</tr>
<tr>
<td>Longli ancient city heritage protection</td>
<td>town, Jinping county</td>
<td>fighting facility, garbage collection system, public toilet, power supply alteration, folk house and ancient building repair, minority culture and tourist information center, tourism service facility.</td>
<td></td>
</tr>
<tr>
<td>Bala river Miao cultural heritage protection in Kaili region</td>
<td>Jidao, Huaienbao, Longjing of Kaili city</td>
<td>Pathway, car park, weather bridge, water supply and drainage system, sewage treatment facility, fire fighting facility, garbage collection system, public toilet, power supply alteration, folk house and ancient building repair, minority culture and tourist information center, tourism service facility.</td>
<td></td>
</tr>
<tr>
<td>Bala river Miao cultural heritage protection in Kaili region in Leishan region</td>
<td>Langdeshangzai, Maomaohe, Nannmeng, Jiaomeng of Leishang county</td>
<td>Pathway, car park, fire fighting facility, garbage collection system, public toilet.</td>
<td></td>
</tr>
<tr>
<td>Xijiang Miao cultural heritage protection</td>
<td>Xijiang town, Leishan county</td>
<td>Pathway, car park, drainage system, sewage treatment facility, fire fighting facility, garbage collection and transport system, public toilet, folk house and typical building repair, tourist information center, village gate, landscape platform, folk performance ground, Timbal and Lusheng ground, intangible cultural heritage protection.</td>
<td></td>
</tr>
<tr>
<td>Zhaoxing Dong cultural</td>
<td>Zhaoxing, Tang’an, jitang, xiage of</td>
<td>Street, pathway, riverbank, water supply and drainage system, sewage treatment facility, fire</td>
<td></td>
</tr>
<tr>
<td>Region</td>
<td>Sub-projects</td>
<td>Construction sites</td>
<td>Construction contents</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>heritage protection</td>
<td>zhaoxing town, liping county</td>
<td>fighting facility, garbage collection system, medical station, folk house repair, demonstration folk house construction.</td>
<td></td>
</tr>
<tr>
<td>Shanmu river cultural and natural heritage protection</td>
<td>shiping county</td>
<td>Road, pathway, car park, bridge, port, water supply and drainage system, sewage treatment facility, garbage collection and transport system, public toilet, electronic monitoring system, emergency assistance facility, public signage, management office building.</td>
<td></td>
</tr>
<tr>
<td>Shidong cultural heritage protection</td>
<td>Shidong town, Taijiang county</td>
<td>Pathway, car park, water supply and drainage system, sewage treatment facility, garbage collection and transport system, public toilet, folk house and ancient building repair, minority craft exhibition hall, information center, public signage, river bank protection, intangible cultural heritage protection.</td>
<td></td>
</tr>
<tr>
<td>Sanmentang cultural heritage protection</td>
<td>Sanmentang village, Tianzhu county</td>
<td>Pathway, water supply and drainage system, sewage treatment facility, garbage collection and transport system, folk house and ancient building repair, ancient stele and port protection, tourist information center, management office building, folk culture and performance ground, intangible cultural heritage protection.</td>
<td></td>
</tr>
<tr>
<td>Ethnic minorities culture and history museum</td>
<td>Kaili county</td>
<td>Minority culture museum, car park, landscape improvement.</td>
<td></td>
</tr>
<tr>
<td>Liping tourism information center</td>
<td>Liping county</td>
<td>Tourist information center</td>
<td></td>
</tr>
<tr>
<td>Jianhe tourism information</td>
<td>Jianhe county</td>
<td>Tourist information center, car park, water supply and drainage system, garbage collection and</td>
<td></td>
</tr>
<tr>
<td>Region</td>
<td>Sub-projects</td>
<td>Construction sites</td>
<td>Construction contents</td>
</tr>
<tr>
<td>------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Qianxinan prefecture</td>
<td>Xingyi national geological park and Dingxiao Guizhou dragon heritage protection</td>
<td>Dingxiao development area of Xingyi county</td>
<td>transport station, public toilet, planting trees, intangible cultural heritage protection.</td>
</tr>
<tr>
<td></td>
<td>Maling river canyon and Wanfeng lake national scenic spot cultural and natural heritage protection</td>
<td>Xingyi county</td>
<td>Fossil museum and square, training items.</td>
</tr>
<tr>
<td></td>
<td>Buyi cultural and natural heritage protection</td>
<td>Zhenfeng county</td>
<td>Pathway, gate, bridge, car park, river bank, water supply and drainage system, sewage treatment facility, public toilet, garbage collection and transport system, folk house repair, ancient tree protection, village environment improvement, performance ground, Buyi culture center, tourism service center, intangible cultural heritage protection and training.</td>
</tr>
<tr>
<td>Guiyang city</td>
<td>Guizhou cultural and natural protection development center</td>
<td>Guizhou Normal University</td>
<td>Guizhou cultural and natural heritage protection and development center</td>
</tr>
<tr>
<td></td>
<td>Guizhou tourism capability development</td>
<td>Guizhou Tourism Agency</td>
<td>Capability building.</td>
</tr>
</tbody>
</table>
Figure 2-1 Guizhou Provincial Tourism Development Master Plan

LEGEND
- Tourism Development Zones
- Special Tourism Development Areas
- Main Scenic Attractions
- Quality Tourism Area
- Capital City of Prefecture
- Capital City of Prefecture
- Gateway Airport
- Regional Airport
- Regional Airport Proposed by Guizhou Master Plan
- Expressway
- Expressway Under Construction
- Principal Roads
- Urban Roads
- Railway
- Proposed Railway
- Provincial Line
- Inter-regional Line
- Intercity Provincial Line
3 ENVIRONMENTAL BASELINE CONDITIONS

3.1 Physical Environment

3.1.A Overview of Physical Environment
Guizhou is located in southwest China and borders the provinces of Sichuan, Chongqing, Hunan, Guangxi, and Yunnan. It has a total area of 176,100 km$^2$, and an average altitude of 1,100m. Guizhou is mountainous and hilly, and possesses significant amounts of karst topography; the most distinctive characteristic of Guizhou’s physical environment. The area is located in the subtropical monsoon zone, characterized by a warm and humid climate, although it experiences notable regional variations. Guizhou is an ideal location for vacations.

3.1.B Surface Water
Guizhou has an abundance of surface water which principally comprises two main river systems, the Yangtze and Pearl River basins. Surface water quality is one of the most serious environmental issues for Guizhou, although water quality is within acceptable levels in many of the scenic areas and attractions.

The monitoring results (see Table 3-1) provided by environmental monitoring stations of Anshun city, Qiandongnan prefecture and Qianxinan prefecture in November 2007 show that the surface water quality in the main project areas, with a few exceptions, basically complies with the relevant requirements.

