SFG1729 V2 REV

World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project

Environmental Impact Assessment

Urban Infrastructure Component

Sichuan Urban Environment Project Office

Southwest Jiaotong University (SWJTU)

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Contents

Chapter 1 General

1.1 Origin of project and necessity of construction

1.1.1 Origin of project

At 8:02, April 20, 2013, a Magnitude 7.0 earthquake struck Lushan, Sichuan, causing severe damages to people's life and properties in the disaster area. Lushan earthquake affected around 2,184,000 people in 32 counties (cities or districts) including Ya'an, Chengdu, Leshan, Meishan, Ganzi, Liangshan and Deyang in Sichuan. For Ya'an City, 4.20 Lushan Earthquake damaged the urban infrastructures in "2 districts and 6 counties" in Ya'an City to a certain degree, seriously affecting local residents' production and life and causing heavy losses to local economy. According to the *State Council's Comments on Supporting Policies and Measures for Post-Lushan Earthquake Recovery and Reconstruction*, Post-4.20 Lushan Earthquake Reconstruction will be implemented using WB loans in order to improve the disaster preventing function of the urban area, restore local residents' production and life, guarantee people's life and property safety and implement the strategy of sustainable development for cities and towns. In accordance with the requirements and work arrangements of the National Development and Reform Commission and taking into account the needs of post-disaster reconstruction, urbanization and industrialization of the disaster area in Sichuan, the WB loans of 270 million US dollars are intended for the development of urban infrastructures in 7 counties (districts) in Ya'an City, i.e. Lushan, Yucheng, Tianquan, Mingshan, Yingjing, Baoxing and Shimian determined in the *Mater Plan for Post-Lushan Earthquake Recovery and Reconstruction.* According to the *State Council's Comments on Supporting Policies and Measures for Post-Lushan Earthquake Recovery and Reconstruction* and relevant principles of the National Development and Reform Commission, the district/county governments, with the theme of scientific development in mind, endeavor to develop the urban infrastructures in the disaster area to improve people's production and living conditions in the disaster area, promote the recovery and reconstruction of the disaster area and realize development and revitalization of the disaster area as early as possible.

In December 2015, Sichuan Development and Reform Commission issued a circular on pushing ahead with preliminary work of Lushan Project. According to *Law of the People's Republic of China on Promotion of Cleaner Production* and *Regulations on the Administration of Construction Project Environmental Protection*, Subproject Employers entrusts qualified EIA Consultant with EIA work. To date, Environmental Impact Statements for each Subproject have been completed.

1.1.2 Necessity of construction

All subprojects of the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project include road construction, pipe network sewage interception, construction of water treatment plant, emergency refuge square, bridge, flood discharge channel and levee. Implementation of these works will help improve the production and living conditions of people in the disaster area, promote the recovery and reconstruction of the disaster area and realize its development and revitalization as early as possible.

1.2 Preparation basis

1.2.1 National laws and regulations

(1) *Environmental Protection Law of the People's Republic of China* (implemented on Jan. 1, 2015);

(2) *Law of the People's Republic of China on Promotion of Cleaner Production* (implemented on Sept. 1, 2003);

(3) *Law of the People's Republic of China on Prevention and Control of Pollution from Environmental Noise* (implemented on Mar. 1, 1997);

(4) *Law of the People's Republic of China on the Prevention and Control of Water Pollution* (implemented on June 1, 2008);

(5) *Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution* (revised on Aug. 29, 2015 and implemented on Jan. 1, 2016);

(6) *Law of the People's Republic of China on Prevention and Control of Environmental Pollution by Solid Wastes* (implemented on Apr. 1, 2005);

(7) *Law of the People's Republic of China on Water and Soil Conservation* (implemented on Mar. 1, 2011);

(8) *Regulations on the Administration of Construction Project Environmental Protection* (Decree No. 253 of the State Council of the People's Republic of China) (implemented on Nov. 29, 1998);

(9) *Circular on Implementing Regulations on the Administration of Construction Project Environmental Protection* (HF [1999] No. 107 of State Environmental Protection Administration, implemented on Apr. 29, 1999);

(10) *Circular on Relevant Issues of Implementing EIA System for Construction Project* (HF [1999] No. 107 of State Environmental Protection Administration, implemented on Apr. 29, 1999);

(11) *Circular on Stepping up Environmental Protection for Construction Project* (HF [2001] No. 19 of State Environmental Protection Administration, implemented on Feb. 21, 2001);

(12) *Classified Directory for Environmental Impact Assessment of Construction Project* (implemented on Jun. 1, 2015);

(13) *Measures for Environmental Protection Management of Traffic Construction Project* (implemented on Jun. 1, 2003);

(14) *Circular on Printing and Issuing the Regulations on Soil and Water Conservation in Highway Construction Project* (SB [2001] No. 12 Document of Ministry of Communications and Ministry of Water Resources, implemented in 2001);

(15) *Circular on Stepping up Regulation of Environmental Impact Assessment* (HB [2002] No. 88 of the State Environmental Protection Administration, implemented in 2002);

(16) *Sichuan Province's Regulations on Environmental Protection* (implemented on Sep. 24, 2004);

(17) *Urban and Rural Planning Law of the People's Republic of China* (implemented on Jan. 1, 2008);

(18) *Law of the People's Republic of China on the Protection of Cultural Relics* (revised on Jun. 29, 2013) and *Implementation Rules for the Laws of the People's Republic of China on the Protection of Cultural Relics*;

(19) *Guidelines for Developing Innovative Traffic Industry* (Ministry of Communications, Jul. 24, 2006);

(20) *Notice on Standardization of Acceptance of Construction Project Environmental Protection* (CHF [2003] No. 56);

(21) *Circular on Stepping up Environmental Protection in Distributed Drinking Water Source Zone* (HB [2010] No. 132 of General Office of the Ministry of Environmental

Protection of the P.R.C.);

(22) *Circular on Scheme for Dividing Source Protection Zone for Centralized Drinking Water in Cities/Towns from General Office of People's Government of Sichuan Province* (CBH [2010] No. 26);

(23) *Circular on Strengthening EIA Management of Construction Project Financed by International Financial Institution* issued by State Environmental Protection Administration (HJ [1993] No. 324)

1.2.2 WB policies

WB requirements include ten basic security policies in which the EIA Policy (OP4.01) is basic requirements as well as one of the main bases on which the EIA report is prepared. The proposed project does not involve OP7.50 international waterway and is not located in the disputed area defined in OP7.60. Therefore, theses two policies do not apply to the assessment. The other policies will be reflected in the assessment on the basis of survey, analysis and screening.

Table 1-1 Analysis of compliance of the Project with World Bank security policies

S/N	Security policy	Applicable or not	Compliance
1	OP/BP4.01 *Environmental Impact Assessment*	Yes	Category B project; in terms of environmental classification, this project is categorized as a Type B project under World Bank loan and this his environmental classification has been acknowledged by the World Bank.
2	OP/BP4.04 *Natural Habitat*	Yes	Shimian, Baoxing and Lushan Subprojects involve bridge works; Yingjing, Shimian and Lushan Subprojects involve existing drinking water source protection zone (suspended now and to be canceled later); Baoxing Subproject involves water plant works and levee works; Yingjing Subproject involves improvement of flood discharge channel; the above subprojects may have disturbing effect on the species in the local surface water. Therefore, this policy applies.
3	OP/BP4.36 *Forest*	No	This policy is not launched. The Project will not fund major transformation or degradation activities involving important areas or relevant key natural habitats defined in this policy.
4	OP/BP4.09 *Pest Management*	No	This policy is not launched. The Project will not purchase any insecticide or cause increased consumption of insecticides. No action will be required according to this policy.
5	OP/BP4.11 *Physical Cultural Resources*	Yes	Only Shimian County Subproject involves a suspension bridge on Dadu River in Xinmian which is a Municipality Protected Historic Site. The possible impacts of the construction project on that historic site and the protective measures to be taken thereof are shown in 2.2.2. The Construction Contractor shall stop construction, protect the site and promptly report to relevant departments according to relevant requirements of *Law of the People's Republic of China on the Protection of Cultural Relics* and of this policy when underground cultural relics or historical remains are encountered in the construction process.
6	OP/BP4.37 *Dam Safety*	No	This policy is not launched. There is no dam in the project area.
7	OP/BP4.10 *Indigenous People*	No	This policy is not launched. No indigenous people live in the project area nor are they affected.
8	OP/BP4.12 *Involuntary Resettlement*	Yes	It is applicable to resettlement and *Resettlement Action Plan* shall be prepared;
9	OP/BP7.50 *International Waterway Project*	No	This policy is not launched. The project does not involve any international waterway.

10	OP/BP7.60 *Disputed Area Project*	No	This policy is not launched. The Project does not involve any disputed site.

World Bank *EHS Guideline* (general guideline), sewage treatment part of *Water, Hygienic Condition, Health and Safety Guideline*, *EHS Guideline for Toll Roads*, and waste collection and transportation part of *EHS Guideline for Waste Management Facilities* also apply to the Project. Mitigation measures included in the *Environmental Management Plan* of the Project are in full compliance with the above guidelines, especially the provisions related to construction management. It should be noted that provisions in the Guidelines are basically consistent with China's laws, regulations, guidelines and construction management codes.

Table 1-2 List of project compliance with *World Bank EHS Guidelines*

World Bank EHS Guidelines	**Compliance with Environmental Impact Assessment/ Environmental Management Plan**
If facilities or projects are close to identified ecologically sensitive regions (such as national park), reduce increase of pollution level as much as possible. In addition, appropriate mitigation measures include application of clean fuels and technologies and implementation of comprehensive pollution control measures.	Project construction will be supported by clean energy to reduce pollution. Lushan County Subproject involves drinking water source protection zone for the existing 2nd Water Plant in Luojiaying County; Yingjing County Subproject involves the existing Jinghe drinking water source protection zone; Shimian County Subproject involves the existing spring water source zone in Yanzi Village. The intake points at the above water sources have been out of service and will be canceled in urban development planning in the future. Therefore, the ambient of the project will have no ecologically sensitive region.
Dust or particulate matters (PM) are the most common pollutants of unorganized emissions. Particles may be generated by certain operations (transportation and open storage of solid materials) and exposed soil surfaces (including unpaved roads).	During the construction period, apply dust control methods (including covering, water spraying or increasing water content of material stack in the open air) and use water spraying method to control delivered materials on paved or unpaved roads.

Table 1-3 List of project compliance with World Bank Water, Hygienic Condition, Health and Safety Guideline

Water, Hygienic Condition, Health and Safety Guideline	**Compliance with Environmental Impact Assessment/ Environmental Management Plan**
Industrial wastewater, domestic wastewater, wastewater generated by operation of utilities and rainwater, which is to be discharged to public or private wastewater treatment systems, shall meet pretreatment and monitoring requirements of the wastewater treatment systems.	During the construction period, no industrial wastewater is discharged and domestic wastewater is treated by existing sewage treatment facilities of rented houses. During project operation period, domestic sewage is transported by the existing sewage pipeline network to the sewage treatment plant.
Rainwater shall be separated from industrial and domestic wastewater so as to reduce the wastewater that is allowed to be discharged only after treatment;	Rainwater is separated from sewage in project area.
If it is expected that noise generated by project facilities or operations exceeds relevant noise indexes at the most sensitive receiving point, noise prevention and control measures shall be taken.	Select equipment with a low sound power level, install vibration isolation devices for mechanical equipment, and limit operation time of special equipment or operations, especially mobile noise sources passing through communities.

Table 1-4 List of project compliance with *World Bank EHS Guideline for Toll Roads*

EHS Guideline for Toll Roads	**Compliance with Environmental Impact Assessment/ Environmental Management Plan**
Under appropriate conditions, avoid important land and hydrophytic habitats (including old-growth forests, wetlands and fish spawning habitat) by selecting appropriate locations of roads and	The project area does not belong to important land and hydrophytic habitats.

supporting facilities and applying existing traffic corridors.	
During the construction period, reduce removal of local plants as much as possible and replant local plants in disturbed areas.	Prepare a water and soil conservation scheme specially and plant proper local herbaceous plants as per the water and soil conservation scheme.
Pave the road in dry days to prevent loss of asphalt and cement materials.	During the construction period, do not pave under strong wind, and confirm the construction site appropriately.
No matter whether much grease will be increased, oil-water separators shall be applied during treatment.	Machine oil-sewage collectors are arranged at the construction site for collecting oil and sewage. Collected oily water is delivered to the organization with treatment capacity for treatment. Do not directly discharge the oily water.
Prevent pollution caused by asphalt cleaning by the following measures: use vegetable oil instead of diesel as releasing agent and cleaning agent, prevent leakage of cleaning product and polluted asphalt, scrap before cleaning, and clean at the place far away from surface water or drainage facilities.	Requirements on "storage of fuels, oils and dangerous and toxic substances" are specifically specified in the Contractor's specification. All fuels at the construction site shall be fenced and the capacity of storage area shall be 110% of that of fuel storage container provided with secondary cofferdam. The fuel storage area shall not be close to any water source (namely, within 100m from the water source).
Take soundproof measures for surrounding buildings (replace windows generally). Use pavement with low pavement/tyre friction noise such as stone mastic asphalt pavement.	During the road operation period, limit functions of areas along the trunk road, plan buildings at road sides, optimize acoustic design and strengthen speed control management.

Table 1-5 List of project compliance with World Bank EHS Guideline for Waste Management Facilities

EHS Guideline for Waste Management Facilities	**Compliance with Environmental Impact Assessment/ Environmental Management Plan**
Collection and transportation of wastes	The wastes are sent to the local waste treatment plant for unified disposal.
Encourage the use of dustbin or garbage bags at the refuse collecting stations around each house and building; collect refuse at a frequency high enough to avoid garbage accumulation; cover the refuse collecting and transport vehicle to prevent refuse being blown away by wind on the road;	Garbage is placed at designated points and sent uniformly by Sanitation Service to the refuse processing plant.
Collect garbage regularly; Prepare cleaning plans for garbage collection vehicles and all garbage collection vessels of the enterprises; Promote use of garbage bags to avoid polluting garbage collection equipment.	
Optimize garbage collection route to reduce travel distance, fuel consumption and emissions; Set up transfer stations for small garbage collection vehicles to transfer the collected garbage to a large vehicle to send the garbage to the refuse processing plant.	

1.2.3 National industrial systems

1 *Technical Standard of Highway Engineering* (JTG B01-2003)

2 *Code for Design of Urban Road Engineering* (CJJ 37-2012)

3 *Codes for Design on Accessibility of Urban Roads and Buildings* (JGJ 50-2001)

4 *Code for Planting Planning and Design on Urban Road* (CJJ 75-97)

5 *Code for Urban Engineering Pipeline Comprehensive Planning* (GB 50289-98)

6 *Measures for Environmental Protection Management of Traffic Construction Project* (Decree No. 5 [2003] of Ministry of Communications)

1.2.4 Main technical guidelines

1 *Technical Guidelines for Environmental Impact Assessment - General Programme* (HJ 2.1-2011);

2 *Technical Guidelines for Environmental Impact Assessment - Atmospheric Environment* (HJ 2.2-2008);

3 *Technical Guidelines for Environmental Impact Assessment – Surface Water Environment* (HJ/T 2.3-93);

4 *Technical Guidelines for Noise Impact Assessment* (HJ 2.4-2009);

5 *Technical Guidelines for Environmental Impact Assessment – Groundwater Environment* (HJ 610-2011);

6 *Technical Guideline for Environmental Impact Assessment – Ecological Environment* (HJ 19-2011);

7 *Technical Guidelines for Environmental Risk Assessment on Projects* (HJ/T 169-2004);

8 *Technical Criterion for Eco-Environmental Status Evaluation* (HJ/T 192-2006);

9 *Regulation of Techniques for Comprehensive Control of Soil Erosion* (GB/T 16543.1~16453.6-2008);

10 *Technical Code on Soil and Water Conservation of Development and Construction Projects* (GB 50433-2008)

1.2.5 Related technical documents

Feasibility Study Report on Subprojects;

Resettlement Action Plan Report on Subprojects;

Social Impact Assessment Report on Subprojects;

Pre-assessment of World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project: Pre-assessment Comments on Dec. 7, 2015;

Official assessment over World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project: comments from the assessment of January 25, 2016

1.3 Environmental assessment

1.3.1 Category of project EIA

One of the main objectives of the proposed project is to improve refuge functions of the urban area under the project, restore local people's production and living activities, guarantee people's life and property safety and implement the strategy of sustainable development of cities and towns. The areas in which the proposed project is located are not concentrated in one place. In addition, according to the site survey and visit by WB's EIA experts, the Project Team from Sichuan Project Office of World Bank and Subproject EIA Consultant, no subproject involves ecological sensitive and fragile areas, areas requiring special protection or attracting social concerns and other environmentally sensitive areas with the exception of Shimian County Subproject which involves a suspension bridge on Dadu River in Xinmian which is a Municipality Protected Historic Site. Therefore, the environmental experts from the World Bank Delegation and the EIA experts from the Sichuan Project Office suggest the environment screening for the proposed project be

classified as World Bank Loaned Project Category B which has been confirmed by WB.

1.3.2 Overview of preparation of subproject EIA reports

EIA documents for each subproject shall be prepared in accordance with the requirements for approval of EIA in China as well as those of the WB security policies. According to the suggestions of WB's EIA experts, Sichuan Project Office of World Bank has organized training for the EIA Consultant, Design Institute and consulting experts involved in the World Bank Loaned Project so that they can familiarize themselves with WB policies and requirements, comprehensively consider possible WB security policies applicable to the project and reflect them in the EIA documents.

EIA Consultant and participants in all Subprojects of World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project have EIA Qualification Certificate issued by Ministry of Environmental Protection of the P.R.C. and researchers and engineers in various disciplines such as sociology, human geography, ecology, environment engineering and traffic engineering. The EIA Consultant has undertaken EIA work for World Bank loaned municipal projects, railway projects, post-disaster urban infrastructure reconstruction projects, etc in recent years.

There are totally 7 copies of EIA documents for all Subprojects of World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project. The documents are all EIA Statements approved by Environmental Protection Bureau of Ya'an City according to the state requirements for EIA classification management.

The 7 subprojects in this project passed the assessment of Environmental Protection Bureau of Ya'an City and the experts on January 26, 2016 and it is anticipated that the result of national assessment will be known in the middle of February.

The subprojects of the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project and the EIA documents are summarized in Table 1-6.

Table 1-6 Summary of Subprojects of the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project and relevant EIA documents

S/N	Project location	Project content	Project investment (10,000 yuan)	EIA documents prepared by
1	Baoxing County	Road works, refuge square and water treatment plant works	21001.06	Southwest Jiaotong University (SWJTU)
2	Lushan County	Road works, bridge works and refuge square works	28511.74	Southwest Jiaotong University (SWJTU)
3	Mingshan District	Road works, levee works and refuge square works	240300.00	Southwest Jiaotong University (SWJTU)
4	Yingjing County	Road works, flood discharge channel works and refuge square works	20347.80	Southwest Jiaotong University (SWJTU)
5	Shimian County	Road works, bridge works, refuge square and levee works	38400.02	Southwest Jiaotong University (SWJTU)
6	Yucheng District	Road works and refuge square works	50407.83	Southwest Jiaotong University (SWJTU)
7	Tianquan County	Road works and refuge square works	31155.08	China Railway Eryuan Engineering Group Co., Ltd.

1.3.3 Main scope of assessment

The scope of EIA for each subproject is presented in Table 1-7.

Table 1-7 Scope of assessment

Assessment content	Scope of assessment
Social environment	Immediately affected areas and the surrounding areas; the immediately affected area is generally within 200m of both sides of the road and bridge; the whole city/town where the project is located.
Ecological Environment	Areas within 300m of both sides of the route and bridge centerlines and within 300m of both sides of the levee centerline; immediately affected area and the area within 500m of the immediately affected area for the water treatment plant and emergency refuge square; river sections involved in the project.
Acoustic environment	The area within 200m of both sides of the road and bridge centerline; the area within 200m of the water treatment plant and emergency refuge square
Ambient air	The area within 200m of both sides of the road and bridge centerline; the scope of assessment is the area within 200m of both sides of the line; the area within 500m of the boundary of the water treatment plant and construction area of the emergency refuge square, extended to 1,000m in downwind direction
Surface water environment	Rivers within 200m of both sides of the road and bridge centerline; 500m upstream and 1,000m downstream of the bridge location for river-crossing sections

1.3.4 Assessment standards and objectives of environmental protection

1 Assessment standards

EIA standards are determined based on the EIA standards and requirements of the Environmental Protection Bureau having authority over the project area.

2 Objectives of pollution control and environment protection

(1) Objectives of pollution control

According to site visit and survey on status quo of social and ecological environment along or around the line in each subproject of the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project conducted by Subproject EIA Consultants, only the Shimian County Subproject involves a Municipality Protected Historic Site (upgraded section S211 is T-connected with the suspension bridge on Dadu River in Xinmian and there is no nature reserve, wildlife, places of interest under state protection or officially protected monuments and sites in the scope of assessment for other subprojects.

According to the nature of each subproject and characteristics of surrounding environment, the objectives of environmental protection are identified as follows:

1) Minimize the impact of noise, waste gas and dust during construction on environmentally sensitive areas including densely populated area, schools, hospitals and water source zones; taken engineering and environmental protection measures to reduce the impact on ecological environment during construction such as soil erosion and vegetation damages and the impact on surface water and groundwater;

2) After project implementation, the qualities of surface water and atmospheric environment will improve; the quality of acoustic environment is not apparently poorer than the status quo;

3) Avoid and reduce adverse impact on the natural and social resources in the

project area;

4) Rehabilitate vegetations affected by construction, improve water and soil conservation level and maintain the integrity of regional ecological system.