Table 3-1 Water Quality Monitoring Results in Project Areas

<table>
<thead>
<tr>
<th>Regions</th>
<th>Water Quality Monitoring Section</th>
<th>Water Environment Quality Assessment Based on Monitoring Results *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anshun city</td>
<td>Benzai section</td>
<td>Requirement: Class III Monitoring results: Class II</td>
</tr>
<tr>
<td>Qiandongnan prefecture</td>
<td>Xiaohuang</td>
<td>Requirement: Class II Monitoring results: Class II</td>
</tr>
<tr>
<td></td>
<td>Shiqiao</td>
<td>Requirement: Class III Monitoring results: Class II</td>
</tr>
<tr>
<td></td>
<td>Longli ancient town</td>
<td>Requirement: Class III Monitoring results: Class II</td>
</tr>
<tr>
<td></td>
<td>Sanbao</td>
<td>Requirement: Class III Monitoring results: Class II</td>
</tr>
<tr>
<td></td>
<td>Sanmentang</td>
<td>Requirement: Class III Monitoring results: Class II</td>
</tr>
<tr>
<td>Qianxinan prefecture</td>
<td>Bike village</td>
<td>Requirement: Class III Monitoring results: Class III</td>
</tr>
</tbody>
</table>

* In terms of water quality, Class I is better than II, and so on.
3.1.C  **Air quality**

Air quality monitoring results (see Table 3-2) provided by environmental monitoring stations of Anshun city, Qiandongnan prefecture and Qianxinan prefecture in November 2007 show that air quality in the main project areas, largely meets the relevant requirements.

<table>
<thead>
<tr>
<th>Regions</th>
<th>Ambient air monitoring site</th>
<th>Assessment index</th>
<th>General assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anshun city</td>
<td>Benzai village</td>
<td></td>
<td>NO₂ reach the national standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Class I</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TSP reach the national standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Class I</td>
</tr>
<tr>
<td>Qiandongnan prefecture</td>
<td>Xintuan drum-tower</td>
<td>NO₂</td>
<td>NO₂ reach the national standards</td>
</tr>
<tr>
<td></td>
<td>Samu river scenic area</td>
<td>TSP</td>
<td>Class I</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TSP reach the national standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Class I</td>
</tr>
<tr>
<td>Qianxinan prefecture</td>
<td>Bike village</td>
<td></td>
<td>NO₂ reach the national standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Class II</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TSP reach the national standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Class II</td>
</tr>
</tbody>
</table>

* In terms of air quality, Class I is better than II, and so on.

3.1.D  **Solid Waste**

According to the Guizhou Environmental Status Bulletin (2005), the average solid waste treatment rate in 2005 was only 26.7%, which means that a considerable amount of solid waste is being disposed of by other means. This includes open dumping and discarding down hill slopes, burning and use as compost or animal food. All landfills are located in major cities and there is no formal solid waste collection or arrangement for disposal of solid waste in rural areas. Of the project cities/towns, only Guiyang, Anshun and Kaili had landfills in 2005, while most of the remainder still lack solid collection and transfer facilities. Random dumping is not only visually unsightly but also causes other negative impacts on the environment.

3.1.E  **Acoustic Environment**

The proposed project sites are mainly rural areas where the noise level is minimal due to low industrial and transportation activities.

<table>
<thead>
<tr>
<th>Serial number</th>
<th>Regions</th>
<th>general assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Guiyang city</td>
<td>Generally accord with the environmental classifications</td>
</tr>
<tr>
<td>2</td>
<td>Qiandongnan prefecture</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Qianxinan prefecture</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Anshun city</td>
<td></td>
</tr>
</tbody>
</table>
3.2 Bio-diversity

Investigation shows that there are no protected ancient trees or rare flora in the project towns/villages. Some of the project cities have ancient trees. However, these are situated far from construction sites or are well protected and as a result negligible impact is anticipated.

3.3 Socio-economic Conditions

3.3.A Demographics and Population

In 2004 Guizhou’s population of 39 million comprised 26% urban residents. Guizhou’s population density is 200 persons/km$^2$, and this is not only higher than the national average but is also increasing. The difference in population distribution between urban and rural areas is large and distribution by geographical area also varies greatly.

3.3.B Ethnic Minorities

Guizhou is home to 49 ethnic minority groups with a population of 13.39 million, which accounts for 36.77% of the population. Ethnic groups whose population exceeds 100,000 include the Miao, Buyi, Dong, Tujia, Yi, Gelao Shui, Hui and Bai.

3.3.C Economy

Guizhou has a predominantly agricultural-based economy and the development of industry (apart from mining and heavy industry), and of the service sector, especially tourism, has lagged behind the rest of China. Despite exceptional growth in recent years, Guizhou remains the poorest province in China, with annual per capita GDP of only US$ 3,603 in 2005 compared to US$9,101 for the whole of China. The Human Development Index (HDI) which measures aspects such as the level of culture, education and science, places Guizhou significantly below the average in China.
4 CULTURAL AND NATURAL HERITAGE

4.1 Overview

Guizhou is endowed with a large amount of nature reserves, forest parks, geo-parks, and diverse ethnic minority groups whose traditional culture and lifestyle have been largely preserved. Guizhou’s cultural and natural heritages are of global significance. Daqikong and Xiaoqikong Scenic Areas in Libo are listed as World Natural Heritage sites, owing to their spectacular karst landforms.

The 25 sub-projects are located in 4 of the 12 Integrated/Featured Tourism Clusters specified in the Guizhou Tourism Development Master Plan. They cover a broad spectrum of attractions including karst landforms, deep gorges, picturesque waterways, ancient towns, dinosaur fossils, and other heritage, both physical and intangible.

4.2 Heritage at Project Sites

4.2.A Scenic Areas

Several sub-projects will be located in two National Scenic Areas (NSA) and three Provincial Scenic Areas (PSA) in Guizhou, which are defined as environmentally sensitive areas:

Wuyanghe (Wuyang River) National Scenic Area

Two sub-projects are located in two sub-regions of Wuyanghe, i.e. Shanmuhe Scenic Area and Huangping Jiuzhou Ancient Town. The former features clean springs and cliffs while the latter has a number of historic hotel buildings and is classified as one of the top 10 Historic and Cultural Ancient Towns of Guizhou.
Malinghe Gorge-Wanfeng Lake National Scenic Area

This area features deep gorges, water falls, the spectacular karst mountains of Wanfenglin, and a large artificial lake.
Liping Dong Village National Scenic Area

Liping Dong Village is home to the Dong ethnic minority whose traditional lifestyle, especially singing and dance, constitutes one of the most important tourism attractions in the province.

Rongjiang Gurong (ancient banyan) Provincial Scenic Area

A sub-project will be located in Sanbao Thousand Households Dong Village of Rongjiang. The village retains some notable traditions such as Dong opera and banquets which stage singing contests. The village also has a number of ancient trees and the highest concentration of Dong minority buildings in the world.
Tiantaishan-Silahe Provincial Scenic Area

The sub-project Tianlong Ancient Town is located in a scenic area and has many attractions including Wulong Temple Ancient Architecture, areas of natural forest, ancient gingko, Tunpu Culture, etc.

Jingpin Sanbanxi-Longli Ancient Town Provincial Scenic Area

Longli Ancient Town is the focal sub-project in this area. Longli Ancient Town features an Ecological Museum co-developed by China and Norway, and a number of historic buildings.
4.2.B  **Geo-Parks**
Projects sites include two National geo-parks, also defined as environmentally sensitive areas.

**Guanling National Geo-park**

Located in Guanling, Anshun City, the geo-park features paleontology fossils such as oceanic reptiles of ichthyosaur, syngnathus and sauropterygia. There are also fossils of invertebrates, fish, and ancient plants, including the sea lily, which is a rare example of an echinoderm of significant scientific and aesthetic value.

*Figure 4-8 Guanling National Geo-park*

**Xingyi National Geo-park**

Located in Xingyi, Qianxinan Prefecture, the geo-park features a considerable reserve of fossils of Guizhou dinosaurs.

*Figure 4-9 Guizhou Dinosaur*

4.2.C  **Cultural Protection Units**
There are two cultural relics under protection located in project sites:

**Shiqiao White Paper Mill**

The paper mill of Shiqiao White Paper dates from the Han and Tang dynasties and is currently a candidate for the National Intangible Heritage Catalogue.
Sanmentang Ancient Buildings

Sanmentang is a village representative of the north Dong minority culture. There are a large number of historic buildings such as steles, houses, and bridges, which were mostly built more than 400 years ago in the Qing Dynasty. In addition the village has a number of ancient trees.

Figure 4-10 Sanmentang Ancient Building

4.2.D Ancient Towns

Jiuzhou Town

“Jiuzhou” and “Tunpu” mean ancient town and a fortress where soldiers were stationed, respectively. Jiuzhou Tunpu culture represents the history of mass army residence in the province in ancient times. Jiuzhou Town is located in Anshun and was approved as a Historic Cultural Town by Guizhou Provincial Government in 2006.
Xijiang Qianhu (a thousand households) Miao Village

The village is the largest Miao ethnic minority village in China. Its traditional culture and lifestyle have been well preserved. The village is well-known as an Open Museum of the Miao ethnic minority.

4.2.E **Intangible Heritage**

Other sub-projects aim to protect intangible cultural heritage in Guizhou, such as the development of minority clothing and decorative jewelry, handicraft, festivals, songs and dances.

*Basha Warrior Tribe*

The Basha, who have maintained their traditions for centuries, are often called one of the last remaining warrior tribes of the world. Basha men retain the appearance of ancient warriors, while the Basha people, who have lived unchanged for generations, have preserved their pristine lifestyle. This area also has the ecological museum of the Miao minority culture.
Xiaohuang Dong Minority Chorus

Xiaohuang Village has been named “Home to Civil Culture and Art” and “Home to Dong Minority Chorus”. It is renowned for its tradition of singing while the diversity and richness of folk songs are considered to be incomparable.
The tin embroidery in Raohao village distinguishes this branch of Miao ethnic minority. This exquisite handicraft, with its clear pattern and striking material, is one of the world’s unique crafts.

**Sisters’ Food Day of Shidong Town**

Sisters’ Food Day is a traditional courtship festival held in Shidong Town. The festival has been classified as National Intangible Heritage.

*Figure 4-15 Sisters’ Food Day*

**Nachan Buyi Minority Culture**

Nachan village is the largest and most ancient village of the Buyi minority. The playing of instruments, various dances, and singing contests make Buyi’s traditional holiday into a festival for all ethnic minority groups in this region. Nachan has been classified as a key tourism destination of Guizhou.

**Bala River Miao Culture**

Bala River Basin features beautiful natural scene along with minority culture and tradition. The Miao villages are very well preserved. Traditional singing and dancing are great tourist attractions.

Langde Upper Village in the area holds cultural relics such as ancient buildings, a fortress, and bridges.
5 IMPACT ASSESSMENT AND MITIGATION

5.1 Overview of Predicted Impacts and Benefits

The proposed project cities include environmentally sensitive regions such as five national or provincial scenic areas, two national geo-parks and two key cultural relic protection units. These environmentally sensitive areas are set as focal points for impact assessment. The remaining sub-projects/components will result in much lower impact and hence a briefer assessment or statement will be conducted accordingly.

Sub-projects that will be implemented under the master plans for these sensitive areas have been assessed to result in short-term and reversible negative impacts due to their small size, short construction periods and the limited areas that will be affected. Sub-projects related to cultural relic protection units aim to rehabilitate and retain their lost functionalities. The principle of implementation is to maintain the authenticity of the subjects. It is suggested that further consultation with local communities be carried out and that the Heritage Conservation Plan and Environmental Management Plan be implemented strictly so that any impact can be minimized.

Assessment of the impact on the cultural heritage is largely carried out through review of the relevant legal, technical and institutional factors. It is found that although the protection of cultural heritage in China is in a relatively early stage, such classified heritage is subject to satisfactory regulatory control. Although a number of risks to the cultural heritage have been identified during the EA screening stage, these risks can be sufficiently mitigated to an acceptable level. Ultimately, after the project is implemented, this heritage will be better protected.

In general, the assessment concluded that these environmental impacts are acceptable to the regional environment.

Project activities include improvement of infrastructure such as pathways, sanitation, solid waste collection and transfer facilities. Training activities will help improve environmental awareness and management capacity. Of greater importance is the fact that the construction and operation of the projects will generate economic benefits for local communities and eventually result in poverty alleviation in rural areas.

5.2 Risks of Adverse Impact

5.2.1 Physical Cultural Heritage Damaged or Destroyed

Damage or destruction of physical cultural heritage may occur from a variety of causes. It may simply be the result of an inappropriate choice of site for new tourism facilities. However, it may also be the result of demolition, reconstruction, or inappropriate restoration of physical monuments, traditional buildings and structures or other significant architecture. Unnecessary reconstruction and re-creation or restoration that does not match the original architecture, style and color, or is carried out by unqualified
personnel with low quality materials and without expert guidance, is a threat to valuable heritage and may result in irreversible loss.

**Mitigation:**

- It is proposed to establish a Cultural Heritage Protection Advisory Commission which will direct local level expert teams for gathering and analysis of technical knowledge and communication between the variety of institutions, business and organizations concerned with cultural heritage. The Commission would provide knowledge and expertise for the effective sustainable management, conservation and preservation of Guizhou’s physical and intangible heritage and cultural landscapes, and would mitigate against inappropriate commercial exploitation; and
- It is recommended that detailed building and restoration standards be applied and jointly enforced by planning authorities and residents in the minority villages that will be developed.

### 5.2.2 Intangible Cultural Heritage Damaged or Altered

The uniqueness of ethnic cultures in Guizhou depends on their ability to maintain their authenticity. Previously, their remoteness and isolation have been vital in retaining their culture and heritage. However, if tourism in the area is overly developed the preservation of ethnic culture may be compromised.

**Mitigation**

- It is recommended that a Code of Ethics be developed. This may comprise a comprehensive set of principles to guide public and private stakeholders involved in the use of intangible heritage as a tourism resource. The Code of Ethics would provide a common voluntary framework to respect and preserve vulnerable heritage and to avoid it being homogenized or degraded as a result of tourism development; and
- It is recommended that guidelines be developed to promote the awareness of the importance of preserving authenticity and avoid rampant commercialization of the intangible heritage.