(2) Objectives of protection of environmentally sensitive areas

According to the site survey of the EIA Consultant, the local yearbook and data and the investigation of the natural environment, ecological environment, cultural relics and residences, only the Shimian Subproject will affect the protection scope of suspension bridge at Dadu River which is a city-level protected relic, Jianshe Road South of Tianquan County Subproject involves 2 ancient machilus trees which have been enclosed, and no other subproject will affect any national conservation area, landscape resort or forest park; none of these projects will affect any rare or precious plant, endangered animal/plant or national protected animal/plant.

Therefore, the environmentally sensitive points and environmental protection targets in this project are mainly the residents, hospitals, schools, administrative buildings and local surface water bodies to be affected by this project, as shown in Table 1-8.

Table 1-8 Objectives of protection of environmentally sensitive areas

County/district and subproject name	Environmentally sensitive spot		Impact factor	Overview of sensitive spots	Location
	No.	Description			
Baoxing County Subproject	1	Former site of County Hospital	Air and noise	The hospital has 120 beds, 7 functional departments, 14 clinical department and 130 employees.	190m east of Emergency evacuation and refuge passage along Yanjiang Road
	2	Baoxing Middle School	Air and noise	5-storey teaching building, 6-storey dormitory, about 3,000 students and 198 teachers	235m east of Emergency evacuation and refuge passage along Yanjiang Road
	3	Yongfu Temple	Air and noise	Reconstructed after 5.12 Wenchuan Earthquake in 2008, one storey for each hall, 7.6m from the ground to roof, main structure constructed of reinforced concrete	45m from the Emergency evacuation and refuge passage along Yanjiang Road
	4	Zhongba Primary School of Baoxing County	Air and noise	4-storey teaching building, about 1,100 students and 28 teachers	15m southeast of Zhongling Road North
	5	Lingguan Town Health Center	Air and noise	The hospital has 20 beds and 60 employees.	77m south of Zhongling Road North
	6	Lingguan Middle School	Air and noise	Reconstructed after Wenchuan Earthquake in 2008, 5-storey teaching building, 6-storey dormitory, about	91m south of Zhongling Road North

County/district and subproject name	Environmentally sensitive spot		Impact factor	Overview of sensitive spots	Location
	No.	Description			
				2000 students and 120 teachers	
	7	Baoxing River	Water environment and ecology	Waters with Class III surface water	Bridge over the river as part the Emergency evacuation and refuge passage along Yanjiang Road
	8	Donghe River	Water environment and ecology	Waters with Class III surface water	Water body involving Lianghekou Water Plant in Baoxing County
	9	Shanmugou	Water environment and ecology	Intake point of the water plant	Water body involving Lianghekou Water Plant in Baoxing County
Lushan County Subproject	1	Villagers in Xijiang Village	Air and noise	Concentrated distribution, 1-3 storey brick-concrete houses	Residents along the Xijiang Binhe Road
	2	Center for Disease Control of Lushan County	Air and noise	3-storey building	6m south of the Community Group Road
	3	People's Hospital of Lushan County	Air and noise	Class 2B general hospital with 450 regular beds and 314 regular employees	110m south of the Community Group Road
	4	Lushan Junior Middle School	Air and noise	The school has over 1,300 students in 26 classes and 99 staff.	188m south of Chengbei Emergency Refuge Square
	5	Luyang Primary School	Air and noise	The school has around 2000 students in 36 classes.	40m north of Central Emergency Refuge Square
	6	Luxigou	Water environment and ecology	Water body Class III	Water body associated with Xiangyang Road works
	7	Xichuan River	Water environment and ecology	Water body Class III	Water body associated with Fuyuan and Xijiang Binhe Road works
	8	Lushan River	Water environment and ecology	Water body Class III	Water body associated with Binjiang Right-bank Major Bridge
Mingshan District Subproject	1	Residential area along Jiangbian Street	Air and noise	Concentrated distribution, 6 storey	63m southeast of the starting point of Pingqiao Road

County/district and subproject name	Environmentally sensitive spot		Impact factor	Overview of sensitive spots	Location
	No.	Description			
				brick-concrete houses, 98 households	6
	2	No. 2 Middle School of Mingshan District	Air and noise	The school has over 850 students in 12 classes and 50 staff.	194m southeast of the starting point of Pingqiao Road 6
	3	Chengdong Township Government	Air and noise	3-storey houses, about 30 people	130m east of Pingqiao Road 6
	4	People's Government of Mingshan District	Air and noise	5-storey houses, about 40 people	East of and adjacent to the reconstructed refuge site
	5	Mngshan Middle School	Air and noise	The school has over 3000 students in 24 classes and 50 staff.	150m east of Mingsheng Road extension line
	6	Experimental Primary School of Mingshan County	Air and noise	The school has over 2000 students in 20 classes and 50 staff.	140m from tail end of the Mingsheng Road extension line
	7	Miaomiao Kindergarten	Air and noise	The school has over 90 students in 3 classes and 10 staff.	78m east of Mingsheng Road extension line
	8	Minshan River	Water environment and ecology	Water body Class III	The proposed roads in Pingqiao Zone and Mingshan River levee arranged along Mingshan River
	9	Huaixi River	Water environment and ecology	Water body Class III	The proposed levee of Huaixi River arranged along Huaixi River
Yingjing County Subproject	1	Yangliuhe Kindergarten	Air and noise	2-storey teaching building, 1-storey dormitory, about 40 students and 5 teachers	10m south of the reconstructed emergency refuge site
	2	Hu Changbao Primary School	Air and noise	4-storey teaching building, about 3,000 teachers and students	20m west of flood discharge channel
	3	County Traditional Chinese Medicine Hospital	Air and noise	50 beds and 27 doctors	144m east of flood discharge channel
	4	County Archives Bureau	Air and noise	6-storey building	54m north of flood discharge channel
	5	County Local Taxation Bureau and Inspection Bureau	Air and noise	5-storey building	26m west of flood discharge channel
	6	County Maternal and Child Care Service Center	Air and noise	12 beds and 29 employees	22m south of the reconstructed Fuyu Road
	7	Nanluoba Village Clinic	Air and noise	2 beds and 5 employees	3m east of the reconstructed Fuyu Road

County/district and subproject name	Environmentally sensitive spot		Impact factor	Overview of sensitive spots	Location
	No.	Description			
	8	County Vocational Middle School	Air and noise	4-storey teaching building, about 1230 teachers and students	4m east of the reconstructed Fuyu Road
	9	Central Primary School of Fucheng Township	Air and noise	4-storey teaching building, about 173 teachers and students	2m west of the reconstructed Fuyu Road
	10	Fucheng Township Health Center	Air and noise	6 beds and 10 employees	8m from the left side of the reconstructed Fuyu Road
	11	Aixin Kindergarten	Air and noise	2-storey building, about 15 teachers and students	140m east of west section of new Jinghe Road
	12	Wuxian Township Primary School	Air and noise	3-storey teaching building, about 310 teachers and students	2m west of the reconstructed Fuwu Road
	13	County Meteorological Bureau	Air and noise	3-storey building	117m south of the reconstructed Fuyu Road
	14	Longcanggou Courthouse	Air and noise	2-storey building	3m west of the reconstructed Fuyu Road
	15	Yinghe River	Water environment and ecology	Water body Class III	North of the reconstructed emergency refuge site and the end point of reconstructed flood discharge channel works
	16	Jinghe River	Water environment and ecology	Water body Class II	105m west of west section of new Jinghe Road
Shimian County Subproject	1	Government office building	Air and noise	12-storey office building	About 92m from the left side of new Xuefu Road
	2	Mingzu Middle School in Shimian County	Air and noise	Seven 4-storey buildings, over 900 teachers and students	About 135m from the right side of new Dianli Road
	3	Chengbei Middle School	Air and noise	3-5 storey, 1400 students and teachers, 400 boarders	About 20 from the right side of the road in new Chengbei Settlement Building Compound and Chengbei Refuge Square
	4	Qiyi Middle School	Air and noise	4-5 storey building, 620 teachers and students, 570 boarders	About 88m from the right side of new Yanzi Road
	5	Health Centre for Women and	Air and noise	4-5 storey building,	About 89m from

County/district and subproject name	Environmentally sensitive spot		Impact factor	Overview of sensitive spots	Location
	No.	Description			
		Children		620 teachers and students, 570 boarders	the right side of new Yanzi Road
	6	Nanya River	Water environment and ecology	Waters with Class III surface water	New Nanyahe Medium Bridge is over the Nanya River; Dianli and Xuefu roads are along the river.
	7	Dadu River	Water environment and ecology	Waters with Class III surface water	Reconstructed sections S211 and G108 are along the river; new Yanzi Binhe Road is along the river; new major bridge crossing Dadu River at Lianpowan is over the river; new G108 major bridge is built over the water; new Yanzi Road levee is along the river.
	8	Suspension Bridge on Dadu River in Xinmian	Cultural relic	Municipality Protected Historic Site of Ya'an City	Upgraded section S211 involves the key protection scope, general protection scope and development control area of the suspension bridge on Dadu River in Xinmian
Yucheng District Subproject	1	The peasant households on the east side of the starting point of east section of the south outer ring road K0+000	Air and noise	12 households on the left side, 50 ones on the right side, 2-3F	19.7m from the left side of the road and 19.5m from the right side of the road
	2	Peasant households north of the refuge square	Air and noise	6 households, 2-3F	10-200m on the north side
	3	Qingyi River	Water environment and ecology	Waters with Class III surface water	1km east of the south outer ring road
	4	Longxi River	Water environment and ecology	Waters with Class III surface water	100m east of the refuge site
Tianquan County Subproject	1	Inpatient Department of Traditional Chinese Medicine Hospital	Air and noise	8-storey building	About 44m from the left side of Anju Road South, about 200m from Guangjian Road South behind it
	2	Tianquan County Health Bureau	Air and noise	5-storey office building	At the intersection with Dengzhan

County/district and subproject name	Environmentally sensitive spot		Impact factor	Overview of sensitive spots	Location
	No.	Description			
					Road, about 15m from the left side of Anju Road South
	3	Dependant's area of the TCM Hospital	Air and noise	Two 6-storey brick-concrete residential buildings, 48 households in 4 units in total	About 17m from the left side of Anju Road South, at the intersection with Dengzhan Road, at a minimum distance of about 15m from Dengzhan Road
	4	Outpatient Department of the TCM Hospital	Air and noise		About 29m from the left side of Anju Road South
	5	Tianquan Maternal and Child Care Service Center	Air and noise		About 24m from the left side of Anju Road South
	6	Machilus tree at Jiancai Road South	Ecological environment	2 ancient and rare trees, within in the protection area of the forestry authority	Jiancai Road South

The environmental impact on residential areas, government office areas, hospitals, schools, etc comes from poorer air quality and noise bothering the residents nearby caused by construction in construction period. It is a short-term controllable local impact. Road works may cause traffic noise which will affect residents on either side of the road in operation period.

Chapter 2 Project Overview

2.1 Project location

The World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project is mostly undertaken in 7 counties (districts) of Ya'an City in Sichuan and it is geographically arranged as shown in the table below and the Figures 2-1 and 2-2.

Table 2-1 Geographical locations of the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project

S/N	Project-related county/district	Geographical location	Layout plan of the project
1	Baoxing County	Muping Town and Lingguan Town of Baoxing County, Ya'an City	See Figures 1-1 and 1-2
2	Lushan County	Luyang Town of Lushan County, Ya'an City	See Figure 2
3	Mingshan District	Chengdong Township and Mengyang Town of Mingshan District, Ya'an City	See Figure 3
4	Yingjing County	Yingjing County, Ya'an City	See Figure 4
5	Shimian County	Shimian County, Ya'an City	See Figure 5
6	Yucheng District	Daxing Town and Beijiao Town of Yucheng District, Ya'an City	See Figure 6
7	Tianquan County	Tianquan County, Ya'an City	See Figure 7

Fig. 2-1 Location of Sichuan Province

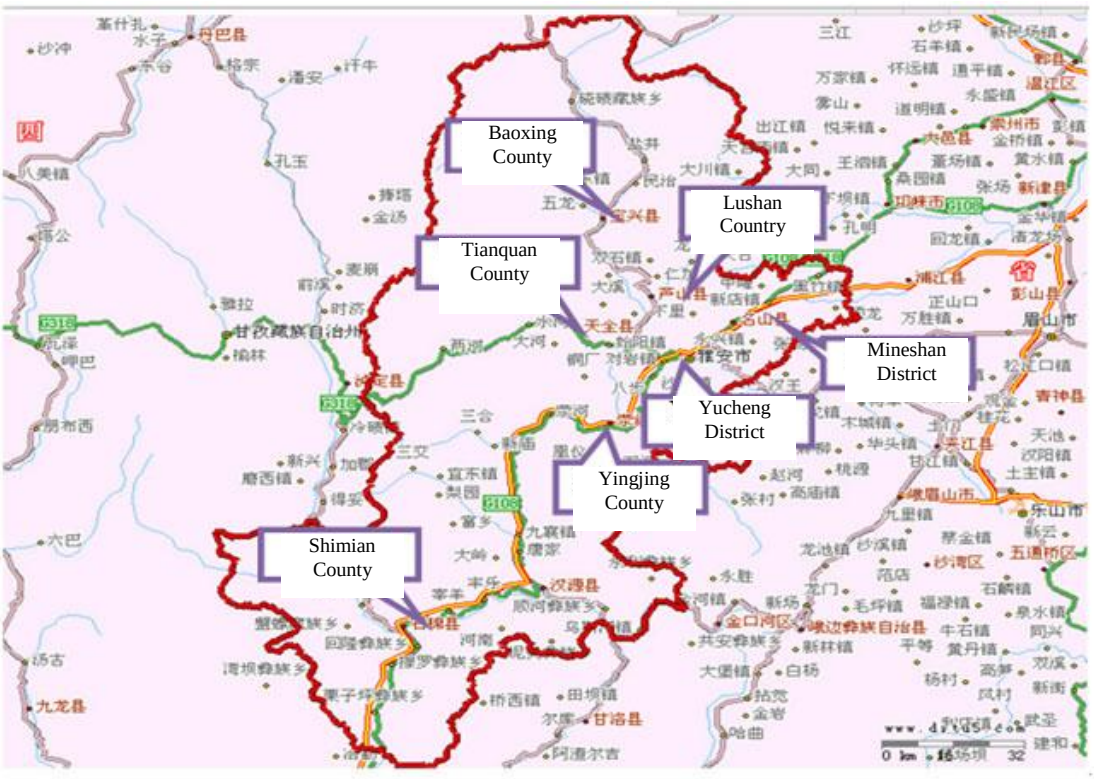

Fig. 2-2 Distribution of Subprojects of World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project

2.2 Construction content, scale and investment

The construction works in World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project are mostly roads, sewage pipe network, water treatment plant, emergency refuge square, bridges, flood channels and river levees. The construction content, scale, investment and construction period of the subprojects are presented in Table 2-2.

Table 2-2 Summary of construction content, scale and investment of each subproject

S/N	Project name	Contents of construction	Main works and scale			Total investment (10,000 yuan)
1	Baoxing County Subproject	Emergency evacuation and refuge passage along Yanjiang Road, Zhongling Road North and Lianghekou Water Plant in Baoxing County	Main works		(1) 1 new water plant with an area of 4.63mu, water supply capacity of 2500t/d, 680m-long associated water pipes, 2342m associated pipe network and auxiliary facilities in the plant area. (2) Emergency evacuation and refuge passage along Yanjiang Road: about 2119m in full length including Section A which is 885.5m long from Yongfu Temple intersection to Red Army Square and Section B which is 1233.304m long from Qingyiyuan Bridge to the south end of Lianghekou Bridge. It is an urban trunk road with a design speed of 40km/h. (3) Zhongling Road North is reconstructed from Xinqiao Street to Jianlian Resettlement Compound with a full length of 6196.977m including K0+000~K0+664.706 which is an urban trunk road with a width of 21~29m and a design speed of 40km; K0+664.706~K1+026.033 which is an urban trunk road with a width of 16m and a design speed of 40km; and K1+026.033~ K6+196.977 which is an urban secondary trunk road with a width of 8m and a design speed of 30km.	21001.06
			Auxiliary works		Administration building for the water plant, guardhouse, etc. Road facilities: traffic signs, traffic markings, signal facilities, separation facilities, safety barriers, crash barriers, etc.	
2	Lushan County Subproject	Road works, bridge works and emergency refuge square	Main works	Road works	New roads: 1303m Xijiang Binhe Road, 146m link road to Xijiang Road, 656m Jingdingge Road, 773 m reconstruction of the right-bank section of Bingjiang Road, 194 m Shuidian Road, 200 m Wanghui Road, 698 m Xiangyang Road, community group roads (557 m Road No. 1, 100m Road No. 2 and 181m Road No. 3) and 950m Fuyuan Road	28815.83
				Bridge works	New Right-bank Major Bridge on Binjiang Road is 372.06m in full length and of half-road-half-bridge type; half of the deck is 10m wide.	
				Emergency refuge square	4 new Class III emergency refuge squares; Including North Refuge Square with an area of 9,600m^2; Guangyuan Refuge Square with an area of 9,300m^2; Central Refuge Square with an area of 5300 m^2; and South Refuge Square in Xincheng District with an area of 8900 m^2	
			Auxiliary works		Xijiang Binhe Road and Link to Xijiang Road include associated water supply network, sewage pipe network, rainwater pipe network, traffic safety, power pipe trenches, lighting works, landscaped separators, traffic works and street lamp monitoring facilities. Other roads include associated sewage pipe network, rainwater pipe network, traffic safety, lighting works and traffic works.	

S/N	Project name	Contents of construction	Main works and scale			Total investment (10,000 yuan)
3	Mingshan District Subproject	Road works, bridge works, emergency refuge square and levee works	Main works	Road works	New roads: 1) Pingqiao Road 1: 285.335m long and 18m wide 2) Pingqiao Road 2: 138.033m long and 18m wide 3) Pingqiao Road 3: 162.561m long and 18m wide 4) Pingqiao Road 5: 195.216m long and 18m wide 5) Pingqiao Road 6: 1,111.527m long and 15m wide 6) Minsheng Road Extension: 575.279m long and 18m wide	24030.00
				Bridge works	One new Mingshan River-crossing simply-supported prestressed hollow slab bridge for pedestrians; its deck is 5.5m in full width (including railings) and the bridge is 40m in full length.	
				Emergency refuge square	2 emergency refuge squares: one new Class III emergency refuge square with an area of 7287m^2 on the north side of Mengdingshan Avenue; one upgraded Class II emergency refuge square (the former Wulizhen Square) with an area of 22,000m^2	
				Levee works	2,349.301m of new urban levee and 36,700m^2 of green area and leisure area on the levee will be built. The levee at the right bank of the Mingshan River is 812.373m long and the green area and leisure area are 13,000m^2 in area; the levee at the left bank of Huaixi River is 746.564m long and the levee at the right bank is 790.364m long and the green area and leisure are on both left and right banks are totally 23700m^2 in area.	
			Auxiliary works		Implementation of associated water supply works, drainage works, lighting works, power and communication pipeline works, landscaping works, etc.	
4	Yingjing County Subproject	Road works, flood discharge channel works and emergency refuge site works	Main works	Road works	New roads: west section of Jinghe Road and Park Branch Road; new Fuyu Road and Fuwu Road built in the original route. The newly built roads are approximately 3,782.568m in total length. The west section of Jinghe River is 3,430.412m long and 16m wide; the Park Branch Road is 352.156m long and 12m wide. They both are two-way two-lane roads with asphalt concrete pavement. Road reconstruction: Fuyu Road is 3,522.888m long and 7~11m wide; Fuwu Road is 261.699 m long and 9m wide; reconstruction works are demolition of existing pavements, compaction of existing subgrade to the compactness specified in the technical specification and elimination of the defects such as subgrade frothing and weak subgrade.	20326.32
				Flood discharge channel works	3240.324m of flood channels are to be rebuilt or newly built and these channels are 1.5~5m wide. The flood frequency is twenty years. Qingzhu Creek is 784.407m long, Zengjiagou 1,431.624m long and Qianjiagou 1024.239m long.	
				Emergency refuge site works	One reconstructed Class III refuge site (the former Yangliuhe Park) with additional emergency refuge facilities, covering an area of around 7000m^2	