### 5.3 Specific Risks Likely in All Sites

#### 5.3.1 Water Environment

Tourism development in the rural area of Guizhou may result in a higher volume of wastewater. This has the potential for a severe impact on water quality in receiving waters. This project has incorporated provision of toilets and construction of domestic wastewater collection and treatment facilities to accommodate the increased wastewater flow resulting from the higher volume of tourists visiting the project area, as well as from the host communities. The proposed project activities will have a negative impact on the water environment during the construction phase. During the operation period, the water environment will benefit from the project. Given that the sub-projects are
scattered and are relatively small in size, it is expected that any impact caused will be limited. Any impact will mainly be associated with the construction activities of waterway rehabilitation and the construction of sewage collection and treatment systems.

Construction phase

• Waterway rehabilitation activities cover 9 sub-project sites and 11 rivers in total. Activities include cleaning up the waterways and banks, and river embankments of solid waste. This will result in temporary re-suspension of sediments. However, as these activities are low level and short-term, any impact resulting from them will be limited;
• The wastewater generated in the construction sites will include construction effluent and domestic sewage. The construction effluent is mainly generated in the process of concrete mixing, equipment washing and the cleaning of materials. Due to the scattered dispersion of construction sites there will be less use of concrete and machinery in construction and instead more manual labor and indigenous techniques will be applied. This will generate less effluent and the resulting impact on water environment will be limited; and
• The domestic sewage will mainly be generated from the sanitation facilities and the dining hall in the workers’ camps. Although the quantity of sewage from each construction site will be small, it will affect the water environment and surrounding environment if it is discharged into surface water without proper treatment.

Operation phase

• Cleaning up of waste and the river embankments will reduce the amount of waste and solids entering into waterways. This will help improve hydraulic conditions which is favorable for good water quality in the rivers. In addition, the natural and ecological environment will be enhanced.
• Operation of (i) Biogas tanks (ii) twin pit flush toilets (iii) toilets with septic tanks (individual or community level) (iv) piped sewerage to community septic tanks, or retention ponds or stabilization ponds (v) piped sewerage to city sewer system will help improve sanitation conditions in rural areas. These facilities can be operated in a simple manner and cost-effective way. Treated effluent is mainly re-used for agricultural application. However, some sub-projects are located in environmentally sensitive areas or have access to important water bodies. In such sensitive areas more stringent discharge standard, Class I A, will be adopted at the wastewater treatment facilities to ensure that the water quality in receiving waters be not affected.

Mitigation

Construction Phase

• The contractors should build septic tanks for domestic sewage treatment to be used in farmlands;
• The construction wastewater should be treated in a settling tank and the treated effluent should be re-used on site;
• Make full use of the existing sanitary facility in the scenic area;
• Construction materials must be correctly stored. Storage of materials on the river
bank at construction sites will be prohibited. The materials must be covered with canvas to prevent it from washing into rivers during periods of rain; and
- Dredging exercises should be scheduled to avoid the high flow season so as to minimize the impact of disturbed sediments on the water quality.

**Operation Phase**

- The wastewater mostly will be domestic sewage generated by tourists and the staff in scenic areas in the operation phase. The wastewater will be treated by the sewage treatment facilities constructed under the project and then be used for municipal irrigation. The resulting sludge should be regularly transported to the landfill facility in the county.

### 5.3.2 Ambient Air Quality

**Construction phase**

- The air-borne dust caused by the construction will have a negative impact on the ambient air quality in the construction areas. It will mainly come from the following sources: excavation and filling, loading and unloading, vehicle movement, and the stockpiling of powder materials. However, the components of Guanling National Geo-Park Heritage Protection and Shanmu River Cultural and Natural Heritage Protection are required to meet a higher class of Ambient Air Quality Standards (GB3095-1996) - Class I standard. Strict protection measures should be implemented to comply with Class I standards in construction in these regions. The impact on ambient air will be only temporary during the construction stage. It will cease immediately the construction is completed.

**Operation phase**

- In the operation phase of this project, especially the peak tourist season, there will be a large amount of automobile traffic entering the region. The nitrogen oxides and dust caused by traffic will affect the ambient air quality in the project areas. In addition, if the cultural and natural heritage tourism were to develop without reasonable planning and guidance, there would be a risk of additional pollution from restaurants that might discharge flue gas.

**Mitigation:**

**Construction Phase**

- Water should be sprinkled at least three times a day in the excavation areas to settle the dust at the sites within the components in Guanling National Geo-Park Heritage Protection and Shanmu River Cultural and Natural Heritage Protection. On windy days, water spraying and monitoring should be increased as necessary in these sensitive areas;
- Cement should be adequately covered during transportation to mitigate the dust
pollution;
• The transport vehicles should be equipped with tail gas purifier to mitigate pollution;
• The roads should be maintained in clean and good condition;
• Any construction materials and earth that are stored in piles should be placed in fenced areas; and
• Vehicles transporting earth or solid waste should be adequately covered before leaving the construction area.

**Operation Phase**

• Planting of trees and other foliage around the park and living areas should be promoted to decrease the impact of air pollutant;
• Kitchen and cooking smoke should be treated by precipitators before it is emitted into open air through a stack; and
• Vehicles operating in the scenic areas should use unleaded petrol, be equipped with exhaust purification systems, and vehicle emission standards should be enforced and regularly controlled. Traffic management should be strengthened to avoid concentrated emissions caused by the intensive use of vehicles during traffic peaks.

5.3.3 **Acoustic Environment**

**Construction phase**

During the construction phase, the main source of noise will be the operation of construction machines and vehicles. Due to the relatively limited area of construction, it is anticipated that construction machines will be small and produce low levels of noise, and the impact will cease immediately after the construction is completed. However, the components of Guanling National Geo-Park Heritage Protection, Shanmu River Cultural and Natural Heritage Protection, Yangasha National Cultural Heritage Protection and Jianhe County Tourism Information Center are located in such sensitive areas that the much higher acoustic environmental quality of *Urban Regional Environmental Noise Standards (GB3096-93)* Class I standard is required to be complied with. Enhanced protection measures should be implemented to meet Class I standards in these sensitive regions.

**Operation phase**

During operation phase, the most likely source of noise pollution will be from vehicles, especially during peak seasons and at entertainment venues.

Mitigation:

**Construction Phase**

• The construction units should work only at reasonable times and construction should be prohibited from 10.00 p.m. to 6 a.m. in affected areas;
• The roadways and traffic areas should be secured against unauthorized access and kept away from affected areas;
• There should be a limit on hours during which equipment may be operated
simultaneously;
- Vehicles will be forbidden from sounding warning devices;
- Mechanical equipments with low operational noise should be selected or machinery should be equipped with muffler devices;
- The speed of transport vehicles should be limited. Mechanical equipment and transport vehicles should be properly maintained and kept in good condition and any necessary repairs promptly carried out; and
- Construction teams should be equipped with portable monitoring devices to measure the noise level at the affected areas.