S/N	Project name	Contents of construction	Main works and scale			Total investment (10,000 yuan)
			Auxiliary works		Road works: Implementation of associated water supply works, drainage works, lighting works, power and communication pipeline works, landscaping works, etc. Flood discharge channel works: associated intercepting sewer (pipe diameter 500mm; about 800m in length) and landscaping works along the channel in Qingzhu Creek Section. Cleaning works in flood discharge channel and new refuse collection system works; Emergency refuge site: build medical station, material reserve center, water supply facilities, supporting facilities such as radio communication, upgrading of toilet, etc.	
5	Shimian County Subproject	Road works, bridge works, refuge square and levee works	Main works	Road works	These roads are totally 8373.78m long, among which the newly built Yanzi Road, Xuefu Road, Mountain Access Road 2 (S2), Road No. 1, Road No. 2, Road No. 3 and Dianli Road are totally 6607.37m long and the rebuilt G108, S211 and Mountain Access Road 1(S1) are totally 1766.41m long. These roads are also furnished with drainage, landscaping, lighting, bus stops, traffic safety and management facilities (signs and markings, road barrier-free facilities and traffic lights) and other auxiliary installations; the Dianli Road in Shunhe zone is furnished with water supply, power supply and communication works; Yanzi Road is furnished with power supply and communication works.	39335.36
				Bridge works	One new large bridge crossing Dadu River at Lianpowan, with 594m total length; one new medium bridge crossing Nanya River, with 60m total length; one new large bridge on National Highway G108, with 372m total length; one new medium bridge on Yanzi Road, 30m in full length	
				Levee works	New levee in Yanzi zone is approximately 1705.48m long	
				Refuge square works	1. New emergency refuge square in Yanzi zone with an area of about 8,500m^2 and emergency facilities, equipment and auxiliary works; 2. New emergency refuge square in Chengbei zone with an area of about 28,600m^2 and emergency facilities, equipment and auxiliary works;	
			Auxiliary works	Water supply pipeline works	New associated water supply pipelines along Dianli Road;	
				Drainage pipeline works	Design of associated drainage pipe network for new and upgraded roads in the subproject (separate flow of rainwater and sewage)	
				Power supply and lighting works	Design of associated power supply and lighting works for new and upgraded roads (excluding new off-class road in Chengbei zone) in the subproject	
6	Yucheng District	Road works and refuge square works	Main works	Road works	The east section of the south outer ring road consists of main line and branch line. The main line, starting from the planned Ya'an Avenue and ending at the point	50407.83

S/N	Project name	Contents of construction	Main works and scale			Total investment (10,000 yuan)
	Subproject				520m to the west of the dam crest road on Daxing Power Station, is totally 5,773.501m long; its subgrade is 19m to 29m wide; it is an urban trunk road, with designed speed of 50km/h. The branch line, starting from the east section of the south outer ring road and ending at the link line of Ya'an-Kangding Expressway, is totally 543.9m long; its subgrade is 29m wide; it is an urban trunk road, with designed speed of 50km/h. The entire road will be built with asphalt concrete pavement.	
				Refuge square works	New emergency refuge square in Beijiao Park with an area of 34,149.59m^2 which can accommodate about 10,000 people and provided with emergency facilities, equipment and auxiliary works.	
			Auxiliary works	Water supply pipeline works	New associated water supply pipelines along Dianli Road;	
				Drainage pipeline works	Design of associated drainage pipe network for new roads in the subproject (separate flow of rainwater and sewage)	
				Power supply and lighting works	Design of associated power supply and lighting works for new road in the subproject	
7	Tianquan County Subproject	Road works and refuge square works	Main works	New road	9 new roads in Shaba zone (i.e. Roads A1, A2, A3, C2, C3, C4, D1, D2 and D3), 3839.6m in total length and 14~20m in width	30879.94
				Reconstructed road	6 reconstructed roads in Old Town (i.e. Anju Road South, Guangjian Road South, Wenxing Road, Binhe Road, Dengzhan Road and Jiancai Road South), 2207.5m in total length and 11~28m in width, including adjustment of pavement cross section layout, pavement upgrading, etc.	
				Emergency refuge square	Two new Class III refuge sites in Old Town and Shaba zone; The refuge square in Old Town covers an area of 8,003m^2; the refuge square in New Town covers an area of 10,539m^2.	
			Auxiliary works	Road works	Comprehensive pipeline works including drainage pipe network (sewage pipe 6789m in length and d400 in diameter; rainwater pipe 6401m in length and d500~d1200 in diameter), power pipe 489m in length with 6-hole duct bank (Anju Road South and new roads in Shaba zone), traffic safety and management facilities (signs and markings, road barrier-free facilities and traffic lights), landscaping, lighting and other associated works.	
				Emergency refuge square	Build emergency administration building, emergency toilet, emergency refuse storage area, emergency water and power supply facilities, emergency medical facilities and associated water, power and lighting facilities, underground parking lot, landscaping works, etc.	

2.2.1 Baoxing County Water Purification Plant

This project will affect the Baoxing County Water Purification Plant, thus this plant is described below.

(1) Status of existing water plant

The water plant in Baoxing County has its water sourced from Jiaochanggou. Baoxing County Water Purification Plant was built in 2013 and the capacity of its Phase I was 2,500m^3/d. Prior to Lushan Earthquake, no debris flow occurred at Jiaochanggou. During the Lushan Earthquake period, the water intake at Jiaochanggou was jammed by debris flow and the water supply to the whole county was interrupted fro several days. During this interruption, water trucks were deployed to deliver water. After the repair, the water supply for Muping Town can usually be maintained, but the water intake has always been exposed to potential debris flow. In addition, according to the Table 3-1 "Plan for mass observation and mass preparedness against geological hazard in Baoxing County" in the *Implementation Plan for the General Geological Hazards Prevention and Control System of Baoxing County in Sichuan in 2015*, Jiaochanggou is subject to the geological risk of debris flow which presents serious hazard. Baoxing Water Supplies Bureau has done comprehensive rectification to the both banks of Jiaochanggou to deal with debris flow, but the water intake head is right in the middle of that waterway, thus the risk of debris flow still persists. Therefore, this project will use another water source, so that the supply water to the county comes from double water sources and water supply security is enhanced.

Fig. 2-3 Mountain stream for water supply at Jiaochanggou

(2) Overview on the proposed water plant

Lianghekou Water Plant of Baoxing County: the new water plant has supply capacity of 2,500m^3/d, with 620m of water pipes, 2,590m of pipe network and other auxiliary installations.

Lianghekou Water Plant is located at Hejiang Group, Shunjiang Village, Muping Town, Baoxing Bounty and its water intake is located at Shanmugou, Shunjiang Village, Muping Town, Baoxing Bounty. The plant site is 680m downstream Shanmugou and is set on relatively flat ground. According to the feasibility study and water source assessment report, the Jiaochanggou (water source for the existing water plant) and Shanmugou (water source for new water plant) are both exposed to the risk of debris flow. In case of debris flow occurrence, the water sources for both the existing water plant and the new water plant will be interrupted. Due to the special nature of this project, it is recommended to prepare emergency water source in to his project. To sustain the water supply security under the geomorphic limitations of Baoxing County, it is proposed to open 2 wells at the Donghe River as emergency water supply, with supply capacity of 1,000m^3/d.

An investigation indicates that the surface water at Shanmugou which is the primary water source for Lianghekou Water Plant in Baoxing County is from Donghe River which is a Class 1 branch river of Baoxing River. This branch river flows between two mountains. The water intake point is surrounded by forests. The land area from 3,500m upstream the water intake point and 100m downstream the water intake point and covering 200m from both banks of that branch river does not contains any factory, livestock farm or any other pollution source and that area has only a few scattered peasant households. Furthermore, the well serving as the backup water source is located within the water plant at the left bank of Donghe River and the area with 100 radius centered around that well does not contain any factory, livestock farm or any other pollution source and contains no peasant household.

(3) Comparison of the schemes

Topographically, the water system of Baoxing County consists of the Donghe River, Xihe River and Baoxing River; the north part of that county is higher than its south part; Donghe River and Xihe River converge at a point near Hainan Street where they flow into Baoxing River. Since the north part of Baoxing County is elevated above its south part, gravity flow is preferably to be used for water intaking and water supply, so as to conserve energy. Comparison between the Xihe River Plant and Donghe River Plant is shown below:

Table 2-3 Comparison between the water plant siting schemes

Items in the assessment and comparison	**Scheme I: Water intake point at Xihe River (water source at Xiayudong)+ plant site at Lianghekou of Xinbao Village near Baoji-Longxian Road**	**Scheme II: Water intake point at Donghe River (water source at Shanmugou)+ plant site at Shanmugou of Shunjiang Village**
Water quantity	Sufficient	Sufficient
Water quality	Sufficient	Sufficient
Housing demolition	None	None
Land availability for construction	Land acquisition	Land acquisition
Geological hazard	Cavern water at water intake point presents no hazard Plant site is exposed to geological hazard	None
Advantages	The water intake point has no geological hazard; the access road to the plant is short; no flood channel is needed; water intake point is quite near the plant; the water pipeline is short	The plant is near the water source; house demolition and farmland occupancy are no needed; geological condition is favorable; plant site is large; the elevation difference can be used to supply water by gravity and provide sufficient water pressure for the users; flood control is practicable; neither plant nor water

		intake point is exposed to geological hazard.
Disadvantages	Low-lying ground requires large volume of filling; plant site is exposed to landslide risk; the water plant is the core of the water supply system, thus rectification of the geological hazards along the pipeline will be costly; Xiayudong is highly elevated, so it is difficult to set the water intake point there; the main urban area at the east bank, thus the water pipeline needs to cross the Baoxing River, making it hard for construction works	Quality of mountain creek is slightly inferior to that of cavern water
Traffic conditions	No access road to the plant is needed	No access road to the plant is needed
Comprehensive evaluation	Ordinary	Excellent
Water supply area	Enter Muping Town	Enter Muping Town
Cost	Water intaking and supply by gravity flow, low energy consumption	Water intaking and supply by gravity flow, low energy consumption
Project investment	10.88 million yuan for water intake and water plant	9.42 million yuan for water intake and water plant

According to the site survey, the plant at Shanmugou of Shunjiang Village is located 680m downstream of Shanmugou. The plant is set at flat ground and the elevation of the site is 1,060.10-1,066.64m. This plant site is set on gentle terrain upstream the town and is near the water intake point at Shanmugou; it is very close to a village road, which is convenient for construction; it is near the Lianghekou Community, which reduces water pipeline; power supply line is shorter; the site is free from flood threat; average fill height of 3m is enough to elevate the site above the once-in-fifty-years flood level. In conclusion, it is recommended to use water intake point at Donghe River (water source at Shanmugou)+ plant site at Shanmugou of Shunjiang Village.

(4) Water source assessment

The water source assessment report on the Lianghekou Water Plant in Baoxing County Subproject was completed by the Chengdu Branch of Yanbian Hydropower Survey and Design Institute in January 2016 and was replied by Baoxing Water Supplies Bureau.

According to the water resource assessment report:

The plan of sourcing water from Shanmugou and preparing backup water well is optimal for this project; the water intake point provides abundant water as a water source; the water quality is Class II which meets the water source requirements. Thus this water source is acceptable for this project.

The availability of the water source for this project is 97% and water flow rate is $0.138m^3/s$; the water intake rate is $0.032m^3/s$ which is reliable. Even during the dry period of the water intake point, the availability of the water source can still reach 100%.

According to the water quality test report, both Shanmugou and the backup water well have high-quality water that is colorless and odorless with pH value of 8 and that is usually moderately or weakly alkalic. The water quality parameters all meet the Class II quality standard in *Environmental Quality Standard for Surface Water* (GB3838-2002). Therefore, the water source is reliable.

(5) Process of water purification plant

The water purification plant in this project extracts water using bottom grille. Due to

the significant volume of silt in the flood season, a 7.5×2.5×3.5m desilting basin with desilting cycle of 15 minutes is needed downstream the water intake point. After the flood season, the valve is opened to discharge the sand. To guarantee water supply security, two large water wells serving as emergency water source will be furnished near the water plant. Based on the quality of the raw water, the raw water is to be treated in the commonly applied process of "flocculent precipitation—filtration—sterilization" to reach or exceed the *Sanitary Standard for Drinking Water*. The turbidity of the output water is less than 0.50NTU.

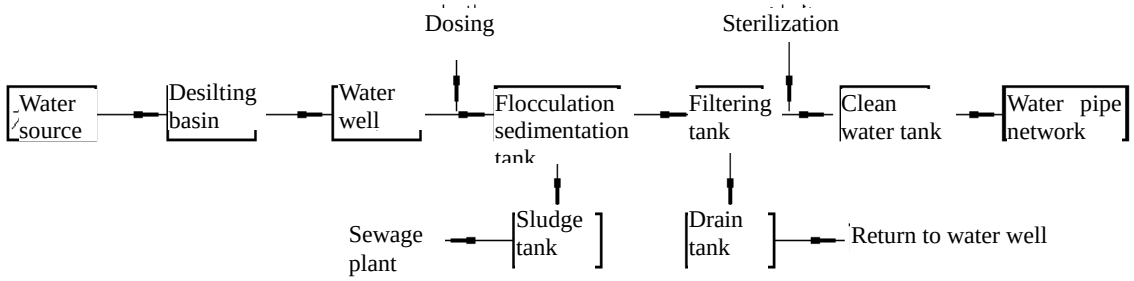

Fig. 2-4 Water purification process

2.2.2 Reconstruction of the road in Shimian County

Reconstruction of the S211 Road in Shimian County will affect the suspension bridge on Dadu River in Xinmian which is a county-level cultural relic, thus this project will be addressed below.

(1) Project contents

The reconstruction section of S211 Road in Shimian County Subproject is located at the slope at the north bank of Dadu River. In terms of road standard, the S211 Road was poorly designed and it has no sidewalk, underground pipeline or lighting system. The road route is built along Dadu River and it forms large angle with the rock formation at the inner mountain side. During reconstruction of the S211 Road in this project, it is proposed to widen the sidewalk and blacken the existing pavement. The reconstruction section within the protection scope of the suspension bridge on Dadu River in Xinmian is K0+000.00~K0+629.35. The sidewalk will be increased to 2.5m~3m width by overhung beams; pavement blackening will involve demolition of existing pavement, rectification of defective subgrade and placement of asphalt concrete pavement.

Due to the topographic limitations, there is only one way to accomplish reconstruction of that road section. In the project design, sidewalk widening by overhung beams and blackening of existing pavement will involve no high-intensity works, minimizing the potential impacts of the project on the suspension bridge on Dadu River in Xinmian. The Administration of Cultural Relics of Shimian County has approved this construction plan. Therefore, it is assessed that the construction plan for S211 Road is acceptable and will not have any damaging effect on the suspension bridge.

(2) Overview on the suspension bridge on Dadu River in Xinmian

Dadu River is a natural moat in Southwest China and is seriously inconvenient for interaction and travel of the people separated by it. The suspension bridge on Dadu River in Xinmian was built in 1940s and has been there for over 70 years. To the north of this bridge is the S211 road and to its south is the main urban area of Shimian County. Even now, this bridge still very well serves the citizens of Shimian County.

Status of the suspension bridge on Dadu River in Xinmian

(3) Protection scope of the cultural relics

In accordance with the "Notice of Declaring the Second Set of Culture Relic Protection Sites and Their Protection Scope by the People's Government of Ya'an" issued in the YFH [2011] No. 247 Document by the People's Government of Ya'an of Sichuan, the suspension bridge on Dadu River in Xinmian is included among the second set of culture relic protection sites. The key protection scope for this bridge is the area covering 20m from the north, east and west sides of the north-end abutment of the bridge. The protection scope also covers 20m from the south, east and west sides of the south-end abutment. The general protection area, i.e. the extension of the key protection scope, extends southward by 90m to the National Road 108 at the south bank and covers 30m from the east, west and south sides; at the north bank, it covers 30m from the east and west sides. Construction control area: this is the extension of the general protection area. At the north bank, the general protection area extends eastward by 110m to the newly built bridge at Dadu River and extends westward by 130m along the Provincial Road 211 to the Martyrs Cemetery. At the south bank, the general protection area extends eastward by 110m to the newly built bridge at Dadu River and extends westward by 130m.

(4) Possible impacts of project construction on the cultural relics

Reconstruction of the S211 road in this project will impact the protection area of the suspension bridge on Dadu River in Xinmian. If the construction design does not allow for the impacts imposed upon this protected cultural relic, the construction team is not informed of the protection area and the restrictions thereof prior to construction commencement or construction proceeds without proper construction practices or strict management, the protected site will be exposed to adverse effects or may be permanently compromised in terms its intactness and functionality.

Due to the topographic limitations, there is only one way to accomplish reconstruction of S211 Road. During the design period, the Administration of Cultural Relics of Shimian County was consulted many times. Based on the protection scope of the suspension bridge on Dadu River in Xinmian, reconstruction of that road section will be limited to widening of the sidewalk and blackening of the existing pavement. The construction area will not affect the main structure of that bridge, thus the impact of the construction works on that bridge is minimized. Besides, the Administration of Cultural Relics of Shimian County has issued an certificate demonstrating the construction design will not impact the bridge.

(5) Mitigation measures

During reconstruction of S211 road, the following measures shall be taken to minimize the impact on the suspension bridge on Dadu River in Xinmian:

① Prior to construction commencement, the construction and management teams will be given certain education, particularly the education in legality, to cultivate their awareness of cultural relics protection.

② Prior to construction commencement, the project investor, management department and construction contractor shall engage with the relevant authorities to enter into an agreement for protection of the cultural relics, so as to specify the responsibilities of the construction personnel for such protection, thus establishing a well functional cultural relics protection responsibility system.

③ During construction, the works will be limited within the property line and no activity will be conducted outside the property line, so as to avoid any and all impacts on the appearance or structure of the protected cultural relic and maintain the intactness and functionality of that cultivate relic.

④ After mobilization, the technical construction department shall undertake the responsibility for cultural relics protection, and pay attention to whole-process supervisory control during construction and prepare a special construction scheme to keep cultural relics under control during construction.

⑤ No large machinery will be used during construction and all works will be done by manual labor and small machinery, to protect the cultural relic from damage. If any high-intensity work (e.g. machinery operation, pavement demolition, blasting and pneumatic pick operation) is required, such work shall not be initiated until the relevant authority has approved such work and the technical experts have reviewed the work scheme. During construction, the technical personnel, supervisors and workers must fulfill their duty, with strict supervision over the works.

⑥ The protected cultural site is a sensitive point and the assignment concludes that the construction area affecting the protected area is subject to intensive supervision during construction, so as to enforce the environmental protection measures and protect the cultural relic from illegal, authorized or unrestrained work activities.

⑦ If encountering underground cultural relics during construction, the Construction Contractor shall suspend construction, protect the site and report to the authorities in accordance with the *Law of the People's Republic of China on the Protection of Cultural Relics.*

⑧ After completion acceptance, the relevant authorities will continue monitoring operation of both the project and the suspension bridge on Dadu River in Xinmian, so as to ensure that operation of the project will not impact that bridge.

(6) Project benefits

The original road had no auxiliary installations such as sidewalk and lighting system, which is very inconvenient for travels of the citizens from Chengbei zone, and it did not account for the tourism functionality of the suspension bridge on Dadu River in Xinmian. In this project, the sidewalk will be widened and the cross section design of the road will fully integrate the road with the bridge, giving certain visual sense of aesthetics, and the road will fulfill its functionality as serving the citizens of Chengbei zone for roaming. This project will bring positive effects on the suspension bridge on Dadu River in Xinmian and even the overall functional zoning of the main urban area of Shimian County.

2.3 Plan compatibility

According to *Guiding Catalogue of Industrial Restructuring* (Edition 2011) (Decree No. 9 of National Development and Reform Committee), the 7 subprojects under the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project fit the categories in subclause 1 "urban flooding warning and control works" in Item 2 "Conservancy", subclause 3 "Construction of urban public transportation system", subclause 4 "Construction of Urban Road and Smart Traffic System" and subclause 9 "Urban water supply and drainage pipeline works, water supply source and water treatment plant works" in Item 22 "Urban infrastructure and real estate" and subclause 39 "Construction of infrastructure for emergency rescue base and public emergency experience" in Item 39 "Public safety and emergency products" in the encouraged category I. Based on the overall urban planning of the counties/districts, the 7 subprojects under the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project all conform to the requirements of the local urban planning.

Therefore, this project is encouraged by the state and complies with the current industrial policies, the local overall urban planning and the strategy for sustainable development of the country.

Chapter 3 Overview of Regional Environment

3.1 Natural environment

3.1.1 Overview of natural environment

1 Geographical location

Ya'an is located at the western fringe of Sichuan Basin, upstream of the Changjiang River, and its coordinates are 28°51′10″-30°56′40″N and 101°56′26″-103°23′28″E. It neighbors Chengdu to the northeast, Emeishan City to the east, Leshan City to the southeast, Ganzi Tibetan Autonomous Prefecture to the east, Yi Autonomous Prefecture of Liangshan to the south and Aba Tibetan and Qiang Autonomous Prefecture to the north. It is the transition zone between Qinghai-Tibet Plateau and Chengdu Plain, the transition zone between Han Chinese culture and other ethnic cultures and also the transition zone between modern metropolitan centers and the natural eco-regions. The land area of Ya'an is 15,300km^2.

This project covers 7 counties/districts of Ya'an, i.e. Baoxing County, Lushan County, Mingshan District, Yingjing County, Shimian County, Yucheng District and Tianquan County. The geographic location of this project is shown in Figures 2-1 and 2-2.

2 Topography and landforms

The Qionglai Mountain to the north of Ya'an extension to the Erlang Mountain in the west and converges with Jiajin Mountain in the north. In its southwest is the northwest-southeast Daxue Mountain that extend to the urban area. In its south and southeast are the Daxiangling Mountain and Xiaoxiangling Mountain. The north, west and south parts of this city are higher than its east part. The ultrahigh mountains (higher than 5,000m) at its southwest and northwest edges are covered in snow all year long. The 5,793m high unmanned peak located at the border between Shimian, Kangding and Jiulong is the highest peak of Ya'an. The high mountains (3500~5000m high) are located in Baoxing, northwest Tianquan and southwest Shimian and the elevation difference between them is 1000~2000m. These landforms account for 21% of the total area of the city. The medium-high mountains (1000~3500m high) located in the counties account for 69% of the total area of the city and they cover large areas. The low mountains (500~1000m high), only 4% of the total area, are mostly located in Yucheng District and Mingshan Mountains. Hills and flat grounds, 6% of the total area, are mostly located beside river valleys, particularly Qingyi River. The point where that river leaves Ya'an is at 627m elevation and is the lowest point of the city.

The morphological features as well as "5.12" Wenchuan Earthquake and "4.20" Lushan Earthquake result in sharp degradation of the geological environmental conditions of Ya'an and lead to the addition of a lot of large-scale and seriously dangerous geological hazards characterized by concealment and long-term properties, so prevention of geological hazard risks is further increasingly onerous and arduous. In addition, geological hazards such as landslide, debris flow and collapse happen from time to time and causes a serious threat to the safety of people's lives and properties due to the construction of a series of projects like Ya'an-Lugu Expressway, National Highway 108, Yongke Lakeside Ring Road and Provincial Highway 211.

3 Climatic conditions

The climate there is subtropical humid monsoon climate, with annual average temperature of 14.1℃~17.9℃ and ample rainfall. Rainfall in most counties is 1000~1800mm, thus Ya'an is nicknamed as "rain city" or "sky funnel". It has high humidity and scarce sunshine. With the annual average rainfall of 1800mm and the

nicknames “sky funnel” or “rain city”, Ya’an is the region with the most rainfall in Sichuan. Except for those high mountains, this place usually has no too cold winter nor too hot summer; it gets warm quite early in spring; rainfall mostly happens in summer and night rain is very common; there is significant climatic difference between the north and south of Daxiangling Mountain. Take Yucheng District and Hanyuan District for example, the annual average temperature of the former is 16.2℃ and that of the latter is 18.0°C; In January, the average temperature of the former is 6.1℃ and the latter 8.3℃; In July, the average temperature of the former is 25.4℃ and the latter is 26.0℃; The sunshine time of the former is 1,005 hours and the latter 1,451 hours. The frost-free period of the river valley areas of the city is 280~310 days and the annual rainfall differs greatly between the south part and north part. The rainfall is 1250~1750mm and only 740~760mm in the south. The Yucheng District and Tianquan County could have 2000mm rainfall in some years and they are the rain centers of Sichuan, thus there comes the name “rain city”.

4 Hydrological condition

The water area in Ya’an is 430,300 mu which is 1.88% of its total area. The major rivers in Ya’an are the Dadu River and Qingyi River which belong in the Minjiang River water system in the Yangtze river basin. These rivers have nearly one hundred branch rivers. Daxiangling Mountain, the natural watershed, separates the Qingyi River water system to the north and the Dadu River water system to the south. Dadu River originates from Qinghai Province and flows through Aba Prefecture, Luding County, Shimian County, Hanyuan County and Leshan City. Its annual average flow rate is 1,340m^3/s. The water level rises and recedes quickly and the flow rate in flood period is over 60 times the flow rate in dry period. Qingyi River originates from Jiajin Mountain, Erlang Mountain and Daxiangling Mountain and flows through Baoxing County, Lushan County, Tianquan District and Yucheng District. It flows into Jiajiang River at Zhuqingguan. Its annual average flow rate is 390m^3/s. The downstream section of Qingyi River flows in wide valley along flat terraces that have numerous alluvial areas which are beneficial for agriculture. Ya’an is rich in rivers, where the total runoff volume of these two rivers is 57,800,000,000m^3 and the annual average runoff volume is 18,290,000,000m^3.

The rivers in the construction areas of the subprojects under the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project are mostly the branch rivers of Dadu River and Qingyi River. According to the survey, the Lushan County Subproject will affect the Luojiaying drinking water conservation area which is the water source for the Water Plant No. 2 of Lushan County, Yingjing County Subproject will affect the drinking water conservation area at Jinghe River and Shimian County Subproject will affect the drinking water source at Yanzi Village. The local government verifies and proves that the aforementioned water sources have been disused and will be abrogated in the future urban planning. Therefore, there will be no drinking water source protection area in the ambient of this project.

3.1.2 Overview on the ecological environment

1 Land utilization

The total land area of Ya’an is 23,117,000 mu, including 1,975,000 mu of cultivated land (1,163,000mu of dry field (58.9%) and 812,000mu of paddy field (41.1%)) with red-yellow soil. The vertical difference of the soil types is significant: the river valleys and terraces are mostly with fertile alluvial soil, the hills and low mountains with alluvial soil and red soil, medium mountains with yellow soil, yellow-brown soil and brown soil, the mountains higher than 3,000m with podzolic soil and alpine meadow, the mountains of 3,500~4,000m height with alpine meadow soil and the mountains

higher than 4,500m with alpine frozen soil.

2 Vegetation, animal and plant resources

The relative height difference in Ya'an is more than 5,000m, with vertically varying climate and vertical distribution of plants. Ya'an is the home of numerous ancient, rare and precious animal and plant species and is a uniquely precious gene pool. The forest area of Ya'an is 9,881,100 mu and usable grassland area 4,969,000 mu. The Cyathea trees and dove trees there are Class I protected plants. There are also 6 Class II protected plant species and 18 Class III protected plant species. Pepper from Hanyuan County, navel orange from Shimian County, Xianggu mushroom from Tianquan County and tribute tea from Mingshan District are all famous. Ya'an is the home of over 1,200 species of medicinal plants, 110 species of medicinal animals (66.3% of medicinal animals in Sichuan). The national Class I protected wild animals include 8 are beast species and 6 bird species. The Class II protected animals include 21 beast species, 30 bird species and 3 aquatic animal. A French biologist named Davy collected the first specimen of giant panda in 1868. The pandas living in Ya'an account for more than half of the total number of pandas in China, thus Ya'an is reputed as "Panda's home". The Laba River in Tianquan County is the only natural conservation area in China that protects takins. Ya'an is the home of 87 river fish species including the famous Schizothorax prenati and Schizothorax davidi from Zhougong River. These fish species are known as "Ya'an fish".

According to the site survey and the confirmation of the relevant authorities in Ya'an, only the Tianquan County Subproject under the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project will affect 2 protected Machilus trees and no other subproject will affect any precious or endangered animal/plant or any national protected animal/plant.

Machilus tree at Jiancai Road South

3 Mineral resources

Ya'an has 62 minerals including abundantly deposited phosphorus, glauberite, marble, granite, asbestos and sylvine-containing rock. The minerals being exploited are primarily building materials and chemical materials and secondarily non-ferrous metals. The building materials are mostly marble and granite with total reserves of over 4,000,000,000m^3 and the most famous products among them are "Sichuan white jade" and "China Red". Ya'an has 6 asbestos mines and their reserves rank as the second place in China. The Kang asbestos from Shimian County has 2.19m long fiber and is reputed as "king of asbestos".

4 Tourism resources

Ya'an, formerly the Shiyang County established in the Western Wei Dynasty, has a history of over 1,400 years. Ya'an is rich in both natural landscapes and cultural landscapes; the Fengtongzhai Natural Conservation Area has the precious animal and plant species such as giant panda, golden monkey, Cyathea trees and dove trees; the Tianwanhe Scenic Zone at the south slope of Gongga Mountain has the integration of glacier, hot spring, plateau and river valley; the Erlangshan Forest Park has the scenic mixture of snow mountain, sunrise, sea of clouds and primitive forest; the Mengshan Scenic Zone is rich in tea culture and elegant and tranquil taste; the Provincial Geopark at Jinkou Grand Canyon of Dadu River is even comparative to Yangtze River Three Gorges and Grand Canyon of Colorado; the Bifengxia Animal Park possesses steep, marvelous, elegant and pleasant land features; the famous tourist attractions such as the Yandao Ancient City at Yingjing County in the southern silk road, Shangli Ancient Town, Gao Yi's Tomb from Han Dynasty, the stone inscription at Lushan County from the Eastern Han Dynasty, the river crossing site of the Red Army at Dadu River used during the Long March, the hot spring newly discovered at Zhougong Mountain, the huge at the Weita Village in Lushan County and the karst caverns are also in Ya'an. Ya'an has 2 national protected cultural relic sites, 11 province-level protected cultural relic sites and 90 city-level/county-level protected cultural relic sites. Ya'an has 4 province-level historically and culturally famous towns: Ya'an City, Lushan County, Shangli Town and Anshun Town. Ya'an was entitled as a province-level historically and culturally famous city in Sichuan in 1995. The Tourism Development Plan of Sichuan completed in early 1999 already included the aforementioned tourist attractions into the West Sichuan Tourism Circle.

According to the site survey and the confirmation of the relevant authorities in Ya'an, only the Shimian Subproject under the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project will affect the suspension bridge at Dadu River which is a city-level protected cultural site and no other subproject will affect any natural conservation area, scenic area, historic site or forest park.

3.2 Social environment

3.2.1 Overview of social environment

1 Administrative division and population

Ya'an has a long history. It was included in to the governance under the central government. It inherited the cultural heritage from the two Han dynasties. In the modern age, it's the place where General Shi Dakai fought in his final stand and the Red Army won their glorious victories. It used to be the provincial capital of Xikang Province. In 1953, Xikang Province was revoked and was included into Sichuan Province, while Ya'an was established as a district. In December 2000, Ya'an was approved by the State Council to be city.

Ya'an governs 2 municipal districts (Yucheng and Mingshan districts) and 6 counties (Yingjing, Hanyuan, Shimian, Tianquan, Lushan and Baoxing counties). In 2014, the population was 1,540,000.

Ya'an has been traditionally called "ethnic corridor". Its 16 ethnic townships are mostly governed by Shimian County, Hanyuan County and Baoxing County and the ethnic minorities living areas account for 30% of the total area of Ya'an. The 29 ethnic minorities include Yi, Tibetan, Qiang, Miao, Hui, Mongolian, Tujia, Lisu, Manchu, Dong, Yao, Naxi, Buyei, Bai, Zhuang and Dai and their population is 60,000 which accounts for 4% of the total population of Ya'an.

None of the subprojects will affect any area inhabited by ethnic minorities.

2 Socio-economic development

According to the Provincial Bureau of Statistics, the gross regional domestic product (GDP) of Ya'an in 2014 was 46.241 billion yuan which was 11.0% growth compared with the prior year if calculated with the comparable price. The added value of the primary industry was 6.749 billion yuan, with 4.6% growth; the added value of the secondary industry was 26.603 billion yuan, with 12.7% growth; the added value of the tertiary industry was 12.889 billion yuan, with 10.6% growth. The contribution rates of the three industries to economic growth were respectively 5.9%, 68.6% and 25.5%. The regional domestic product per capita was 30,052 yuan, increased by 10.4%. The industrial structure ratio changed from 15.1:57.5:27.4 to 14.6:57.5:27.9.

The added value of the private economy in that year was 27.599 billion yuan which was 12.1% growth compared to the prior year and accounted for 59.7% of the GDP. The added value of the primary industry was 1.671 billion yuan, with 2.8% growth; the added value of the secondary industry was 18.6 billion yuan, with 13.4% growth; the added value of the tertiary industry was 7.328 billion yuan, with 12.3% growth.

3.2.2 Traffic conditions

Ya'an has always been reputed as "key junction in West Sichuan", "doorway to Tibet" and "ethnic corridor". It is the point where Sichuan-Tibet Highway and Sichuan-Yunnan Highway intersect. It is 140km distant from Chengdu. The national roads 108 and 318 pass through Ya'an; Ya'an-Lugu Expressway and Chengdu-Ya'an Expressway are linked to Ya'an'; the G5 Beijing-Kunming Expressway also passes through Ya'an. There are passenger buses that depart from the Xinnanmen Bus Station and Shiyangchang Bus Station of Chengdu to Ya'an every day. The travel from Chengdu to Ya'an via the Chengdu-Ya'an Expressway is only one and half hours. There are dozens of passenger bus shuttles and also taxis travel traveling between Ya'an city and the scenic spots.

Ya'an city has very comfortable traffic conditions: the Chengdu-Ya'an Expressway linking Ya'an to the megacity Chengdu is 128km long and is a one-hour travel; the national roads 318 and 108 pass through Ya'an; the Leshan-Ya'an Expressway is now in service. Ya'an is located at the intersection point of the link roads between Shangri-La, Panxi sunshine scenery and Hailuogou Glacier and many other lucrative tourist routes; Ya'an is the starting point of Sichuan-Tibet Highway—which is praised as the "scenic route of China" by the National Geographic Magazine; Ya'an is the east access point to Shangri-La and is a major transfer station on the West Sichuan Tourism Circle; the area covering 15－30km radius centered around Ya'an City has the scenic attractions such as Mengding Mountain, Bifeng Gorge, Panda Base, Zhougongshan Hot Spring and Shangli Ancient Town. These scenic areas and Ya'an City closely benefit each other.

3.3 Current environmental quality

3.3.2 Investigation and assessment of current water environment quality

Through the site reconnaissance and in combination with the engineering design documents, the sites for monitoring current water environment quality are arranged on the basis of the possibly affected surface water bodies determined within the scope of assessment of all subprojects in World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project. For the regions where the existing routine monitoring data is relatively perfect, their statistical results are used directly. The monitoring of current water environment quality of all subprojects in the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project is as shown in Table 3-3.

Table 3-3 Current water environment quality of all subprojects

S/N	Subproject name	Current water environment quality	Remarks
1	Baoxing County Subproject	The monitoring results indicate that pH, COD_{cr}, BOD_5, ammonia nitrogen, SS and petrolic substances in Baoxing River and Donghe River can meet the requirements of Class III surface water standard, thus the regional surface water environment quality is good.	The monitoring of current water quality of Baoxing River and Donghe River carried out by Chengdu CTI Technological Co., Ltd. during December 1-3, 2015.
2	Lushan County Subproject	The monitoring results shows that all water-quality indices in Lushan River within the subproject area respectively meet the Class III standards in *Environmental Quality Standard for Surface Water* (GB3838-2002), except fecal coliforms whose number exceeds the standard; the investigation shows that the reason why the number of fecal coliforms in Lushan River exceeds the standard is the mixed flow of rainwater and sewage (sanitary sewage) of the residents along the line, causing pollution of water body and poor water quality.	The monitoring of current water quality of Luxigou, Xichuan River and Lushan River carried out by Chengdu CTI Technological Co., Ltd. during December 1-3, 2015.
3	Mingshan District Subproject	The monitoring indicates that water quality of Mingshan River is good and that all water quality factors can meet the standards of Class III waters in *Environmental Quality Standard for Surface Water* (GB3838-2002); however, water quality of Huaixi River is poor and ammonia nitrogen exceeds the standard, despite the remaining indices can meet the Class III water quality standards. This is caused by mixed flow of rainwater and sewage (sanitary sewage) from the residential areas nearby Huaixi River; such flow is discharged into the surface rivers without pretreatment, thus resulting in pollution of water body and decreasing of water quality.	The monitoring of current water quality of Mingshan River and Huaixi River carried out by Chengdu CTI Technological Co., Ltd. during December 2-4, 2015.
4	Yingjing County Subproject	According to the monitoring results, all water-quality indices in Jinghe River and Yinghe River within the subproject area respectively meet the Classes II and III standards in *Environmental Quality Standard for Surface Water* (GB3838-2002), except fecal coliforms of which the number exceeds the standard; moreover, ammonia nitrogen, COD, BOD and the number of fecal coliforms in water of flood discharge channel exceed the standards. The reason for exceeding, known from the investigation, is long-term discharge of domestic sewage by residents along the line, causing poor water quality.	The monitoring of current water quality of Yinghe River, Jinghe River and flood discharge channel carried out by Chengdu CTI Technological Co., Ltd. from November 30 to December 2, 2015.
5	Shimian County Subproject	The monitoring results indicate that pH, COD_{cr}, BOD_5, ammonia nitrogen, SS and petrolic substances in Dadu River and Nanya River in the regions affected by the subproject construction can meet the requirements of Class III surface water standard, thus the regional surface water environment quality is good.	The monitoring of current water quality of Dadu River and Nanya River carried out by Chengdu CTI Technological Co., Ltd. during December 2-4, 2015.
6	Yucheng District Subproject	The monitoring results indicate that pH, COD_{cr}, BOD_5, ammonia nitrogen and petrolic substances in Qingyi River and Longxi River in the regions affected by the subproject construction can meet the requirements of Class III surface water standard, thus the regional surface water environment quality is good.	The monitoring of current water quality of Qingyi River and Longxi River carried out by Sichuan Industrial Institute of Environmental Monitoring during

			November 25-27, 2015.
7	Tianquan County Subproject	The monitoring results indicate that pH, COD_{cr}, BOD_5, ammonia nitrogen, SS and petrolic substances in Tianquan River can meet the requirements of Class III surface water standard, thus the regional surface water environment quality is good.	The monitoring of current water quality of Tianquan River carried out by Tianquan County Environmental Monitoring Station during November 21-27, 2015.

3.3.3 Investigation and assessment of current atmospheric environment quality

Through the site reconnaissance and in combination with the engineering design documents, the sites for monitoring current atmospheric environment quality are arranged on the basis of the main atmospheric-environment sensitive points determined within the scope of assessment of all subprojects in World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project. For the regions where the existing routine monitoring data is relatively perfect, their statistical results are used. The monitoring of current atmospheric environment quality of all subprojects in the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project is as shown in Table 3-4.

The current quality monitoring results and the statistics of existing routine monitoring data indicate that all subproject areas conform to the Grade II standards in *Ambient Air Quality Standard* (GB3095-2012), except Lushan County Subproject in which the routine monitoring data of inhalable particulates exceeds the standard.

Table 3-4 Monitoring results of current atmospheric environment quality in all subprojects

Subproject name	Monitoring point	Item	SO_2	NO_2	PM_{10}	Overall assessment	Remarks
Baoxing County Subproject	1# at former site of County Hospital	Average value (mg/m^3)	0.077~0.016	0.005~0.025	0.026~0.099	Contents of SO_2, NO_2 and PM_{10} in the ambient air at monitoring sites do not exceed the limits of standard and the ambient air quality of the assessed area meet the limit requirements of Grade II Standard in *Ambient Air Quality Standard* (GB3095-2012).	The monitoring of current atmospheric environment quality carried out by Chengdu CTI Technological Co., Ltd. from November 30 to December 5, 2015.
		Standard value (mg/m^3)	0.50	0.20	0.15		
		Over-standard	/	/	/		
	2# at the center of the site of Water Plant	Average value (mg/m^4)	0.007~0.016	0.005~0.022	0.029~0.097		
		Assessment criteria (mg/m^4)	0.50	0.20	0.15		
		Over-standard	/	/	/		
	3# at new site of County Hospital	Average value (mg/m^3)	0.007~0.014	0.006~0.021	0.035~0.107		
		Standard value (mg/m^3)	0.50	0.20	0.15		
		Over-standard	/	/	/		
	4# at Zhongba Primary School of Baoxing County	Average value (mg/m^3)	0.007~0.016	0.005~0.018	0.025~0.158		
		Standard value (mg/m^3)	0.50	0.20	0.15		
		Over-standard	/	/	/		
Lushan County Subproject	Residential area (close to the side of the subproject) in Daban Village, Heren Township	Average value (mg/m^3)	0.007~0.018	0.007~0.026	0.127~0.167	Contents of SO_2 and NO_2 in the ambient air at the monitoring site do not exceed the limits of standard and	The monitoring of current atmospheric environment quality carried out by Chengdu CTI
		Assessment criteria (mg/m^3)	0.50	0.20	0.15		
		Over-standard	/	/	40% excess		

Subproject name	Monitoring point	Item	SO_2	NO_2	PM_{10}	Overall assessment	Remarks
						meet the limit requirements of Grade II Standard in *Ambient Air Quality Standard* (GB3095-2012). PM_{10} (40% excess)	Technological Co., Ltd. from November 30 to December 5, 2015.
Mingshan District Subproject	No. 2 Middle School of Mingshan District	Average value (mg/m^3)	0.007~0.015	0.005~0.015	0.053~0.128	Contents of SO_2, NO_2 and PM_{10} in the ambient air at the monitoring site does not exceed the limits of standard and the ambient air quality of the assessed area meet the limit requirements of Grade II Standard in *Ambient Air Quality Standard* (GB3095-2012).	The monitoring of current atmospheric environment quality carried out by Chengdu CTI Technological Co., Ltd. during December 1-5, 2015.
		Standard value (mg/m^3)	0.50	0.20	0.15		
		Over-standard	/	/	/		
Yingjing County Subproject	Hu Changbao Primary School	Monitoring value (mg/m^3)	0.007~0.012	0.005~0.018	0.046~0.091	Contents of SO_2, NO_2 and PM_{10} in the ambient air at the monitoring site does not exceed the limits of standard and the ambient air quality of the assessed area meet the limit requirements of Grade II Standard in *Ambient Air Quality Standard* (GB3095-2012).	The monitoring of current atmospheric environment quality carried out by Chengdu CTI Technological Co., Ltd. during December 1-5, 2015.
		Assessment criteria (mg/m^3)	0.50	0.20	0.15		
		Over-standard	None	None	None		
Shimian County Subproject	Main urban district of Shimian County (Qiyi Middle School)	Monitoring value (mg/m^3)	0.007~0.016	0.005~0.017	0.062~0.092	Contents of SO_2, NO_2 and PM_{10} in the ambient air at the monitoring site does not exceed the	The monitoring of current atmospheric environment quality carried out by
		Assessment criteria (mg/m^3)	0.50	0.20	0.15		
		Over-standard	None	None	None		

Subproject name	Monitoring point	Item	SO_2	NO_2	PM_{10}	Overall assessment	Remarks
						limits of standard and the ambient air quality of the assessed area meet the limit requirements of Grade II Standard in *Ambient Air Quality Standard* (GB3095-2012).	Chengdu CTI Technological Co., Ltd. during December 1-5, 2015.
Yucheng District Subproject	The People's Government of Daxing Town	Monitoring value (mg/m^3)	0.008~0.031	0.010~0.034	0.059~0.077	Contents of SO_2, NO_2 and PM_{10} in the ambient air at the monitoring site does not exceed the limits of standard and the ambient air quality of the assessed area meet the limit requirements of Grade II Standard in *Ambient Air Quality Standard* (GB3095-2012).	The monitoring of current atmospheric environment quality carried out by Sichuan Industrial Institute of Environmental Monitoring from November 25 to December 1, 2015.
		Standard value (mg/m^3)	0.50	0.20	0.15		
		Over-standard	None	None	None		
	National Center of Quality Supervision and Inspection of Tea (Sichuan)	Monitoring value (mg/m^3)	0.011~0.034	0.011~0.037	0.067~0.085		
		Standard value (mg/m^3)	0.50	0.20	0.15		
		Over-standard	None	None	None		
	Proposed refuge site	Monitoring value (mg/m^3)	0.009~0.032	0.015~0.035	0.068~0.083		
		Standard value (mg/m^3)	0.50	0.20	0.15		
		Over-standard	None	None	None		
Tianquan County Subproject	1# at green landscape (proposed construction site of the regulating reservoir)	Monitoring value (mg/m^3)	0.009~0.032	0.015~0.035	0.096~0.106	There are no obvious atmospheric pollution sources in this region and the quality index numbers of various assessment factors are far smaller than 1. The ambient air quality of assessed area is good and can meet the requirements of Grade II Standard and the needs of use function.	The data comes from reports of monitoring by Tianquan County Environmental Monitoring Station during November 21-27, 2014.
		Standard value (mg/m^3)	0.15	0.08	0.15		
		Assessment index	/	/	/		
	2# at the end point of Xijiaoxi Reconstruction Works	Monitoring value (mg/m^3)	0.017~0.023	0.016~0.021	0.105~0.115		
		Standard value (mg/m^3)	0.15	0.08	0.15		
		Assessment index	/	/	/		

3.3.4 Investigation and assessment of current acoustic environment quality

Through the site reconnaissance and in combination with the engineering design documents, the sites for monitoring current acoustic environment quality are arranged on the basis of the main acoustic-environment sensitive points determined within the scope of assessment of all subprojects in World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project. The monitoring of current acoustic environment quality of all subprojects in the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project is as shown in Table 3-5.