**Operation Phase**

- The greening belt along the roadsides should be finished as soon as possible to reduce the noise pollution and to improve the ecological environment;
- Vehicles that are extremely noisy should be prohibited. The speed of all vehicles should be limited in the affected areas.

**5.3.4 Solid Waste**

**Construction phase**

As each component is of a relatively small scale and the construction period will be brief it is anticipated that the quantity of solid waste resulting from construction will not be significant. In addition, most of the construction solid waste can be used for backfilling. River dredging will generate sediments in large amounts and this will require proper disposal. If solid waste is not well managed along the river, soil erosion may occur in the rainy season, leading to pollution of the water course.

**Operation phase**

In the operation phase of this project, solid wastes will typically be generated by visitors discarding empty bottles and papers; the public toilets, the catering facilities and accommodation as well as sludge from waste water treatment facilities.

**Mitigation:**

**Construction Phase**

- The spoils and construction waste should be collected and transported to a designated site which should be fenced to prevent soil erosion and environmental pollution;
- Full use should be made of existing garbage collection facilities in the scenic area or a simple facility for garbage collection should be established. If the construction is in a scenic area, solid wastes should be disposed of in the manner as required by the regulations for such areas;
• Construction personnel must not be permitted to discard garbage; and
• Sediment dredged from rivers should be collected and transported to the county landfill for disposal.

**Operation Phase**

• Public education campaigns should be promoted to discourage littering and improper disposal of garbage. Garbage should be collected and transported to the municipal disposal station by local sanitation teams;
• Garbage bins should be distributed in the tourists areas, especially in and around the museum and catering facilities; and
• The sludge from WWT facilities should be transported to the county landfill for proper disposal.

**5.3.5 Ecology and Biodiversity**

**Construction phase**

Construction of roads, power supply, water supply and sewage facilities, and sanitation facilities can cause the clearance of vegetation as well as soil erosion which may result in loss of habitat and degradation of biodiversity. As a result, the rehabilitation of existing roads and services is to be a priority over the construction of new roads and services. This will control, or limit as far as possible, any negative impact on flora. There will be a similar policy for the provision of pedestrian ways, hiking trails and water supply systems.

There may be a significant impact on fauna as a result of construction activities. It is necessary to prevent workers and construction from destroying vegetation and the resultant habitat of fauna. Reptiles, birds and animals may be forced away from construction areas or disturbed by construction noise. The preservation of habitat will allow fauna to return to the project sites when the construction is finished. There is frequent human activity in the project areas and there is no record of the presence of any protected species.

Due to Guizhou’s long history of isolation from outside influences, the eco-system is very vulnerable to the introduction of new species. These may be brought into the area through a variety of methods including via timber materials or saplings intended for greening. New pathogens/viruses or pests may cause a change in the population of a certain species with devastating results.

**Operation phase**

Tourism activities during the operation phase may disturb wildlife, resulting in forced migration and reduction in population size. Road construction creates and increases access to ecologically sensitive areas, and this may encourage poaching/hunting of wildlife or collection of rare plants. Hiking and camping may result in soil erosion. A large flow of tourists or the misbehavior of tourists, such as trampling of grassland and accidents with fire, may result in degradation of biodiversity.

**Mitigation**
**Construction Phase**

- To limit damage to landscape and vegetation, warning signs should be posted at the construction sites to prohibit the personnel moving out of the area;
- Preserve the top soil on the temporary land occupation area for the establishment of vegetation;
- To reduce the impact on water quality and any disturbance of aquatic animals, river regulation works should be scheduled for the low flow season;
- Strengthen environmental protection awareness and provide educational programs for the construction workers;
- Prohibit the construction workers from catching or hunting wildlife including frogs, snakes, birds and other animals to reduce the impact on the ecology and the environment.
- Locate construction sites away from sensitive areas;
- Adopt proven construction techniques and methods which will control and reduce the impact on vegetation and the landscape caused by construction activity such as excavation works.
- Loosen the compacted soil and replant in the construction sites once the construction is completed;
- The national protected rare plants and ancient trees will be classified and identified and displayed on notice boards. The management department will carry out fertilization measures to maintain healthy growth of plants;
- Local species should be given preference when considering alternatives for restoring vegetation or greening works; and
- Timbers of local origin should be preferably used while any timber from other places should be properly controlled via stringent management of quarantine inspection.

**Operation Phase**

- Education programs should be provided to the tour guides and the tourists for the protection of the environment;
- To protect the environment a code of behavior for tourists should be established and encouraged.
- Tourist flow should be controlled based on an assessment of the sustainable capacity of the environment.

5.3.6 **Landscape and Visual Impacts and Mitigation**

Tourism development may also cause direct and indirect visual impact on the landscape. Tourism development demands the provision of amenity infrastructure such as hotels, shops and recreational facilities. These may result in negative landscape and visual impacts where their positioning, architectural style or color is inconsistent with the surrounding environment. This impact will be particularly significant for heritage-based tourism development, especially if new construction is not compatible with the host environment and cultural styles.

**Mitigation**

It is recommended that the landscape and visual impact of construction projects be incorporated into EIA procedures for Guizhou. It is also important that development and
renovation within remote ethnic minority villages strictly follow the traditional local style and use local materials to minimize potential negative visual impact.

### 5.4 Potential Impacts to Specific Sites and Mitigation

At some individual sites, there are environmental risks that result from the unique environment of the site, or the particular investments to be made at the site.

The most significant risks are anticipated at the following sites: Guanlin National Geo-Park; the potential risks are mainly related to the construction of the exhibition hall of triasichthyosaur and the construction of green areas of trias park; Xingyi National Geo-Park, related to the construction of the fossil museum of Guizhou Dragon; Wanfenglin National Scenic Area, mainly related to construction of a pathway along the Nahui River, the regulation of the river bank, the encampment and pathway for walking and biking, and the discharge of treated effluent; Shamu River National Scenic Area, mainly related to construction of the Miejiayan bridge and a port on Liangcha River and the discharge of treated effluent.

These particular potential impacts have been considered in the development of mitigation measures. The mitigation measures for the two geo-parks are focused on the procedures to be adopted in the event of a “chance-find”. They are as follows:

- When a chance find, or potential chance find, is uncovered at the construction site, all construction activities at the site will be immediately put on hold.
- Workers and site management are responsible to take necessary measures to protect the chance find from damage by construction related activities or other activities such as sliding, flooding, damage by machinery, access by others, or theft.
- Contractors will notify the PMO, project owner and Cultural Relics Authority immediately.
- Site investigation by professional archaeologists may be conducted to determine the nature, value, conditions, areas of the find, etc. On this basis, the professional team will recommend the next steps and whether to preserve the site or not.
- Construction may only resume following the reports of the professional investigation and with the approval of the Cultural Relics Authority.
- If the site is deemed to be of high value and site preservation is recommended by the professionals and requested by the Cultural Relics Authority, the project owner will need to make necessary design changes to accommodate the request and preserve the site.
- All contractors and construction supervision companies will be trained by professionals before the construction starts to understand the procedures and the basics on how to recognize a potential archaeological chance find.

The mitigation measures for Wanfenglin National Scenic Area are:

- Sites for recreational activities should be carefully selected to avoid ecologically sensitive areas;
- Educational programs should be provided to construction teams on environmental protection in scenic areas;
• Workers’ camps should be situated a suitable distance from the Nahui River;
• Spoils and solid wastes should be collected and stored in a designated site away from the river and transported out of the site regularly;
• Construction sites for the recreational camps and sites for bull fighting, etc. should be fenced and minimized to reduce the disturbance on the ground vegetation;
• Wastewater and solid waste collection system should be provided in each of the recreational camps;
• The boundaries of each camp should be clearly indicated by posts;
• Environmental awareness should be enhanced by posting signs and by providing training to tour guides;
• Routes for walking and biking should be carefully selected to avoid ecologically sensitive areas;
• Treated effluent from the WWT facilities should be reused for irrigation in grassland or forest areas which are remote from surface water or significant groundwater aquifers.
• Visitors should be prohibited from entering into any such areas applied with treated effluent and warnings should be posted.
• Excess sludge from the WWT facility should be transported to the county landfill for disposal.

The mitigation measures for Shamu River National Scenic Area are

• Construction activities should be scheduled to occur during the low flow season;
• Construction sites which will be carrying out underwater works should be dammed to minimize disturbance of the river sediments;
• Construction of the bridge deck should be managed carefully so as to avoid materials falling into the river;
• The construction solid waste arising from pier construction should be collected and conveyed to a designated place for safe disposal in timely manner.
• Environmental awareness should be enhanced by posting signs and providing training to tour guides;
• Treated effluent from the WWT facilities should be reused for irrigation in grassland or forest areas which are remote from surface water or significant groundwater aquifers.
• Visitors should be prohibited from entering into any such areas which have been applied with treated effluent and warnings should be posted
• Excess sludge from the WWT facility should be transported to the county landfill for disposal.

Risk of Overdeveloping the Scenic Areas
In addition, although the scenic areas in Guizhou are well classified, proper planning for development is currently absent which may lead to uncontrolled commercial development within protected areas. It would be likely that some of this development would not have undergone the correct procedures to acquire the proper permits or planning guidance.

Recommendation
It is recommended that Construction Bureau representatives be included in provincial and regional development planning since consultation suggests that they are unaware of plans being proposed by other government departments within the protected areas under their jurisdiction.

5.5 Social-Economic Impacts

Construction phase

Construction activities would have a negative impact on the lives of local communities. Noise and dust would affect both the acoustic environment and ambient air quality, resulting in a decrease to overall life quality. Harassment, theft and/or other kind of disturbance caused by external workers are also potential threats to the local community. Temporary construction facilities such as fences and barriers will be inconvenient for people’s normal activities. However, in general the impact experienced during the construction period will be short-term and reversible.

Operation period

Operation of the project facilities, if handled properly, will bring long-term economic benefits to local communities and improve local living standards. Construction of infrastructure, including roads, water supply and sanitation, and power supply facilities will help improve the overall living conditions of local communities. Economic benefits would help protect the precious cultural and natural heritage which is an essential resource of Guizhou’s tourism industry. A booming tourism industry in return brings the local communities more employment opportunities and pride in their culture and tradition.

Guizhou’s culture and tradition are unique. The pristine environment is particularly suitable for the development of eco-tourism, ethnic culture tourism and rural tourism. However, increased tourism activities can also disturb local people’s traditional life. Ethnic groups have cultures and customs that are not familiar to the general population. For example, some minorities set restricted areas where people, especially those from outside the community, are forbidden to enter. It is vital that tourists are educated in these beliefs so that they can behave accordingly.

There is also a risk that tourists may create social and psychological distress to local residents. The sudden arrival of large numbers of visitors may do harm to the environment, architecture, beliefs and moral codes. Ceremonies were traditionally conceived as festivals to mark particular events in the calendar and took place on a limited number of occasions. However, many of these ceremonies are now performed regularly in the villages for the frequent benefit of organized groups of tourists and currently constitute the main sources of tourism related revenues in minority villages. Finally, there is a risk that ethnic heritage will be commercialized, homogenized or otherwise altered.
Land Acquisition and Resettlement and Social Impact Assessment

Land Acquisition and Resettlement: According to the feasibility study, the proposed sub-projects will permanently use about 1,443 mu of land. This includes 163 mu of state-owned land and 1280 mu of collective-owned land. In addition to land used by the project, Longli sub-project will involve the demolition of some housing. In summary, about 1,337 persons will be affected. Of these 20 people from 4 households will be affected by acquisition of collective land, 457 people from 86 households will be affected by the dismantling of residential houses, 557 people will be affected by the demolition of public units and 30 people will be affected by the demolition of 9 business and shops. The state owned land to be used by different sub-projects will be obtained through free land transfer. No people will be affected by the use of state owned land since, according to the information available, the land is currently empty. The collective land to be used by different sub-projects will be obtained in two different ways; land acquisition and land adjustment. Land adjustment applies only to the villages which use a participatory approach in sub-project planning and implementation.

Resettlement action plans and resettlement policy framework were prepared in compliance with Chinese domestic laws and regulations and World Bank policy. The compensation standards covering land acquisition and housing demolition, livelihood rehabilitation and income restoration measures, resettlement costs and budgeting as well as grievance procedures and monitoring arrangements, are included in the RAP while the land adjustment procedures are included in the RPF.

Ethnic Minority: Guizhou is the home of 49 ethnic minority groups with a population of 13.39 million, which accounts for 36.77% of Guizhou’s total population. Ethnic groups whose population exceeds 100,000 include the Miao, Buyi, Dong, Tujia, Yi, Gelao, Shui, Hui and Bai. Of these, three minority groups, Miao, Dong and Buyi, will be affected by the proposed project. Free, prior and informed consultation with affected minority groups and communities has been carried out in the process of social assessment during the project preparation and broad community support for the project has been obtained.

Community participation and consultation: A community participation manual has been prepared based on the results of the social assessment. The manual addressed the concerns of minority groups and ensured the participation of minority communities in the whole cycle of the project, from planning, decision making, implementation, through to management and operation.
6 HERITAGE CONSERVATION PLAN

The national and provincial regulations on cultural heritage protection require that repair or reconstruction of buildings deemed to be of important historical and cultural value be subject to an administrative approval procedure which reviews the proposed conservation plan for the heritage. The components which are required to prepare the conservation plans and the summary of the preparation information are given in Table below.