Table 3-5 Monitoring results and assessment of current acoustic environment quality in all subprojects

Subproject name	Monitoring point no.	Monitoring point	Daytime (Leq)	Nighttime (Leq)	Assessment	Remarks
Baoxing Subproject	1	Post-5.12 Earthquake temporary settlement building in Baoxing County	57.6	46.8	The monitoring data shows that all of such sensitive spots as comply with Class-2 standard in *Environmental Quality Standard for Noise* (GB3096-2008) meet the Class-2 standard and that all of such sensitive spots as comply with Class-4a standard in the abovementioned standard meet the Class-4a standard. This indicates that acoustic environment quality in the subproject area is good.	The monitoring of current acoustic environment quality carried out by Chengdu CTI Technological Co., Ltd. during November 29-30, 2015.
			57.8	47.2		
	2	Residential area along Lianghekou Street	54.4	43.3		
			54.1	44.5		
	3	Former site of County Hospital	51.6	43.5		
			52.3	43.8		
	4	Baoxing Middle School	52.4	42.8		
			51.5	43.7		
	5	Yongfu Temple	50.3	42.5		
			51.2	43.9		
	6	Noise at sensitive spots on the north of the Water Plant	54.4	44.7		
			53.8	43.2		
	7	Noise at the site of Lianghekou Water Plant	58.7	47.4		
			59.2	46.9		
	8	Resettlement residential area in Group 2, Jianlian Village	54.7	43.2		
			54.3	44.5		
	9	Zhongba Primary School of Baoxing County	59.6	44.8		
			59.6	44.6		
	10	Lingguan Town Health Center	52.4	43.7		
			53.5	43.2		
	11	Lingguan Middle School	53.0	44.5		
			52.8	44.3		
	12	Residential area at No. 20, Lingguan Road North	59.4	49.5		
			59.4	48.7		
Lushan Subproject	1	Group 3 of Luxi Village	52.3	44.3	The monitoring report shows that all monitoring points meet the Class-2 standard. This indicates that acoustic environment quality in the subproject area is good.	The monitoring of current acoustic environment quality carried out by Chengdu CTI Technological Co., Ltd. during November 28-30 2015.
			53.5	43.8		
	2	Residential area of Luxi Village	53.7	44.5		
			53.3	44.2		
	3	Xinmin Group in Daban Village	54.7	43.2		
			54.2	42.9		
	4	Residential area of Daban Village in Heren Township	54.8	44.7		
			54.6	44.8		
	5	Group 1 of Xijiang Village	55.3	43.7		
			54.3	44.0		
	6	Group 2 of Xijiang Village	57.9	43.5		
			58.5	43.8		

Subproject name	Monitoring point no.	Monitoring point	Daytime (Leq)	Nighttime (Leq)	Assessment	Remarks
	7	Group 3 of Xijiang Village	55.8	43.5		
			54.9	44.2		
	8	Group 4 of Xijiang Village	55.3	44.2		
			54.7	43.5		
	9	Residential area along Community Group Road	54.1	44.5		
			54.6	44.3		
	10	People's Hospital of Lushan County	59.6	47.5		
			59.3	48.2		
	11	Starting point of Shuidian Road	59.8	47.7		
			58.9	46.6		
	12	End point of Shuidian Road	57.4	46.9		
			58.2	47.3		
	13	End point of Wanghui Road	53.6	43.2		
			54.3	44.5		
	14	Starting point of right riverside road	50.2	42.1		
			50.7	43.2		
	15	End point of right riverside road	59.6	49.5		
			59.6	48.7		
	16	Lushan Junior Middle School	51.6	43.5		
			52.1	41.6		
	17	Lushan Transport Bureau	54.5	43.6		
			53.8	44.1		
	18	Luyang Primary School	54.3	45.8		
			53.9	42.5		
	19	Residential area around Chengnan Refuge Square	56.5	44.6		
			56.5	44.6		
Mingshan Subproject	1	Residential area along Jiangbian Street	55.7	46.5	The monitoring report shows that all monitoring points meet the Class-2 standard. This indicates that acoustic environment quality in the subproject area is good.	The monitoring of current acoustic environment quality carried out by Chengdu CTI Technological Co., Ltd. from November 29 to December 1, 2015.
			56.1	47.2		
	2	No. 2 Middle School of Mingshan District	54.8	44.5		
			54.2	45.1		
	3	Chengdong Township Government	56.9	46.2		
			57.3	46.5		
	4	Residential area along Dongjiang Road	58.3	44.6		
			57.8	44.3		
	5	Residential area along Yuehua Street	57.2	45.8		
			56.6	46.1		
	6	Mnigdu Compound	56.5	46.2		
			56.9	46.5		
	7	Residents around emergency refuge site	54.8	44.5		
			55.1	45.1		
	8	New Settlement Compound	55.2	45.7		
			54.6	44.8		
	9	People's Government of Mingshan District	54.2	44.9		
			55.9	45.8		
Yingjing County Subproject	1	Xiangzhen Compound	52.3	45.6	The monitoring data shows that all of such sensitive spots (1#~5#, 7#, 2#) as comply with Class-2 standard in *Environmental Quality Standard*	The monitoring of current acoustic environment quality carried out by Chengdu CTI Technological Co., Ltd. during
			53.5	46.1		
	2	Hu Changbao Primary School	55.4	44.7		
			55.5	45.2		
	3	Yingjing Archives Bureau	58.1	48.9		
			58.7	47.9		
	4	Gucheng Village	56.2	45.2		
			54.3	45.8		
	5	Luoyuanzi	49.7	43.7		

Subproject name	Monitoring point no.	Monitoring point	Daytime (Leq)	Nighttime (Leq)	Assessment	Remarks
			50.1	44.1	*for Noise* (GB3096-2008) meet the Class-2 standard and that all of such sensitive spots (6#~11#, 13#~18#) as comply with Class-4a standard in the abovementioned standard meet the Class-4a standard. This indicates that acoustic environment quality in the subproject area is good.	November 29-30 2015 and from November 30 to December 1, 2015.
	6	Yingjing Health Care Center for Women and Children:	56.4	47.8		
			57.2	47.4		
	7	Yingjing Meteorologic Bureau	55.3	46.5		
			56.3	46.9		
	8	Yingjing Administration School	56.5	45.8		
			57.8	45.4		
	9	Group 3 of Nanluoba Village	54.7	44.3		
			55.2	43.9		
	10	Yingjing Vocational Senior High School	55.3	43.2		
			56.1	44.1		
	11	Longcanggou People's Court	56.7	46.5		
			58.9	46.1		
	12	Aixin Kindergarten	55.8	45.3		
			55.7	44.8		
	13	Nanluoba Village Clinic	57.3	46.8		
			56.2	47.4		
	14	Wuxian Township Primary School	57.5	43.2		
			57.3	43.8		
	15	Fucheng Township Health Center	58.4	47.5		
			58.2	46.7		
	16	Residential area by Yingjing-Gangshang Road	56.2	42.3		
			55.6	43.4		
	17	Tuanjie Group of Nanluoba Village	54.7	41.5		
			54.8	42.5		
	18	Group 6 of Nanluoba Village	55.3	40.7		
			53.9	41.5		
Shimian Subproject	1	Group 3 of Shunhe Village	54.7	46.2	The monitoring data shows that all of such sensitive spots as comply with Class-2 standard in *Environmental Quality Standard for Noise* (GB3096-2008) meet the Class-2 standard and that all of such sensitive spots as comply with Class-4a standard in the abovementioned standard meet the Class-4a standard.	The monitoring of current acoustic environment quality carried out by Chengdu CTI Technological Co., Ltd. during November 29-30 2015 and from November 30 to December 1, 2015.
	2	Group 4 of Shunhe Village	53.8	45.8		
	3	Government office building	58.6	44.2		
	4	Mingzu Middle School in Shimian County	57.8	46.7		
	5	Chengbei Settlement Building Compound	53.9	44.2		
	6	Chengbei Middle School	55.6	43.8		
	7	Jiuzhoutianshui Mingcheng Compound	56.1	45.7		
	8	Zhaoyang Compound	58.4	46.2		
	9	Qiyi Middle School	57.8	47.3		
	10	Health Centre for Women and Children	55.2	44.6		
	11	Houses for resettlement in Xiangyang East Area	58.3	46.7		

Subproject name	Monitoring point no.	Monitoring point	Daytime (Leq)	Nighttime (Leq)	Assessment	Remarks
	12	Yulong Village	57.8	45.8	This indicates that acoustic environment quality in the subproject area is good.	
Yucheng District Subproject	1	Nearest peasant households on the east side of the starting point of east section of the South Outer Ring Road	48.2	41.0	The acoustic environment quality of the assessed area in this subproject is fine and totally meets the limit requirements of Class-2 Standard in *Environmental Quality Standard for Noise* (GB3096-2008).	The monitoring of current acoustic environment quality carried out by Sichuan Industrial Institute of Environmental Monitoring on November 25, 2015.
	2	East side of the South Outer Ring Road (the intersection of it and No. 2 Nongke Road)	47.7	40.5		
	3	Nearest peasant households on the west side of the South Outer Ring Road (intersection of it and the Xinqu Avenue)	47.8	40.5		
	4	Nearest peasant households on the west side of the South Outer Ring Road (the intersection of it and Yinxins Road)	47.5	40.2		
	5	Nearest peasants households on the east side of the South Outer Ring Road (the intersection of it and Kangtai Road)	48.9	40.1		
	6	East boundary of the refuge site	57.8	46.7		
	7	South boundary of the refuge site	58.2	48.3		
	8	West boundary of the refuge site	59.1	47.9		
	9	North boundary of the refuge site	57.7	46.4		
	10	Nearest peasant households to the north of the refuge site	55.6	45.5		
Tianquan County Subproject	1	Commerce and residence compound at No. 10, Anju Road South	57.8	46.5	The proposed subproject is located in the urban area of Tianquan County where the main noise pollution sources are the traffic noise from existing roads and	The monitoring of current acoustic environment quality carried out by Environment Engineering Research Institute of
	2	In-patient Department of Tianquan Hospital of Traditional Chinese Medicine	56.4	49.8		
	3	Tianquan County Health Bureau	60.8	54.6		

Subproject name	Monitoring point no.	Monitoring point	Daytime (Leq)	Nighttime (Leq)	Assessment	Remarks
	4	Dependant's area of the TCM Hospital	57.4	51.3	noise from social activities. According to the monitoring results of current acoustic environment quality, this subproject can meet the requirements of both Class-4a standard and Class-2 standard in *Environmental Quality Standard for Noise* (GB3096-2008).	CREEC during December 1-3, 2015.
	5	Outpatient Department of the TCM Hospital	54.2	48.9		
	6	Management Office of Laba River Natural Reserve and the surrounding residential buildings	59.4	53.8		
	7	Self-built resident houses	59.8	54.6		
	8	Long-distance Communication Bureau Dormitory	59.4	53.3		
	9	Dianli Compound	59.7	52.5		
	10	Government Dormitory	58.4	57.5		
	11	Telecommunication Office Building	58.8	52.5		
	12	Dormitory of Muzong Factory and the surrounding residential buildings	57.5	46.0		
	13	Shuimunianhua Building under construction	59.1	52.4		
	14	Kangchengpinshang	59.1	54.4		
	15	Self-built resident houses	58.4	49.1		
	16	Feicuihaoting	55.3	51.7		

In general, the assessment area of this project has favorable environment quality that does not exceed the limit values specified in Environmental Quality Standard for Noise (GB3096-2008).

Chapter 4 Environmental Impacts and Mitigation Measures

4.1 Analysis of impacts on social environment

4.1.1 Analysis on positive social benefit

All subprojects in World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project fall into the category of municipal works of cities/towns, including road construction, bridge construction, pipe network sewage interception, construction of emergency refuge square and water treatment plant, etc. The Project construction will necessarily improve urban infrastructures effectively so as to perfect local emergency refuge system, promote local economic development and environmental improvement and improve people's life quality, thus creating more job opportunities, improving local residents' economic incomes, and making an overall plan to coordinated development of city and town to achieve benefit sharing.

Therefore, positive social benefits of the Project are significant and positive environmental benefits are outstanding, as shown specifically below:

1. Promoting improvement of traffic facilities and bringing convenience to people's travel

   Due to restrictions from economic development of the whole Ya'an areas and lack of construction fund, including relatively backward road traffic construction of cities and county towns, lack of proper maintenance and repair for existing roads plus impact of this earthquake, most of existing pavements have cracked, thus causing inflow and mud squeezing, so that traffic and the whole city environment are affected seriously. Therefore, the Project construction is of necessity for restoring and improving road traffic in Ya'an area.

   The road, upon completion, will enhance transport links between various districts/counties in Ya'an, facilitate nearby residents' travel, enhance the resistance to natural disasters, improve the ecological environment and ease the status quo of traffic jams

2. Promoting risk-avoiding capacity of urban area

   The construction of emergency refuge square can improve local emergency evacuation system and risk-avoiding functions of urban area, and enhance disaster prevention and mitigation capability of disaster area.

   The overall social emergency handling capacity of the city is substantially supported by a series of urban infrastructures. Besides corresponding evacuation passageways (roads, etc.), corresponding emergency refuge squares are required. The emergency refuge square is used to avoid direct or indirect damages brought about by disaster within a period of time after the disaster occurs and is a site divided in advance to have a certain functional facilities to ensure basic life. The emergency refuge square for disaster resistance and alleviation to be built in the Project is the main content of fully performing governmental functions and strengthening social management and public services, as well as a necessity for actively coping with emergent public events and minimizing people's life and property losses.

3. Improving flood control facilities of urban area and enhancing flood control capability

   In this proposed project, there are three areas involving flood control dike construction, including Mingshan District, Shimian County and Yingjing County. Since existing flood control facilities of these three districts/counties are relatively backward, and no flood control facilities are available for most of riverways, without a whole flood control system formed for the whole river reach, losses may be caused

in case of flood.

For proposed project in Mingshan District, the dike on west side of Mingshan River and the dike on north side of the Huaixi River are parts of urban flood control dike works in Mingshan District. Its implementation means construction completion of all dikes on west side of Mingshan River in Pingqiao area, and it forms a whole with the dikes in Pingqiao area, thus greatly improving the city flood control capability, helping to perfect flood control system of the whole city, and providing powerful guarantee for people's production and living.

For construction of dike works in Shimian County, the flood control standard will be raised to once in 50 years from once in 20 years. The flood control standard for built upstream and downstream dikes connecting with this new dike is once in 50 years. Thus, the weak dike in Yanzi area will be greatly improved. Enhancing flood control capability of the whole Shimian County town can also improve all flood control systems of Shimian County.

The construction of flood drainage dike works in Yingjing County can improve not only flood control capability of the whole county but also environmental quality of the city, water environment and ecological environment as well as residents' life quality. The construction of flood drainage dike works in Yingjing County can improve not only flood control capability of the whole county but also environmental quality of city, water environment and ecological environment as well as residents' life quality. For reconstruction of flood drainage channel, cabinet collection boxes will be provided at appropriate positions around the flood drainage channel to change the status quo that no domestic garbage collection facilities are available for surrounding residents. Meanwhile, in old county town, intercepting sewers may be laid at the channel bottom to collect domestic sewage generated by surrounding residents. The construction of comprehensive sewage and rainwater pipelines at the same time of reconstructing Fuyu Road will change the situation of discharging sewage, etc. into the riverway in past, which caused river water pollution. The project construction can effectively maintain environmental health of the city and promote the development of urban and rural ecosystems in benign direction.

4. Improving economic development of Ya'an City

The Project implementation has obvious location advantages for enhancing the competitiveness of Ya'an and promoting the development of modern transportation industry, as shown below:

The Project construction brings basic conditions for accelerating urban construction and reconstruction of various districts/counties in Ya'an City. After rapid development in recent years, the development environment of Ya'an City has been optimized constantly with the Project implementation, personnel exchanges and economic ties of various districts/counties in Ya'an City have become more and more closely, all of which provide good conditions for speeding up regional rapid development. The construction of road reconstruction project lays a solid foundation for various urban constructions and will necessarily promote rapid urbanization greatly.

The Project implementation will relieve traffic pressure and environmental pollution of original roads, create a modern urban atmosphere and play an important role in maintaining the urban landscape, improving its taste and style and enhancing its image.

5. Improving resident's life quality

If the Project can further improve and enhance road traffic capacity of Ya'an and facilitate enterprise product transportation, it will not only bring more development opportunities for the enterprise development but also ensure locals being employed locally and increase residents' income.

Meanwhile, reconstructed infrastructures of the Project site can attract enterprises to invest here, but the enterprise development needs employing numbers of local laborers to work here, thus creating many job opportunities for 40% of local low-income people and women.

For example, during the Project construction, the Project can provide on-site job opportunities and business opportunities for local residents, and also can create a certain job opportunities in implementation & operation period. In addition, the Project construction can boost the development of surrounding services, e.g. local residents can provide raw materials and catering services for the construction team during the Project construction. These can bring opportunities for local residents to increase economic incomes.

4.1.2 Negative impact on social environment and mitigation measures

1. Land requisition

According to the Project social assessment report, the Project involves only the permanent occupancy impact on collective land and house removal and relocation. The total land area of the Project is 1556.8 mu, including the state-owned land of 898.8 mu, and 867.7 mu planned to be permanently occupied rural collective land (including 730.5 mu of arable land, accounting for 84.2%, 13 mu of garden area, for 1.5%, forest land of 108.1 mu, for 12.5%, homestead of 36.9 mu, for 4.3%. From the land plants and crops, the local villagers mainly plant paddy, corn and oilseed rape, and those in Mingshan District mainly plant tea. The land requisition involves 2 towns and 6 villages in Yucheng District, 2 towns and 6 villages in Mingshan District, 1 town and 2 communities in Lushan County, 1 town and 2 villages in Tianquan County, totaling 6 towns and 16 villages and 2577 people in 733 households.

The Project will occupy some land for engineering construction, including for permanent occupancy and temporary occupancy. The former will cause effect on some local people's living and income and the latter will lead to certain damage to crops and plants near the Project due to inevitable mechanical grinding, personnel treading, etc. at the site with the results of crop output drop and forest land resources shrinkage.

Mitigation measures:

The EIA requires that the Project shall comply with the national and local documents and regulations in providing the relocated people with reasonable compensation and relocation and resettlement service. When the Project is designed, the detailed investigation results shall be referred to for improvement in order to minimize the volume of land requisition amount and relocation households, and when the household relocation is necessary, to implement strictly the relocation plan and ensure the relocated people's interests and rights. Meanwhile, following measures shall be adopted:

① Strict compliance with the policies and uniform in standard-setting. The standards shall be complied with to compensate the relocated units and people with the payable amount in time.

② Thorough investigation and strengthened propaganda. Thorough investigations shall be carried out to know the project details and relevant consequences and

impacts, and propaganda shall be strengthened among the people to be relocated in order to win their understanding, coordination and support for the relocation work.

③ Close cooperation and united in mind and action. Various units (departments) shall take united actions, and information submission shall be strengthened, information smoothness guaranteed, ten-day report on job progress implemented, and active investigation carried out for early discovery and timely handling of any problems.

2. Project-related demolition

The Project involves 1318 people of 316 rural households of 6 towns and 11 villages in 5 counties or districts, and the demolition housing area totals 102400 m^2. According to the structure, the frame structure accounts for 4180 m^2, brick-concrete structure for 77758 m^2, brick-wood structure 18678 m^2. In the affected area, Yucheng District faces a large-scale demolition, amounting to 70520 m^2 in the total area, and affecting 606 people of 143 households.

The demolition and resettlement will bring certain impacts to the residents. Such impacts can be disturbance to their life in the transition period, and the new resettlement place will affect the residents in one way or another, take just two examples.

Mitigation measures:

According to the site investigation, the demolition should be for the rural houses along the Project road and the houses are mainly brick houses or brick-concrete houses. The Project should be such that after reasonable resettlement and fair compensation on the basis of the national and local compensation regulations and local living standards, the need of resettlement and construction of new houses for those relocated people shall largely be satisfied. The resettlement area, under the pretext of the willingness of the people to be relocated, shall be next to their original place as possible and should be provided with a fairly good living environment and convenient production and living conditions. When the proposed road shall involve demolition and resettlement, any construction garbage produced during the process shall be treated in a regulated manner and the site of demolition shall be watered. Ensure that no new environmental problems will be caused. Since the Project will need a large area for demolition, for the effective implementation of resettlement policy and various measures, the original living environment of the relocated people shall be restored as possible with improved living conditions for them. 3. Impact on urban traffic

During the Project construction, there will be direct or indirect impacts on existing traffic system in the Project construction area. During construction, increasing transportation vehicles will cause traffic congestion and damages to highway facilities, inducing traffic accident and causing travel inconvenience.

Meanwhile the earthwork piling and road excavation will impede traffic flow and cause inconvenience. And sharp increase in the transportation vehicle flow will adversely affect the road conditions. During the implementation period of the roads in the Project, the vehicle flow will be increased, and the daily travel and internal road conditions in the area will be affected. Mitigation measures:

① The road construction contractor shall conduct in-depth and meticulous field investigation on impact of increasing traffic pressure of relevant roads during preparation of construction management plan, and prepare one scientific and

reasonable construction & transportation management plan (e.g. staggering countryside trading days or bypassing farm market roads to transport bulk materials and equipment, setting conspicuous route detouring signs at entrance and exit of reconstructed road, prohibiting transportation vehicles from over-speeding and overloading, selecting transportation route reasonably, avoiding sound-sensitive places such as schools, hospitals and concentrated residential areas, setting transportation vehicle washing facilities at the exit of construction site, and transporting bulk materials by covering) in combination with transportation capacities of relevant roads.

② When constructing near any a sensitive point, and normal construction will not be affected, all personnel shall use the appointed access road, and the road surface shall be smooth and no normal passage will be affected, and the access direction change shall be accompanied with indication signs for personal safety. For road sections requiring large construction amount, protective facilities, such as stop crossings, stop lights and stake marks shall be used. Constructors shall put up a public notice for the work and require people for following the appointed route. The cross-gutter access bridge shall be reliable and installed with banisters on the two sides.

③ Signboards are required at the construction site, and shall indicate the main work of the Project, the construction time, the inconvenience that would be caused to the public and the forgiveness sought from them, and the contact person, complaint hotline, etc. 4.Impacts during the construction period

During the construction period, due to vehicle flow increase, construction land enclosure, the road traffic near the construction area will be affected, and noise and flying dust may be caused.

Meanwhile, during the construction, floating people from the outside due to the Project will cause a kind of pressure on the local public security. The possibility of infectious disease will increase and health threats are possible for the Project staff and local community. For example, the constructors will dine and live together, which increase the possibility of disease contraction. What should be noted is the prevention and treatment of AIDS, and the awareness of HIV-AIDS-related symptoms shall be heightened among the constructors and workers. Mitigation measures:

① The environment management of the Contractor during the construction period shall be improved, with reasonable construction time order and slag and soil transportation route arrangement. For windy weather, watering times shall be increased to reduce the noise and dust pollution during the period.

② Safety and cultural education shall be strengthened for the constructors, the Constructors and Workers' Rules of Behavior shall be prepared and all of them shall abide by the national laws and regulations. No pornography circulation and gambling shall be allowed at the construction site, let alone fighting and bawling, disturbance for nearby area and local residents, but rather all of the Project-related persons shall respect the local culture, customs and traditions.

5. Impact on cultural relics

Only Shimian County Subproject involves a suspension bridge on Dadu River in Xinmian which is a Municipality Protected Historic Site. Without proper education and restrictions in advance or strict rules and regulations during the construction, the cultural relics may be affected, and may even be damaged in terms of their intactness or functionality.

Mitigation measures:

① Before the construction, the constructors and managers shall be educated, especially legally, to form the awareness of cultural relic protection.

② Prior to commencement, the Employer and the Construction Contractor shall sign a contract for cultural relics protection with relevant departments to make protection responsibilities assigned to the Project construction-related personnel and establish & complete cultural relics protection responsibility system.

③ During construction, the construction operation zone shall be located within the red line area, and no activities that may cause any damage or negative effect on the cultural protection units shall be allowed to be carried out outside the area. Then the completeness and functionality of the cultural protection units can be preserved.

④ After mobilization, the technical construction department shall actively undertake cultural relics protection responsibility, and pay attention to whole-process supervisory control during construction and prepare a special construction scheme to make cultural relics under control during construction.

⑤ During construction, large-scaled mechanics shall be forbidden to operated, but manual work plus small-sized machines should be used for the intactness of the cultural relics. During the construction period, if highly intensified works (such as large-scaled mechanical operation, road surface breaking and operation, and air pick operation) should be conducted, before their commencement, a report shall be submitted to a related competent department and they can only be conducted with the approval of the department and the verification of the work plan of related construction experts. During the operation, the technicians, supervisors and operators shall do a good job of their respective work and strict control shall be exercised.

⑥ During the construction period, since the cultural relics are highly sensitive and easily damaged, the construction area for them shall be strictly monitored with various environmental protection measured implemented effectively in order to avoid any damage to the cultural relics as a result of any construction activities or behaviors in violation of the laws, regulations and of any brutal construction.

⑦ If encountering underground cultural relics during construction, the Construction Contractor shall suspend construction, protect the site and report to the authorities in accordance with the *Law of the People's Republic of China on the Protection of Cultural Relics*

⑧ In addition, after the Project is completed and accepted, the operation conditions and the suspension bridge on Dadu River in Xinmian shall be monitored continuously to ensure the minimum impact of the project operation on the cultural relics.

4.2 Main impact analysis and mitigation measures

4.2.1 Impacts on ecological environment and mitigation measures

1. Impact on ecological environment

According to the Project social assessment report, the Project involves only the permanent occupation impact on collective land and house removal and relocation. The total land area of the Project is 1556.8 mu, including the state-owned land of 898.8 mu, and 867.7 mu planned to be permanently occupied rural collective land (including 730.5 mu of arable land, accounting for 84.2%, 13 mu of garden area, for

1.5%, forest land of 108.1 mu, for 12.5%, homestead of 36.9 mu, for 4.3%.

In the Project, main temporarily acquired land includes construction sites, accesses, etc. With progress of the Project, some species of plants within the scope of land acquisition will disappear, and most species of plants will be reduced significantly. As a result, there will be certain impact on biodiversity of the area. Except two ancient machilus trees already enclosed in construction of Jianshe Road South of the Tianquan County Subproject, plants damaged in other regions are mostly classified as normal in the assessed areas. There are no national-level precious and endangered plants and wild animals found in the area. Therefore, the construction of the site will only have minor impacts on plant systems and types of the area, and definitely will not cause extinction of any species or types of plants in the area. After construction is completed, landscaping will be carried out and vegetation will be gradually restored to make up the loss of diversity of plant species.

Some wading works of the Project, such as emergency evacuation and refuge passage works along Yanjiang Road in Baoxing County, Right-bank Major Bridge Works on Binjiang Road in Lushan County, levee works in Mingshan County, and bridge works and levee works in Shimian County, will disturb bed sediment of the river, and certain impact may be caused to algae and benthos of the area. However, after completion of the Project, the original algae will be gradually restored and stabilized. Wading construction will result in turbid water and changed pH value of regional water. The growing environment of some plankton may be destroyed, resulting in reduced biomass in the construction area. However, as the construction area in wading construction is relatively small comparing with the entire water basin and due to general nature of plankton and self-cleaning capability of water as well as the scope of impact on plankton may be reduced in cofferdam construction, such environment can be basically restored after completion.

Meanwhile, in earth and rock excavation for municipal pipe network trenches, subgrade filling of road works, excavation of foundation trench of river banks, leveling of refugee sites, etc., vegetation will be damaged. With vegetation and soil replaced, the surface is exposed, and thus local ecological structure of the areas along the road may be changed to some extent. The exposed earth surface resulting from excavation will be subject to water/soil loss under the effect of rainwater and surface runoff.

2. Mitigation measures

(1) Vegetation protection measures

Try to collect and save mellow soil on surface of permanently occupied land and temporarily occupied farmland during construction. Cover mellow soil for vegetation restoration promptly after construction. Recover afforestation of temporarily occupied farmland and Plant trees for places of temporary work sheds especially after completion of the Project.

Select to plant fast-growing tree species and transplant proper trees for proper land from the same area in road greening, so as to ensure the ratio of living trees and the integration with nature.

As for two machilus trees belonging to construction of Jiancai Road South in reconstruction of Tianquan County, they have already been enclosed for protection by local forestry authorities. In construction, their roots shall be avoided in laying underground pipes and lines, and enhanced management shall be conducted during construction to prevent disturbance. In this way, there will be no impact on these trees.

(2) Protective measures for aquatic life

The general protection measures are as follows: practically strengthen the protection of water environment to avoid eutrophication in local waters along the project line and to minimize the impacts on living environment of aquatic life.

Construction materials shall be stored at the places far away from water sources and other water bodies, where such materials are well sheltered against scouring of storm flows. For some construction materials stacked near the bridge location, open drains shall be excavated around the material stacking yard or retaining walls shall be provided there, so that such materials can be prevented from entering the waters along with the storm runoff to affect the water quality. Various materials shall be equipped with rain-proof and shelter facilities. Rationally arrange construction procedures and machinery; water drainage design and construction shall be in strict accordance with the road construction codes; construction personnel shall be well educated about ecological conservation. Ecological restoration shall be carried out after completion of the Project to minimize damages to vegetation and adverse impacts of water and soil loss on aquatic life.

(3) Water and soil conservation measures

Protective measures for top of the side slope shall be taken before excavation of the side slope in main works. Temporary drainage ditch must be provided around the excavated area and sand trap must be provided along the drainage ditch. The temporary drainage ditch shall be backfilled after use and be afforested. For embankment filling, temporary chutes shall be provided along the side slopes on both sides of the subgrade to make rainwater discharged along the chute to the outside of subgrade, so as to avoid scouring the side slopes. For masonry works in respect of excavation and backfilling of side slopes, the side slopes shall be protected with blocks immediately after the design stability is obtained, meanwhile, drainage systems shall be provided for the slope surfaces and toes, so that each section can be reinforced upon completion of construction. Measures such as slope protection by grids, building facing walls, and planting grass between the grids or cambers shall be taken for the side slopes of subgrade on the excavated and filled road sections. Grass and tree planting on the side slopes can effectively conserve water and soil, as well as beautify such road sections.

According to the soil conditions, the combined planting patterns of arbores and shrubs shall be adopted for the protected land areas on both sides of the road, with a row of shrubs inserted after a row of tall and straight evergreen arbores are planted. Moreover, some fast-growing grasses shall be densely planted to avoid soil and water loss on the loose exposed surface within the protected land area in the early days of planting arbores and shrubs, so as to make them form an integrated ecological community system.

4.2.2 Impact on water environment and mitigation measures

Wastewater during the construction period of the project mainly stems from construction wastewater and sanitary sewage. Construction wastewater includes water for cooling and washing of construction machinery, for cleaning construction site, for cleaning building materials, for concrete placement & curing and for rinsing and contains a certain amount of sand. Sanitary sewage of construction personnel mainly contains organic contaminants, ammoniacal nitrogen and SS. Besides, surface runoff of working site in rainy season contains a certain amount of sand and high concentrations of suspended substances.

1. Impact on water environment during the construction period

(1) Construction wastewater

Commercial concrete will be used in road works. As no concrete batching plants are to be provided in the construction site, there will be no wastewater from concrete batching process. As a result, waste water produced during the construction period mainly consists of slurry water and a small amount of oil-bearing production wastewater.

As the foundations for the wading bridges in the Lushan River concerning Right-bank Major Bridge Works on Binjiang Road in Lushan County and Dadu River and Nanya River related to Bridge Works in Shimian County are the cast-in-situ pile foundations, the construction period will be in the dry season with a steel-sheet cofferdam. The most potential pollutants of cast-in-situ pile construction for water bodies are drilling residues and slurry used for wall protection. Water bodies will be polluted if drilling residues and construction wastewater are improperly treated and discharged into rivers. During construction of bridge foundation, construction processes including cofferdam sinking, positioning and removal will disturb river water and bottom sludge, increasing SS concentration and affecting river water quality.

Construction slurry water (produced during excavating working faces, rainwater scouring, site and construction machinery washing) will be collected for each construction section. After sedimentation, the upper layer of clean water will be recycled whenever possible, and excessive wastewater can be sprinkled on the ground.

Oil stains will be produced in vehicle and machinery washing, resulting in increased concentration of petrolic substances in surface water. However, such influence is usually temporary and minor. Sewage from the construction site may be used in construction after preliminary oil separation and sedimentation. Excessive wastewater can be sprinkled on the ground, provided that sprinkling is conducted in a proper amount at a correct place to prevent wastewater from flowing into the ditches around.

(2) Domestic sewage

During the construction period, domestic sewage mainly consists of water used for dining, washing and septic sewage of construction personnel. Local houses will be rented as the construction camp during execution of the Project. Domestic sewage will be discharged into the urban sewage pipe network after treated with existing treatment facilities, and then drained by local sewage treatment plant following relevant standard. Therefore, the sanitary sewage during construction would not have distinct impacts on the local environment.

2. Mitigation measures for impact on water environment during the construction period

(1) Aquatic environment protection training shall be carried out at the construction site and the camps. When the bridge lower structure is constructed, the construction should take place at the poor water phase as possible to reduce the impact on the lower stream water quality of the bridge. Meanwhile, construction management and engineering monitoring shall be strengthened by having close inspection on the construction machinery to prevent any oil leakage that will pollute the canal water.

(2) Asphalt, oils, chemicals and other construction materials shall not be stored near any surface water bodies, which shall be temporarily covered up by canvas.

(3) Excavated soil and rock shall not be piled up near any water bodies or on a slope

adjacent to a river, otherwise they may be flushed into the surface water bodies. In construction at a temporary river section, a construction fence shall be provided to prevent temporarily stored excavated soil and rocks from falling into water.

(4) In road construction, upon sedimentation and filtration, rinsing wastewater generated by the aggregate processing systems, concrete mixing systems and machineries is mostly recycled to clean the field areas and rinse gravel aggregate, and only a small part is discharged after meeting relevant standards. Petroleum rinsing wastewater from machineries are recycled after processing and prohibited to be discharged after treatment in compliance with the GB8978-1996 Class I (10mg/L) and the deoil rate over 90%.

(5) In bridge works, it is necessary to adopted the cycling cast-in-situ pile construction method to recycle slurry and reduce discharge of slurry. After construction, slurry will be naturally settled and covered with soil. Excavated spoils will be delivered to a dump site for treatment. To avoid and minimize the suspended solid pollutants in the surface runoff at the in-water bridge pier construction site, an intercepting channel will be built at the pile foundation construction site to divert the SS polluted water to the emergency settling tank for sedimentation and discharge.

Construction of pier peg foundation shall be carried out in strict according to the process for steel-casing cast-in-situ pile to reduce the production of suspended sediment in construction. Recycle the slurry for piling and drilling, and prevent overflows from entering into any surface water bodies. Residues of drilled piles can be filtered, collected and used as subgrade fills onshore. Construction machinery for bridge works shall be under proper control to prevent overflow, spillover, dropping and leakage.

(6) The cofferdam technology is adopted for river bank works. Except that the river bed may be disturbed during construction of the cofferdam, all other construction procedures are carried out inside the cofferdam to basically ensure separation of construction activities and water bodies.

In sum, there will be certain impact of the Project on water environment around the construction area, which will be gradually eliminated after construction is completed. With proper environmental protection measures taken, the EIA believes that the impacts of construction wastewater and domestic sewage on water environment of the affected areas during the construction period are minor.

3. Impact on water environment during the operation period

(1) Precipitation runoffs

Wastewater in the operation period of the proposed road of the project is mainly from rainfall and road runoff generated from pavement flushing. After subprojects including the road and bridge as refugee square are put into operation, the impact of pavement rainfall runoff (the main pollutant) on the water environment is mainly manifested in the water body pollution resulting from such emissions of vehicle exhaust, tire friction particles, road flying dust and dripping oil as flow into the adjacent river system and cross over the river system with the pavement rainfall.

According to domestic researches and evaluation materials, the pollution caused by surface runoff on water bodies mostly happens at the beginning of precipitation. Such pollution can be absorbed by the environment attributed to

self-cleaning capability of water body.

(2) Domestic sewage from the refugee square

Permanent toilets will be provided for some refugee squares of the Project. Domestic sewage from these squares will be properly treated with the existing urban sewage pipe network (tank cars provided for toilets where there is no urban sewage pipe network) and sewage treatment plants according to Class A, Grade I of *Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant* (GB18918-2002). Thus, the impact on the surface water environment is minor.

(3) Wastewater from purification plant works

During the operation period of Lianghekou Water Plant of Baoxing County, production wastewater is mainly composed of the discharged mud-bearing water from the sedimentation tank and the backwash wastewater from the filtration tank. The backwash wastewater is recycled through the recycling tank without being discharged. The upper clean layer of mud-bearing water is discharged as per relevant standard into an adjacent flood draining ditch.

During the operation period of the water purification plant, the amount of domestic sewage will be about 1.2m^3/d, including main pollutants of COD, BOD_5, SS, ammonia nitrogen, etc. Domestic sewage of the purification plant is regularly transported to local treatment plant by sewage tankers for treatment.

4.2.3 Impact on atmospheric environment and mitigation measures

Construction of the proposed project includes local breaking and excavation of existing pavement, transport of sand and gravel materials and asphalt paving. Therefore, the main source of air pollution during project construction is construction dust, followed by asphalt fume from asphalt paving, exhaust pollutants emitted by power machineries, etc. Construction dust has an obvious impact on surrounding environment.

1. Impact on atmospheric environment during construction period

(1) Construction dust

The breaking of existing cement pavement, especially breaking with drills and removing cement concrete fragments will produce dense dusts and cause air pollution under the effect of strong wind.

During demolition, dry building materials cause apparent dust pollution at the moment of collapse due to aerial work and large work faces.

Some sand and gravel materials piled in open air and broken concrete temporarily stockpiled for the purpose of construction will cause dust in dry and windy weather.

(2) Waste gas of construction machinery

A small amount of construction waste gas will be generated during the operation of project construction vehicles and construction machineries. During the construction, motor vehicles for transportation of raw material, operation of equipment and construction machinery will all discharge certain amount of CO, NO_2 and imperfectly combusted hydrocarbons. Its characteristic is that the discharge amount is small, and it is discontinuous and unorganized discharge.

(3) Asphalt fume

During construction, asphalt fume from asphalt concrete pavement is another

major source of air pollution besides dust. The asphalt concrete used in the Project is outsourced with no batching plant or batching point on site. Currently, enclosed batch process with dedusting installations is employed in road construction; asphalt is delivered to worksite with heat source free or high-temperature containers; the concentration of discharged asphalt fume is lower than the maximum allowable concentration of discharged asphalt fume specified by *Integrated Emission Standard of Air Pollutants* (GB16297-1996), having a small impact on surrounding environment. According to relevant data, the fume pollutants produced during asphalt paving can affect a range of about 100m in downwind direction. However, this impact is temporary as duration of asphalt paving is short according to construction organization.

2. Mitigation measures for atmospheric environmental impact during the construction period

(1) During the project worksite management, the principle of "Six Must" and "Six Prohibitions" of site management shall be put into effect. The "Six Must" and "Six Prohibitions" are: wet process operation must be carried out; enclosing operation must be carried out for the construction site; roads must be hardened; washing facilities must be set up; cleaning personnel must be allocated completely; the construction site must be cleaned regularly; it's prohibited for vehicles to leave with mud; it's prohibited for slag transportation vehicles to be loaded over the height of the trailer; it is prohibited to throw construction slag from high altitude; it is prohibited to mix concrete on site; it is prohibited for ponding to occur on site; it is prohibited to burn waste on site. These measures are to effectively control dust pollution on construction site.

(2) Water sprinkling shall be performed in due time (except for rainy days) to the construction sites including road sections under construction and major transport roads, etc; The frequency of water sprinkling is determined according to the actual site conditions by the supervisor on site;

(3) Powdered materials such as cement, lime, etc. shall be packaged in a canned or bagged manner, and are forbidden to be transported in bulk. During transportation, they are forbidden to be stained by fugitive dust and spilled during transportation. During storage, they shall be storied in a warehouse or covered by plastic tarpaulins;

(4) There should be dust mat at the exit of construction site. It is required to wash the body and tires of transport vehicles going out the construction site. Soil, grit and stone are forbidden to be overloaded with the height not more than that of transport vehicle board, and shall be covered by tarpaulins. No spilling along the way during transportation;

(5) When the wind speed is above level IV and can produce fugitive dust easily, the construction contractor is recommended to suspend the earth excavation and take such measures as covering the stacked materials and moistening so as to effectively reduce fugitive dust pollution;

(6) Construction waste needs to be promptly removed and transported. For the construction waste that cannot be removed and transported for the moment, measures such as covering shall be taken. The vehicles for transporting sand, stones, cement, earth and other substances which are liable to produce dust must be well covered and no spilling or leakage is allowed.