### Preparation of Conservation Plans

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Heritage</th>
<th>Classification</th>
<th>Completion of Conservation Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Huangping Jiuzhou ancient town heritage protection</td>
<td>Huangping Jiuzhou Ancient Town</td>
<td>National cultural relic protection unit</td>
<td>Urban and Countryside Planning &amp; Design Institute of Guizhou Province, Approved in December, 2004</td>
</tr>
<tr>
<td>3</td>
<td>Xijiang Miao cultural heritage protection</td>
<td>Xijiang Miao Village</td>
<td>National famous historical and cultural town</td>
<td>DAVOST Landscape Planning Institute, 2007</td>
</tr>
<tr>
<td>4</td>
<td>Sanmentang cultural heritage protection</td>
<td>Sanmentang Ancient Buildings Complex</td>
<td>National cultural relic protection unit.</td>
<td>DAVOST Landscape Planning Institute, 2007</td>
</tr>
</tbody>
</table>

There is great concern of the potential risk of damaging the integrity of the cultural heritage in the rural villages. Thus, a conservation plan for the villages where repair and maintenance of ancient buildings are proposed is summarized below.

### Summary of Conservation Plan

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Description</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inventory</td>
<td>Inventory of heritage be developed to indicate the core part and the classes of various alternations allowed</td>
<td>Local communities; Municipal Administration of Cultural Heritages</td>
</tr>
<tr>
<td>2</td>
<td>Construction Planning</td>
<td>Construction planning be developed to designate both the core area and construction control area</td>
<td>Local communities; Municipal Administration of Cultural Heritages</td>
</tr>
<tr>
<td>3</td>
<td>Standards</td>
<td>Standards for repair and upgrading of heritage</td>
<td>Local communities; Municipal Administration of Cultural Heritages</td>
</tr>
<tr>
<td>4</td>
<td>Qualification requirements</td>
<td>Qualification criteria for construction teams</td>
<td>Provincial Administration of Cultural Heritage</td>
</tr>
<tr>
<td></td>
<td>Public awareness program</td>
<td>Mechanism to ensure public compliance and support of the conservation plan</td>
<td>Local communities; Provincial Project Management Office; Municipal Administration of Cultural Heritages</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>6</td>
<td>Capacity building program</td>
<td>Assistance on the control measures to ensure the successful self-management of communities</td>
<td>Municipal Administration of Cultural Heritages</td>
</tr>
</tbody>
</table>

### 6.1 Reporting

The independent monitoring team is required to prepare a bi-annual report on the implementation of the conservation plan and submit the report to the provincial project management office. The reports will include:

- A description of the progress of heritage repair/upgrading works in each component;
- Evaluation of the implementation of the public awareness program and the capacity building program;
- Evaluation of any alteration of design of repair/upgrading works;
- Evaluation of any deviation to the technical specifications and standards in the construction stage;
- Analysis and response to public concerns on the works;
- Suggestions for further actions necessary for successful implementation of the conservation plan.
7 ANALYSIS OF ALTERNATIVES

7.1 “Without Project” Situation

Impacts that would occur both with and without the project have been analyzed during the project preparation phase. Analysis reveals that the proposed project will promote sustainable development of a tourism industry while supporting the protection of Guizhou’s cultural and natural heritages and aiding poverty alleviation. Guizhou’s reputation as an ideal, pristine and well-managed travel destination is preserved under this scenario. Adverse impacts will be either avoided or mitigated by implementing an Environmental Management Plan. Hence the proposed project is recommended. A more detailed description of the benefits and potential impacts under this scenario are presented in Chapter 4.

7.2 Safeguards Review of Sub-projects Proposals

In the preparation of the project proposal, the feasibility study and the preliminary design, a number of options have been considered before the finalization of the details of each component. Safeguards review studies contributed to the analysis of alternatives. Screening of the sub-components proposed in the original proposal began during identifications mission in April 2007 and continued until the pre-appraisal mission in December 2007. Proposals were evaluated based on the environmental and social sensitivity of each specific site, and whether they were in accordance with laws and regulations, and other related criteria.

Five sub-projects in the original proposals were screened out during feasibility study and design phases because they were evaluated to have negative environmental implications. For example, building a dam in Malinghe Gorge to make an artificial waterfall does not comply with the requirement of Comprehensive Water Resource Utilization Planning of Malinghe River. Hence, it was eliminated.

Other alternatives cover specific engineering solutions. For example, gateway construction solution for Dingxiao Guizhou Dinosaur Heritage Protection has been optimized for a resettlement plan that covers 8 households and 1320 m² of land acquisition.

7.3 Alternative of Project Locations

Environmental considerations have been taken into account when alternative locations of project facilities were considered.

i. Jiuzhou Tunpu Museum

The location of the museum had two alternatives: 1) Lu Ancient House on West Street and 2) southwest corner of Xiaotun Hill, West Street. The assessment shows that the first alternative has better infrastructure conditions and occupies only 2, 720 m² of land.
compared to 3,500 m² of the second alternative. In addition, the second alternative requires land acquisition. As a result the first alternative has been recommended due to a reduced environmental impact.

ii. **Dingxiao Guizhou Dinosaur Museum**
Two locations were proposed and compared: 1) located at the front of Houlong Hill, Lvyin Village of Dingxiao Development District; 2) located at the foot of hills in the east of Lvyin Village. Based on an evaluation of the landform, layout of car-park, the available functions and traffic conditions, the first alternative was recommended.

iii. **Tourism Information Center of Guizhou Normal University**
Two alternatives were compared. One was located close to the southwest entrance of the campus and the other was located in the central area of the campus. Though the latter option had better geological and traffic conditions, public consultation suggested that 70% of the stakeholders were in favor of the former alternative, mainly due to concerns about noise disturbance during construction period.
8 PUBLIC CONSULTATION & INFORMATION DISCLOSURE

8.1 Public Consultation

During the project preparation, two rounds of public consultations were carried out at various levels by means of questionnaire surveys, workshops and expert consultations.

The first round of public consultation was carried out by GHIDRI during April 24 - 30 and May 11 - 18, 2007. Consultations with local communities were held in Anshun and Qiandongnan Prefecture. A collective interview with local residents that were potentially affected by land acquisition or resettlement was conducted to request their suggestions on mitigating measures. Afterwards, 200 questionnaires were distributed among participants and 196 valid responses were returned. Meanwhile, consultation with scenic area management, government bodies and institutions was also conducted in Guiyang, Anshun, Qianxinan and Qiandongnan Prefecture. A second public consultation, as required by World Bank safeguards, was organized during November 26 – December 12, 2007. A draft EA was publicized during the second consultation. 300 questionnaires were distributed among local residents in Guiyang, Anshun, Qiandongnan and Qianxinan Prefectures. 291 valid responses were submitted. In addition, consultation was conducted seeking opinions and suggestions regarding the management of the scenic areas, geo-parks as well as cultural heritage protection in environmentally sensitive sites.

Most people consulted expressed their willingness to be cooperative and helpful regarding measures that would be taken to mitigate adverse environmental impacts. People who would be potentially displaced expressed their concerns regarding compensation for lost assets, transparency of resettlement policies and public involvement, and specific training programs for displaced people.

Opinions and suggestions collected from public consultations have been taken into consideration when preparing project designs and environmental management plans. Impacts which may be hard to define for the moment will be closely monitored. Mitigating measures will be developed in accordance with the progress of the project. Suggestions on resettlement were forwarded to authorities to ensure proper settlement.

8.2 Information Disclosure

Along with each round of public consultation, information disclosure was updated by means of the internet, newspaper, on-site bulletins, distribution of hardcopies of EA documentations, and hotlines, to ensure maximum broad and convenient access, particularly for remote residents in rural areas.
9 ENVIRONMENTAL MANAGEMENT PLAN

9.1 Objectives of EMP

The role of the EMP is to outline the mitigation, monitoring and institutional measures to be considered during project implementation and operation to avoid, minimize and control adverse environmental impacts, and take the actions deemed necessary to implement these measures. For each proposed measure, the EMP defines the technical content, the estimated cost, the schedule of implementation, the role and responsibilities of government agencies, the source of funding and the way to monitor the results. The actions should be technically feasible and financially sustainable.

9.2 Organizational Responsibilities for Environmental Management

9.2.1 Organizations for EMP Implementation and Supervision

During project preparation and the construction phase, implementation of the EMP will be managed by the Provincial Project Management Office (PPMO) under the coordination and supervision of Guizhou Tourism Bureau. During operation phase, local Project Management Offices (PMO), in collaboration with local municipalities, will be responsible for the management of EMP, which has been endorsed by local PMOs. Supervision is to be conducted at various levels including SEPA, PPMO, and Guizhou Provincial, Municipal and Prefecture EPBs. Key responsibilities include:

- Coordinating environmental management with relevant government agencies for the implementation of the EMP;
- Supervising compliance with environmental regulations and standards of construction management and operation; and
- Performance analysis, evaluation and reporting. Taking corrective measures when necessary.

9.2.2 Reporting and Supervision

Supervision results are reported in both internal and external manners. During the construction period, the third party Environmental Supervision Consultant should contribute to weekly construction reports submitted to PMOs, which will cover problems, impacts and mitigation measures taken. Externally, local environmental
monitoring stations should report results of monitoring and supervision to local EPBs, which should brief the results to the Provincial EPB biannually.

Upon completion of construction of each sub-project, an Acceptance Report should be prepared to ensure that the operation of the project complies with applicable environmental requirements.

9.2.3 **Response and Corrective Measures**

Based on monitoring and supervision reports, the Provincial EPB decides whether further mitigation measures or performance improvements are needed. Should the implementation of the EMP found to be not in place, the PPMO should immediately consult with the Provincial EPB and the World Bank to decide whether supplemental environmental assessment and public consultation is needed to make sure the EMP can help to deliver the expected environmental performance.

9.3 **Environmental Monitoring Plan**

Environmental monitoring plans have been developed for each type of constructed works for both the construction and operation phases. The following matrix is the summary of the type of works contained in each project site, which can be used to implement the respective monitoring plan.
Matrix of Works in Each Site

<table>
<thead>
<tr>
<th>Type of Works</th>
<th>Guizhou Cultural and Natural Protection Center</th>
<th>Jiujiang Fortress</th>
<th>Jiuzhou Fortress</th>
<th>Minle Miao in Kaili County</th>
<th>Balahe Miao in Kaili County</th>
<th>Xijiang Miao in Leishan County</th>
<th>Zhaoxing Dong in Pingtang County</th>
<th>Sanbao Village Dong in Rongjiang County</th>
<th>Shamu River National Scenic Area</th>
<th>Guanlin National Geopark</th>
<th>Xingyi National Geopark</th>
<th>Wanshenglin National Scenic Area</th>
<th>Shama River National Scenic Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid waste collection and transfer</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Wastewater collection and treatment facility</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Parking lot</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Public toilet</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Pathway</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>River course regulation/dredging/bridge construction</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Public building construction</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

For each type of the construction work, the environmental monitoring plan has been developed in table below.

General Environmental Monitoring Plan

<table>
<thead>
<tr>
<th>Type of Works</th>
<th>Aspects</th>
<th>Monitoring Parameters</th>
<th>Monitoring Locations</th>
<th>Monitoring Timing and Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid waste collection and transfer</td>
<td>Air</td>
<td>TSP</td>
<td>On site of storage tanks, roadsides, etc.</td>
<td>Twice</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>Leq(A)</td>
<td>On site of storage tanks, roadsides, etc.</td>
<td>Twice</td>
</tr>
<tr>
<td>Wastewater collection and treatment facility</td>
<td>Air</td>
<td>TSP</td>
<td>On respective construction sites</td>
<td>Twice</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>Leq(A)</td>
<td>On respective construction sites</td>
<td>Twice</td>
</tr>
<tr>
<td>Parking lot</td>
<td>Air</td>
<td>TSP</td>
<td>On respective construction sites</td>
<td>Twice</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>Leq(A)</td>
<td>On respective construction sites</td>
<td>Twice</td>
</tr>
<tr>
<td>Location</td>
<td>Measurement Type</td>
<td>Measurement</td>
<td>Location Details</td>
<td>Frequency</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>------------------</td>
<td>-------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Public toilet</td>
<td>Air</td>
<td>TSP</td>
<td>On respective construction sites</td>
<td>Twice</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>Leq(A)</td>
<td>On respective construction sites</td>
<td>Twice</td>
</tr>
<tr>
<td>Pathway</td>
<td>Air</td>
<td>TSP</td>
<td>Roadside</td>
<td>Twice</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>Leq(A)</td>
<td>Roadside</td>
<td>Twice</td>
</tr>
<tr>
<td>River course regulation/dredging/bridge</td>
<td>Water</td>
<td>SS</td>
<td>Location of dredging works/bridge construction site</td>
<td>Twice</td>
</tr>
<tr>
<td>construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public building construction</td>
<td>Air</td>
<td>TSP, PM$_{10}$, NOx</td>
<td>Location of construction site, and roadside</td>
<td>Twice</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>Leq(A)</td>
<td>Location of construction site, and roadside</td>
<td>Twice</td>
</tr>
<tr>
<td>Operation Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wastewater collection and treatment facility</td>
<td>Water environment</td>
<td>CODcr, BOD$_{5}$, SS, NH$_3$-N</td>
<td>Inlet and outlet of the treatment facility</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Parking lot</td>
<td>Air</td>
<td>NOx, HC</td>
<td>Boundary of parking lot</td>
<td>Quarterly</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>Leq(A)</td>
<td>Boundary of parking lot</td>
<td>Quarterly</td>
</tr>
</tbody>
</table>
9.4 **Capacity Development and Training**

In order to deliver the expected environmental performance, it is necessary for project management and contractors to undertake training to strengthen their capacity to implement the EMP. Training programs should cover environmental management and supervision, mitigation, emergency response, environmental decision making and other necessary environmental management technologies and skills. It is recommended that professionals from the World Bank, Provincial EPB, institutions, EA Consultant, and supervision parties contribute to the training programs. Table A.3 represents details of training programs.

9.5 **Cost Estimate for EMP**

The total budget for the implementation of the EMP is RMB 1,178,000, including RMB 298,000 for training activities, RMB 890,000 for management of PMOs and monitoring activities.

10 **REFERENCE**


World Bank Team. 2006 2007 “Guizhou Aide Memoire #2 - #7.” World Bank. China