(7) Water sprinkling shall be performed regularly to temporary stack yard inside the property line to reduce the impact of fugitive dust on surrounding environment. It

is recommended to set up closed block higher than stacked materials around such stack yard, separate material areas from roads, and timely clean away scattered materials and wash roads to keep roads clean.

(8) If road construction soil is piled for more than 48 hours, it shall be fully covered to prevent dust.

(9) Construction site and batching plant shall be properly located on open ground enclosed with barriers and as far away from environmentally sensitive points such as residential area as possible.

(10) Temporary spoils shall be used for backfill in time, subject to compaction treatment and covered with dustproof net to prevent secondary dust pollution.

3. Impact on atmospheric environment during operation period

In operation period of the Project, the major source of air pollution comes from vehicle exhaust emission and dust caused by running vehicles. Main air pollutants are CO, NO_x, THC and TSP. With increasing traffic volume in the region, the quantities of pollutants also increase, tending to pollute more local air along the road.

After implementation of road reconstruction under the Project, cement pavement will be transformed into asphalt pavement to improve traffic environment and enable vehicles to run in good conditions with less emissions of pollutants. Project implementation will not cause air pollution, but rather can reduce pollution load of vehicle exhaust on regional atmospheric environment.

4. Mitigation measures for atmospheric environmental impact during the operation period

(1) Improving greening measures, optimizing greening tree varieties, greening structure and layer, improving the greening effect and reducing impact of gaseous pollutants on surrounding environment

(2) Enhance traffic management and limit running speed of vehicles to reduce accidents; arrange vehicle transport route properly; prohibit vehicles carrying hazardous goods from passing.

(2) For fuel vehicles, quality of fuel shall be subject to high standard. High-quality fuel shall be used to reduce pollutant emission. The inspection system for car exhaust emission shall be implemented strictly. Vehicles having excessive emission of exhaust or transport excessive residues are not allowed to get on the road.

(4) Establish teams specialized in road maintenance, repair and cleaning to keep the roads clean and running in a good condition. In rainless days, the sprinkler is operated to spray water and decrease the dust so as to enhance the adhesion strength and water stability of loose soil and reduce the dust.

4.2.4 Impact on acoustic environment and mitigation measures

1. Impact on acoustic environment during construction period

Noise during the construction period refers to noise generated in the process of operation of various construction machinery, equipment and engineering transportation vehicles. Construction noise is the most obvious, since diverse machines are needed for different types of construction based on the characteristics of the works, there are many subprojects in the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project and the road works require the largest number of mechanical equipment. At present, the commonly used machinery mainly

includes excavator, loader, pneumatic tyre roller, paver and mixer. The source of construction noise can be classified as fixed source and mobile source. The former is mainly the construction machinery and the latter is mainly the vehicles transporting materials.

The intensity of construction machinery noise source is mostly between 80-100dB (A). Noise generated by construction machinery during construction period of the Project is generally at a distance of 60m, which basically meets the requirements of daytime standard in *Noise Standard for Construction Site* (GB12523-90) and meets the requirements of nighttime standard within a distance of 300m. The subprojects of the World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project are mostly located in the constructed town areas and the surrounding regions. There are a certain number of noise-sensitive buildings such as residential houses within the distance of 300m, thus they will be affected to some extent during construction period.

2. Mitigation measures for impact on acoustic environment during the construction period

(1) Arrange construction site in a proper and scientific way and concentrate fixed noise sources on construction site to minimize the impact of noises.

(2) The Construction Contractor must select and use such construction machines and tools as conform to relevant national standards and the low-noise construction machinery or technology whenever possible, so as to reduce the noise source and decrease the intensity of noise source fundamentally.

(3) Properly arrange construction time in accordance with *Emission Standard for Noise within the Boundaries of Construction Sites* (GB12523-2011) and prohibit operation of high-noise machineries at nighttime (22:00-6:00); during construction close to residential areas, construction time shall be adjusted accordingly or temporary noise reducing measures be taken and temporary sound barriers be provided such as using temporary wood sound insulating board or semi-underground construction. As for a construction site where continuous construction is necessary, the Construction Contractor shall contact with the environmental protection administration in time and apply for the permit for nighttime work. In addition, announcement of such construction activities shall be made to the public to obtain their support as much as possible.

(4) The route and vehicle for construction and transportation, especially large transport vehicles, shall be arranged rationally. The route and schedule of transportation shall be determined reasonably according to regulations of relevant authorities. The side of road far from residential areas shall be selected during transportation. When transporting, loading and unloading the building materials, vehicles should be slowed down to 20km/h and not allowed to whistle around environmentally sensitive sites.

(5) Low-noise construction equipment is preferred and shall be subject to regular maintenance and preservation; construction methods and site boundary shall be properly selected; during construction, sound insulating boards shall be placed on the side of high-noise machineries which is near the sensitive point to minimize its impact on environmentally sensitive points.

(6) In order to exercise effect control over the impact of the construction noise on the urban environment, in addition to the implementation of the related control measures, the environmental management shall be strengthened at the same time; the Construction Contractor shall initiatively accept the supervision and

inspection carried out by the environmental protection departments, according to the national and local laws, orders, regulations, etc; when the following-up project is for public tendering, the noise reduction requirements shall be included in the tender documents; and when undergoing project contracting, the Employer shall incorporate the construction noise control into the contract and should appoint persons specifically in charge of the implementation of the noise reduction measures in the process of construction and engineering supervision. Construction operators and site constructors control the working time as per labor hygiene standard and perform self protection well such as wearing earplugs and helmets.

3. Impact on acoustic environment during operation period

Noise impacts in the operation period of subprojects are primarily caused by road traffic and operation of water treatment plant (equipment).

(1) Noise from road traffic

Noises in the operation period of the Project come mainly from road traffic. According to the traffic volume and relevant background data provided in the feasibility study report of subprojects, noise prediction is conducted with the road noise prediction mode recommended by *Technical Guidelines for Noise Impact Assessment* (HJ 2.4-2009). The results of this prediction are shown in Schedule 1.

According to Schedule 1, road traffic noises in some areas of the Project exceed the limit to varying degrees in mid and long terms, mainly because noise impact increases with growing traffic volume and road load in mid and long terms.

(2) Noise in water treatment plant area

Under Baoxing Subproject, a water plant project — Lianghekou Water Plant — will be built. Refer to Table 4-10 for the results of estimate on noise impact of the project during the operation period.

Table 4-10 Noise monitoring results dB (A)

Item		East boundary of the plant	South boundary of the plant	West boundary of the plant	North boundary of the plant	Sensitive spot
Background noise, dB(A)	Day	58.7	58.7	58.7	58.7	54.5
	Night	47.4	47.4	47.4	47.4	44.7
Contribution value dB(A)		42.4	38.9	39.1	37.6	33.0
Estimated value dB(A)	Day	59.0	58.8	58.8	58.7	54.6
	Night	48.6	47.9	48.0	47.8	44.9

According to the table, the contributions of equipment noise to the plant boundaries during the operation period of Baoxing County Water Purification Plant can satisfy the standard limits for Class 2 specified in *Standards of Noise at Boundary of Industrial Enterprises* (GB12348-2008). The day and night noise levels estimated for the sensitive sites of the project are separately 54.6dB(A) and 44.9dB(A), which can satisfy the standard limits for Class 2 specified in *Environmental Quality Standard for Noise* (GB3096-2008). In sum, the project will only have minor impact on sensitive sites of acoustic environment.

(3) Noise from fixed sources

A lifting (submerged) pump is installed in the blowdown tank of the water purification plant in Baoxing County Subproject. The pump has a noise level of 70dB~80dB. In addition, as it is installed inside the pump house, noise can be reduced

by soundproof function of the pump house and distance attenuation. According to estimate on noise level of the source, noise level at 30m from the water pump can meet the standard limits for Class 2 specified in *Environmental Quality Standard for Noise* (GB3096-2008). The pump house is located inside the water purification plant according to the 100m sanitation protection distance for such plants (larger than 50m sanitation protection distance specified for pump house in the EIA). There are no residents in with the range of 100m and thus the pump house will not cause significant impact on the surrounding acoustic environment.

4. Mitigation measures and suggestions for impact on acoustic environment in operation period

(1) Reasonable urban planning, architectural layout and control of land on both sides of road

As the areas along the new road are poorly developed, it is suggested that at the same time of rationally planning land functions along the road, architectural layout and soundproof be improved in construction works, especially in real estate development projects so as to ensure interior environment of sensitive buildings can satisfy the functional requirements. It is suggested that the row of houses beside the road be constructed as non-teaching or residential multi-story buildings having at least 3 floors, which can not only satisfy the shortage of urban land use, but isolate traffic noise for the buildings behind.

(2) Strengthening greening

Due to precious urban land resource, it is not likely to construct a wide green belt along the road. Thus, it is suggested that border trees be planted to mitigate the impact of noise on acoustic environment on both sides of the road in a combined and three-dimensional manner of landscaping. The real estate developer may provide a green belt of a certain width on the roadside to reduce noise, control dust and improve community landscape.

(3) Reducing noise source radiation

Vehicles entering the city should be controlled at the night, and sensitive road sections shall have restrictions on speed at night. Strengthen regulation on vehicle whistle by erecting signboards for “No Whistling” and “Slow Down” on either side of the school and hospital; strengthen urban road maintenance and management by repairing damaged pavement in a timely manner and limiting over-speed, over-weighted and oversized vehicles.

(4) Sound insulating glass should be erected around some areas where mid- and long-term noise exceeds the limit and traffic control should be strengthened after the road is completed and put into operation to avoid out-of-limit noise due to traffic jam; vehicle noise monitoring should be enhanced to control vehicles producing out-of-limit noise on the road.

4.2.5 Analysis and assessment of impact of solid wastes on environment

1. Impact of solid wastes in construction period

Solid wastes produced in construction period consist mainly of wastes from building demolition, spoils from excavation works and domestic garbage produced by construction personnel.

Inappropriate stacking and disposal of solid waste will bring direct damage to the crops and vegetation, thus hinder the agricultural production; the solid waste will be covered with dust after being stacked for too long and flying dust caused in windy

conditions will affect the nearby residents; stacking garbage along the road will lead to mass propagation of bacteria and flies which may cause increased incidence and transmissibility of infectious diseases in the local, the foul smell brought by garbage will affect the life of residents and the landscape environment. Hence such impacts shall be reduced and avoided by strengthening construction management during construction period of the project and by cleaning, transporting and disposing of solid waste immediately after completion of construction.

2. Mitigation measures for impact of solid wastes on environment in construction period

   (1) For solid wastes on site during construction period, the principle of "centralized collection, classified disposal and recycling" shall be followed.

   (2) Vehicles carrying construction and building waste must be capped with dust screens and be washed when they leave the muck loading yard, so as to prevent spilling and flying dust along the road; the vehicles must be emptied after they arrived at the muck unloading yard; the Construction Contractor shall carefully study the transport route of spoil and muck with the traffic authority, environmental authority and so on, to avoid such route passing through environmental sensitive spots such as centralized residential areas; the transport shall be carried out in the nighttime whenever possible.

   (3) During construction, spoils shall be reused where possible. For spoils which cannot be reused, the Employer has designated spoil ground at EIA stage. Therefore, during construction, spoils shall be transported and stockpiled strictly in compliance with the requirements.

   (4) During construction, small temporary refuse stockpile yards shall be provided on construction site; domestic refuses shall be sorted on worksite and handed over to the nearby urban sanitation department which sends them regularly to the urban refuse disposal yard. The maintenance and management of the refuse stockpile yards shall be strengthened, so as to avoid the disorder of randomly stacked garbage; Temporary stockpile yards for construction waste shall not be located in drinking water source protection zone or near the river. Additionally, they shall be sprayed regularly with sterilization and insecticide liquid to reduce the breeding of mosquitoes and bacteria.

   (5) In addition, desilting of flood discharge channels under Yingjing County Subproject will produce some sludge (1t) and garbage (2400m³) both of which shall be removed in parallel with excavation to the waste compression transfer station in Yingjing County for dehydration and compaction and then hauled to the landfill for disposal.

3. Impact of solid wastes in operation period

   Solid wastes during the operation period mainly come from domestic refuse from management personnel and maintenance staff. They present a point-like pattern along the project and have less impact on the environment compared with the construction period; as solid wastes during the operation period are produced in areas nearer to the road, they are closely linked with people's life. They will influence the scenery, contaminate air, transmit disease and jeopardize people's health if not properly handled. During the project operation period, collection, stacking and clearing of domestic garbage shall be well done to prevent voluntary stacking or throwing that affects the environmental hygiene. Solid waste generated during the operation period of the road and bridge works of the Project will be cleared in a unified way by the sanitation sector and transported to the local garbage disposal plant for disposal.

Solid wastes in production area of water treatment plant under Baoxing County Subproject are drying sludge and office and domestic garbage. The subproject will produce drying sludge at a capacity of about 1.4t/d. There are about 18 persons engaged in production in the plant area, practicing three-shift a day. Through calculation taking the average domestic garbage in the office area of 0.5kg per person per day, the daily domestic garbage in the office area can be obtained as 3kg/d or so. Disposal measures: drying sludge will be transported to the landfill for disposal; office and domestic garbage shall be collected in a concentrated manner and disposed uniformly by local sanitary department.

The majority of solid wastes in the operation period of emergency refuge squares comes from the garbage left by the residents nearby and domestic garbage from the staff at the refuge square emergency command center; the domestic garbage shall be collected and handed over to local sanitation department for uniform disposal.

Chapter 5 Public Participation

5.1 Purpose of public participation

Public participation is an important part of the environmental impact assessement of the construction project and a two-way communication between the Employer or the Assessment Consultant and the people. Through public participation, the environmental problems that the public concern themselves with can be understood, so that relevant departments can deveop practicable environmental protection measures to ensure realization of good social and economic benefits in the project.

The purpose of public consultation is to obtain opinions from the general public directly affected by the Project to make decision-making department timely find potential problems and modify & complete design scheme and ensure problems reflected by people are solved fundamentally, making process design, environmental protection measures and environmental supervisory control & management become more complete and reasonable and striving optimal unity of environmental benefit, social benefit and social benefit in terms of the Project construction.

5.2 Public participation methods

The Client or personnel from EIA Consultant shall firstly introduce basic information of the proposed project and main conclusions of environmental impact assessment (including project scale and long-term & short-term impacts of proposed project on general public and environment during construction period and operation period) in details to the general public in affected area, and know attitudes, requirements and recommendations of general public for proposed project. Public consultation methods are mainly:

Publicizing information on the web and newspaper;

Conducting field visit to the areas affected by the Project construction to post notices;

Communicating with the general public and distribute public participation questionnaires;

Individual interview, household interview and group interview (conversazione);

Visiting important sensitive areas and negotiation.

5.3 Public notification

After completing environmental screening and determining EIA outline and scheme upon receipt of EIA entrustment, all EIA Consultants of the Project made the first round of information publicity on the local government affairs website before November 23, 2015 (see Schedules 2-1 and 2-2 for the specific time of the first round of information publicity for all subprojects). The publicity contents mainly include the basic information of project construction and working procedures concerning EIA.

For all subprojects, upon completion of preparing the first draft of EIA report, the second round of information publicity was made before January 18, 2016 (see Schedules 2-1 and 2-2 for the specific time of the second round of information publicity for all subprojects). The contents of publicity mainly include brief introduction of the construction project, the possible impacts of the construction project on the environment, countermeasures and steps for preventing or reducing adverse environmental impacts, and EIA conclusions.

Meanwhile, Environmental Protection Bureau of Ya'an City made full-text publication of the Project on January 27, 2016 (http://www.yahb.gov.cn/news/XMSLQK/2016127/16127165816611307 0H7EG822E8D55J.html).

Refer to Schedule 2-1 for detailed publication information.

5.4 Notice posting

On the EIA stage of the Project, notices were posted in places with frequent population activities selected from residential areas, villages, etc. near the roads in the affected areas of the Project. The contents of the notices include project overview, environmental impact, countermeasures to be taken, and the contact information of the Employer and the Assessment Consultant. The posting of notices can help the public know about the Project in time; meanwhile, the people who disagree with construction of the Project can seek advice and make complaints. During the periods of posting notices of all subprojects, the people concerned themselves more with the concrete implementation and completion dates of the Project and no related complaints and disagreement have been received.

Site notices in Baoxing County

5.5 Public conversazione

The conversazione of public participation with regard to the project was held by the Employer and the EIA Consultant of each subproject in the EIA process. Personnel taking part in the conversazione involves personnel in a wide range and mainly include the affected residents in the project area, representatives of the enterprise units related to the project, students and representatives of civil servants. In the conversazione, the Assessment Consultant and the Employer introduced the overview of this Project first, and explained the necessity of the project construction, positive impacts of the Project on local economic development and convenient transportation, adverse impacts such as water and soil loss, ecological damage, noise, sewage and environmental pollution caused by the Project during the construction period and operation period as well as the environmental protection measures to be taken, and then the public asked questions of their concern, and the Environmental Impact Assessment and Survey Team answered such questions.

Public symposium in Lushan County

Through the conversazione, the Assessment Consultant and the public representatives have made enough and effective communication, and exchanged opinions. The public representatives said that all regions were badly stricken by the 4.20 Lushan Earthquake and raised their concerns such as imperfect infrastructure and insufficient refuge places. They also expressed their strong support for the project and their expectations of project implementation. Although the environmental impacts that are likely to occur in the process of project construction were acceptable to them, they expected that the Construction Contractor would carry out civilized construction as far as possible and do not cause adverse impacts on the existing environment, also, they hoped that the competent organizations would strengthen management to ensure successful implementation of the project.

Refer to Schedule 2-2 for the time and manner of detailed public consultation about the project.

5.6 Questionnaire survey

In the EIA period of each subproject of the Project, each Employer gave out public questionnaires to the affected people and enterprises around the Project. The respondents mainly included government at all levels in the project areas, enterprises and institutions, schools, hospitals and communities. Such local residents, workers, teachers and students, individual business operators, etc. as would be directly affected by the project construction were also included. With regard to selection of public representatives, considerations were given to such constitutions as gender, age, occupation and degree of educations of the public, and the selection was random and the people chosen were widely representative.

When issuing the questionnaires for public opinion, the investigation personnel introduced basic information about the proposed project to the objects of investigation, including construction scale, route and positive and negative effects possibly brought to local areas. The respondents voluntarily filled in the questionnaires for public opinion, or their oral opinions were truthfully recorded by the investigators. Meanwhile, the employer, home address, sex, age, education background and other information about the respondents were indicated. Finally, the EIA Consultant arranged, analyzed and summarized the questionnaires collected during investigation. Refer to Schedule 2-3 for details.

From analysis on investigation results, public reflection on the Project is good. The Project construction gets the endorsement and support of most of local people. Besides, people's consciousness of environmental protection is becoming stronger and stronger so that most of people believe that the Project, upon completion, will play a positive role to promote urban economic development and improve the living environment, but there are also some environmental problems. We hope that corresponding environmental protection measures will be taken for effective control. Based on statistics on above investigation opinions:

(1) The scope of this investigation mainly covers residents around the Project location or affected people, and investigated people have certain representativeness;

(2) All the respondents showed their support for the Project. In combination with the opinions and feedback of the respondents, the construction of road works and bridge works in the Project will facilitate the resident trips, the construction of water treatment plant will provide guarantee for their drinking water, the embankment works and flood discharge channel works will further perfect the unban flood prevention function, and the refuge square will be a good place of refuge in case of disaster. This shows that the construction of the Project is one of the long-cherished wishes of the public.

(3) Since the first and second batches of World Bank Loaned Wenchuan Earthquake Reconstruction Project have been successfully implemented in Lushan, Baoxing and

Shimian, many common people think highly of World Bank and the local government and expect fast and successful implementation of the Project after they are informed of the Project.

(4) From the aspect of social influence, people believe that construction of the Project not only plays an important role in promoting social and economic development of cities and towns and improving infrastructure but also makes the common people have a sense of well-being and belonging. But there are still some people who concern themselves more with such problems as compensation for requisition of land and demolition & resettlement in the Project.

(5) In terms of environmental impacts that may be caused by the project implementation, most people believe that the project construction will not result in major environmental impacts; however, there are still a lot of people who hold that the noise and flying dust resulting from the reconstruction and extension of roads in urban areas may affect the residents along both sides of the original streets; besides, some individual business operators think their operating income will be affected during construction period.

(6) With regard to environmental impact mitigation measures taken throughout the project construction, some people also expect that the competent departments would consider the contractor having rich experience in World Bank Loaned Project whenever possible at the time of calling for tenders of project and that civilized construction would be achieved as far as possible to cause no adverse impacts on the existing environment, besides requesting the Construction Contractor to strictly comply with the requirements stated in the EIA report. Furthermore, they hope that the competent departments would strengthen their management to ensure successful implementation of the Project.

In general, public opinions in the questionnaire have a high reference value for the Project construction, operation and management. In the process of consultation with the public during EIA, the EIA workers made detailed explanations to the public having doubts about the Project and promptly reported the environmental protection problems that the public concern themselves with to the Employer and the Feasibility Study Unit, so that great importance would be attached to the such problems and improvement would be made in the design on the next stage; meanwhile, they presented corresponding environmental protection requirements and measures in the EIA report.

Chapter 6 Environmental Management and Monitoring Plan

6.1 Environmental management organization

6.1.1 Environmental management system and procedures

The environmental management system and procedures for the project are shown in Table 6-1 and the environmental management system organization framework is shown in Fig. 6-1.

Table 6-1 Table of environmental management system and procedure

Project stage	Content of environmental protection	Implementation organization of environmental protection measures	Environmental protection and management department	Environmental protection and supervision department
Construction period	Implement environmental protection measures and handle environmental emergencies	The Construction Contractor	Environmental protection bureaus of each county/district and the Employer	The Supervisor, provincial and municipal environmental protection bureaus
Operation period	Implement environmental protection measures and environmental management	The Employer or Operation Management Organization	Environmental protection bureaus of each county/district	Provincial and municipal environmental protection bureaus

6.1.2 Organization of environmental management and responsibilities

1 Environmental protection and management organization

Environmental protection and management organizations and their responsibilities are shown in Table 6-2.

Table 6-2 Organization of environmental management and responsibilities

Name	Responsibilities
Sichuan Urban Environment Project Office	Coordinate and manage the work of World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project and ensure that environmental protection meets the requirements of WB security policies.
Ya'an Project Office	Be responsible for all environmental management work, including effective execution of mitigation measures, supervision & monitoring, and making budget security and reporting to World Bank and the local environmental protection bureau; Ensure that measures in the environmental management plan can be included in the bidding documents and construction contract; Supervise and manage the Construction Contractor to implement pollution prevention and control measures, and promptly notify the Construction Contractor of any violations; Ensure that the contents of supervision and management executed by the environmental protection bureau can be incorporated into the bidding documents and the contract singed with the supervision engineer and supervision and participate in the monitoring of the works; Organize the training concerning environment for the contractors and environmental supervision engineer.
Each Subproject Office	Each Subproject Office will implement the infrastructure construction works financed by World Bank, including procurement, construction management, implementation of security guarantee policies and compliance, monitoring and reporting.
Environmental Protection Bureau of Ya'an City; Environmental	Instruct the Employer to implement national environmental protection laws and regulations and be responsible for approval; supervise the

Protection Bureau of each district/county	implementation of various environmental protection measures for the proposed project; take overall charge of the inspection and acceptance of environmental protection for the proposed project.
County/District Transport Bureau	Take charge of detailed work in supervision and management of environmental protection measures for the road subprojects under its jurisdiction in operation period.
County/District Water Resources Bureau	Take charge of detailed work in supervision and management of environmental protection measures for the river control subprojects under its jurisdiction in operation period.
County/District Environmental Protection Bureau	Take charge of detailed work in supervision and management of environmental protection measures for the World Bank Loaned Project under its jurisdiction in operation and construction periods.

6.1.3 Supervision organization

Environmental protection supervision organizations and their responsibilities are shown in Table 6-3.

Table 6-3 Environmental protection supervision organizations and their responsibilities

Name	Responsibilities	Remarks
Environmental Protection Bureau of Ya'an City	Be responsible for review and approval of EIA documents for the proposed project; supervision of the implementation of various environmental protection and management measures for the proposed project; inspection and acceptance of environmental protection for the proposed project.	Environmental Protection Administration
Municipal environmental protection bureau	Carry out supervision and management of environmental protection work for the construction project; organize and coordinate relevant agencies to provide service for environmental protection work; supervise the implementation of EMP; take charge of completion acceptance of environmental protection facilities of the project; confirm environmental regulations and standards applicable to the project; instruct County/District Environmental Protection Bureau on environmental supervision and management in construction and operation periods; accept, investigate and coordinate the handling of public complaints about environment and supervise improvement of environmental protection facilities and measures.	Environmental Protection Bureau of Ya'an City
7 County/District Environmental Protection Bureaus	Accept work instructions from environmental protection department at a higher level, supervise the Employer's implementation of EMP and relevant environmental management regulations and standards; coordinate various departments to carry out environmental protection work; take charge of inspection, supervision and management of construction, completion and operation of environmental protection facilities under its jurisdiction; accept, investigate and coordinate the handling of public complaints about environment and supervise the improvement of environmental protection facilities and measures.	District Environmental Protection Bureaus: Mingshan District and Yucheng District; County Environmental Protection Bureaus: Baoxing, Lushan, Yingjing, Shimian and Tianquan counties;
External Environmental Monitoring Consultant	Environmental supervision in project preparation period includes: review provisions on environmental protection in the *Project Construction Organization Plan* prepared by the	At the next stage, determine External Monitoring Consultant through bidding.

Name	Responsibilities	Remarks
	Construction Contractor; check whether the environmental protection system established by the Construction Contractor is reasonable; participate in the approval of the submitted *Unit Project Commencement Report*; conduct engineering supervision of construction of pollutant treatment works. Environmental supervision in construction period includes: prepare *Key Points of Environmental Protection Work* based on construction organization design for each lot; publicize environmental protection to the Construction Contractor; point out sensitive spots vulnerable to environmental pollution for the Construction Contractor; propose detailed environmental protection measures based on major pollutants in the construction process; review the *Scheme for Environmental Protection during Project Construction* submitted by the Construction Contractor; inspect whether the Construction Contractor's environmental protection system operates normally; check the implementation of environmental protection measures; supervise the construction of water and soil conservation measures. Environmental supervision in operation period includes: review the *Final Report on Environmental Protection during Project Construction* prepared by the Construction Contractor; compile completion documents on environmental protection; carry out acceptance of environmental protection work for the project; prepare the *Final Report on Environmental Supervision*, etc.	

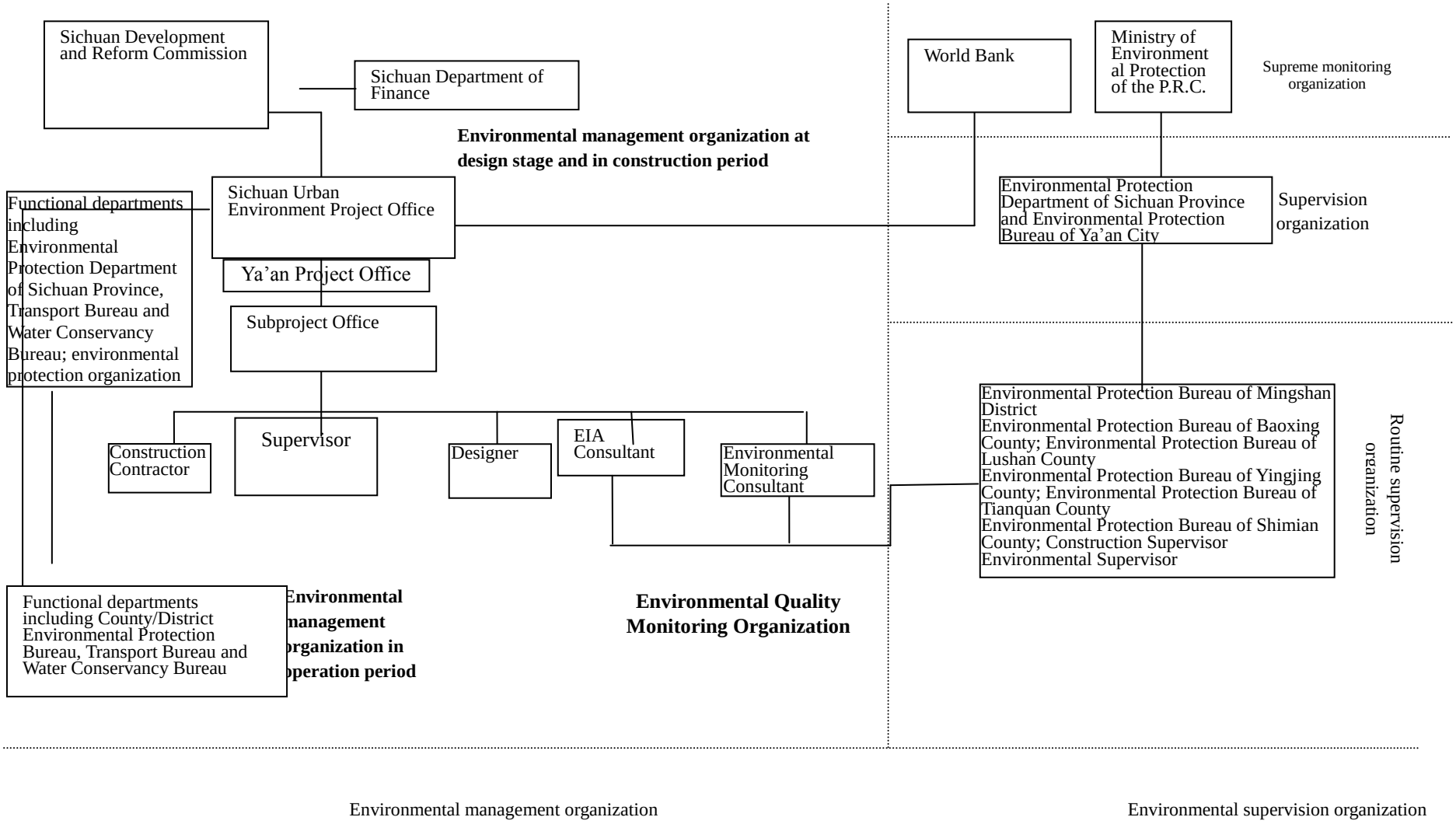

Fig. 6-1 Environmental management and supervision organization framework for World Bank Loaned Lushan

6.2 Content of environmental management

1 Environmental management by the Employer

The Employer shall positively carry out the bidding design of environmental protection measures in the bidding design stage. During construction, the Employer shall be responsible for the environmental protection and management from the start of commencement up to the final acceptance, which primarily includes:

(1) Establishing the environmental protection implementation planning and management measures for construction period.

(2) Taking the responsibility for incorporating the bidding design achievements of environmental protection measures into the Bidding Documents and Contract.

(3) Establishing the annual work plan for environmental protection.

(4) Taking charge of review and arrangement of annual environmental protection expenses.

(5) Supervising the execution of environmental protection measures by the Contractor.

(6) Organizing the implementation of the Client's environmental protection measures and monitoring.

(7) Coordinating with the environmental protection and other relevant departments.

(8) Preparing annual environmental protection work report as well as monthly, quarterly and annual statements.

(9) Organizing and carrying out environmental protection publicity, education and training.

2 Environmental management by the Contractor

The Contractor shall be responsible for the environmental protection in relation to its own construction activities, which primarily includes:

(1) Establishing the annual work plan for environmental protection.

(2) Checking the construction progress, quality, operation and test of environmental protection facilities and dealing with relevant issues in the implementation process.

(3) Verifying the use of annual environmental protection expenses.

(4) Reporting the execution of environmental protection provisions set out in the Contract.

3 Environmental management by the environmental protection and supervision departments

The local environmental protection bureaus at county and district levels as well as the Supervisor shall be responsible for daily supervision and inspection, urging and ensuring the execution of environmental protection measures. Additionally, relevant functional departments involved such as transportation bureau and water resources bureau will also take part in surveillance.

6.3 Environmental protection technology and skills training

1 Environmental protection technology and skills training

To ensure the successfully efficient implementation of environmental protection,

training on environmental protection knowledge and skills must be provided for all employees (including construction personnel, etc.). In addition to explaining the importance of the proposed project and the significance of implementation to all employees, different kinds of training shall pertinently be provided for employees for different posts.

(1) On-the-job training of environmental management personnel

The purpose of on-the-job training of environmental management personnel is to strengthen environmental management during construction period and operation period to ensure environmental monitoring quality and practical and effective environmental management so as to improve quality of the whole works. On-the-job training can make environmental management personnel possibly distinguish main environmental problems at construction stage and know more problems and deficiencies existing during environmental management so as to report the situation to the engineering environmental protection department to adopt necessary control measures as quickly as possible. During construction, the Project management organization shall invite environmental protection experts or environmental management personnel with similar management experience to the site to explain possible environmental problems and solutions.

(2) Training of persons responsible for construction and construction personnel of various works

Prior to commencement of the Project, the successful responsible person undertaking the Project construction and construction personnel shall receive systematic training on professional environment knowledge to avoid environmental disruption caused by misoperation. The purpose of training person responsible for contract is to define environmental protection responsibilities to be fulfilled by the Construction Contractor, while the purpose of training construction personnel is to strengthen correct operation methods of construction during construction to reduce unnecessary environmental disruption. The training can make the person responsible for works know his environmental protection responsibilities to be fulfilled and possible consequences that may occur in case of environmental disruption, and make construction personnel intuitively understand the degree and methods of environmentally-sensitive point protection. According to actual conditions of the Project, construction personnel training lasts for one week.

(3) During the project operation period, the project management organization shall periodically provide environmental protection knowledge training so that the employees could identify possible environmental issues which may occur on the respective posts and take necessary measures. Each employee must bear the idea of environmental protection.

2 Training program

Table 6-4 Environmental protection training program for Baoxing County Subproject

S/N	Training object	Training content	Organizer	Number of trainees	Training time	Place	Budget (10,000 yuan)
1	The Client and relevant staff	Learn environmental protection and environmental management knowledge	Sichuan Urban Environment Project Office and External Environmental Monitoring	3	1-2 days (at the same time of signing the contract upon the Project bidding)	Chengdu	1.0

S/N	Training object	Training content	Organizer	Number of trainees	Training time	Place	Budget (10,000 yuan)
		comprehensively, and know the content of environmental impact assessment report and environmental management plan for the Project.	Consultant				
2	The Supervisor's main principal and engineering environmental monitoring personnel	Environmental monitoring knowledge and content of environmental impact assessment report and environmental management plan for the Project as well as content of environmental protection design documents corresponding to the Project	Sichuan Urban Environment Project Office, the Client and External Environmental Monitoring Consultant	2		Chengdu	
	The Contractor's main technical principal and person responsible for construction	Environmental protection and environmental management knowledge	The Client and External Environmental Monitoring Consultant	3		Chengdu	
3	Construction personnel	The Project environmental protection knowledge and specific requirements	The Client and External Environmental Monitoring Consultant	20	Continuous training at the Project implementation stage	Baoxing	1.0
Total			/	/	/	/	2.0

Table 6-5 Environmental protection training program for Lushan County Subproject

S/N	Training object	Training content	Organizer	Number of trainees	Training time	Place	Budget (10,000 yuan)
1	The Client and relevant staff	Learn environmental protection and environmental management knowledge comprehensively, and know the content of environmental impact assessment report and	Sichuan Urban Environment Project Office and External Environmental Monitoring Consultant	3	1-2 days (at the same time of signing the contract upon the Project bidding)	Chengdu	1.0

		environmental management plan for the Project.					
2	The Supervisor's main principal and engineering environmental monitoring personnel	Environmental monitoring knowledge and content of environmental impact assessment report and environmental management plan for the Project as well as content of environmental protection design documents corresponding to the Project	Sichuan Urban Environment Project Office, the Client and External Environmental Monitoring Consultant	2		Chengdu	
	The Contractor's main technical principal and person responsible for construction	Environmental protection and environmental management knowledge	The Client and External Environmental Monitoring Consultant	3		Chengdu	
3	Construction personnel	The Project environmental protection knowledge and specific requirements	The Client and External Environmental Monitoring Consultant	20	Continuous training at the Project implementation stage	Lushan	1.0
Total			/	/	/	/	2.0

Table 6-6 Environmental protection training program for Mingshan District Subproject

S/N	Training object	Training content	Organizer	Number of trainees	Training time	Place	Budget (10,000 yuan)
1	The Client and relevant staff	Learn environmental protection and environmental management knowledge comprehensively, and know the content of environmental impact assessment report and environmental management plan for the Project.	Sichuan Urban Environment Project Office and External Environmental Monitoring Consultant	3	1-2 days (at the same time of signing the contract upon the Project bidding)	Chengdu	1.0
2	The Supervisor's main principal and engineering	Environmental monitoring knowledge and content of environmental	Sichuan Urban Environment Project Office, the Client and External	2		Chengdu	

S/N	Training object	Training content	Organizer	Number of trainees	Training time	Place	Budget (10,000 yuan)
	environmental monitoring personnel	impact assessment report and environmental management plan for the Project as well as content of environmental protection design documents corresponding to the Project	Environmental Monitoring Consultant				
	The Contractor's main technical principal and person responsible for construction	Environmental protection and environmental management knowledge	The Client and External Environmental Monitoring Consultant	3		Chengdu	
3	Construction personnel	The Project environmental protection knowledge and specific requirements	The Client and External Environmental Monitoring Consultant	20	Continuous training at the Project implementation stage	Mingshan	1.0
Total			/	/	/	/	2.0

Table 6-7 Environmental protection training program for Yingjing County Subproject

S/N	Training object	Training content	Organizer	Number of trainees	Training time	Place	Budget (10,000 yuan)
1	The Client and relevant staff	Learn environmental protection and environmental management knowledge comprehensively, and know the content of environmental impact assessment report and environmental management plan for the Project.	Sichuan Urban Environment Project Office and External Environmental Monitoring Consultant	3	1-2 days (at the same time of signing the contract upon the Project bidding)	Chengdu	1.0
2	The Supervisor's main principal and engineering environmental monitoring personnel	Environmental monitoring knowledge and content of environmental impact assessment report and environmental management plan for the Project as	Sichuan Urban Environment Project Office, the Client and External Environmental Monitoring Consultant	2		Chengdu	

		well as content of environmental protection design documents corresponding to the Project					
	The Contractor's main technical principal and person responsible for construction	Environmental protection and environmental management knowledge	The Client and External Environmental Monitoring Consultant	3		Chengdu	
3	Construction personnel	The Project environmental protection knowledge and specific requirements	The Client and External Environmental Monitoring Consultant	20	Continuous training at the Project implementation stage	Yingjing	1.0
Total			/	/	/	/	2.0

Table 6-8 Environmental protection training program for Shimian County Subproject

S/N	Training object	Training content	Organizer	Number of trainees	Training time	Place	Budget (10,000 yuan)
1	The Client and relevant staff	Learn environmental protection and environmental management knowledge comprehensively, and know the content of environmental impact assessment report and environmental management plan for the Project.	Sichuan Urban Environment Project Office and External Environmental Monitoring Consultant	3	1-2 days (at the same time of signing the contract upon the Project bidding)	Chengdu	1.0
2	The Supervisor's main principal and engineering environmental monitoring personnel	Environmental monitoring knowledge and content of environmental impact assessment report and environmental management plan for the Project as well as content of environmental protection design documents corresponding to the Project	Sichuan Urban Environment Project Office, the Client and External Environmental Monitoring Consultant	2		Chengdu	
	The Contractor's main technical	Environmental protection and environmental	The Client and External Environmental	3		Chengdu	

S/N	Training object	Training content	Organizer	Number of trainees	Training time	Place	Budget (10,000 yuan)
	principal and person responsible for construction	management knowledge	Monitoring Consultant				
3	Construction personnel	The Project environmental protection knowledge and specific requirements	The Client and External Environmental Monitoring Consultant	20	Continuous training at the Project implementation stage	Shimian	1.0
Total			/	/	/	/	2.0

Table 6-9 Environmental protection training program for Yucheng District Subproject

S/N	Training object	Training content	Organizer	Number of trainees	Training time	Place	Budget (10,000 yuan)
1	The Client and relevant staff	Learn environmental protection and environmental management knowledge comprehensively, and know the content of environmental impact assessment report and environmental management plan for the Project.	Sichuan Urban Environment Project Office and External Environmental Monitoring Consultant	3	1-2 days (at the same time of signing the contract upon the Project bidding)	Chengdu	1.0
2	The Supervisor's main principal and engineering environmental monitoring personnel	Environmental monitoring knowledge and content of environmental impact assessment report and environmental management plan for the Project as well as content of environmental protection design documents corresponding to the Project	Sichuan Urban Environment Project Office, the Client and External Environmental Monitoring Consultant	2		Chengdu	
	The Contractor's main technical principal and person responsible for construction	Environmental protection and environmental management knowledge	The Client and External Environmental Monitoring Consultant	3		Chengdu	
3	Construction personnel	The Project environmental	The Client and External	20	Continuous training at the	Yucheng	1.0

		protection knowledge and specific requirements	Environmental Monitoring Consultant		Project implementation stage		
Total			/	/	/	/	2.0

Table 6-10 Environmental protection training program for Tianquan County Subproject

S/N	Training object	Training content	Organizer	Number of trainees	Training time	Place	Budget (10,000 yuan)
1	The Client and relevant staff	Learn environmental protection and environmental management knowledge comprehensively, and know the content of environmental impact assessment report and environmental management plan for the Project.	Sichuan Urban Environment Project Office and External Environmental Monitoring Consultant	3	1-2 days (at the same time of signing the contract upon the Project bidding)	Chengdu	1.0
2	The Supervisor's main principal and engineering environmental monitoring personnel	Environmental monitoring knowledge and content of environmental impact assessment report and environmental management plan for the Project as well as content of environmental protection design documents corresponding to the Project	Sichuan Urban Environment Project Office, the Client and External Environmental Monitoring Consultant	2		Chengdu	
	The Contractor's main technical principal and person responsible for construction	Environmental protection and environmental management knowledge	The Client and External Environmental Monitoring Consultant	3		Chengdu	
3	Construction personnel	The Project environmental protection knowledge and specific requirements	The Client and External Environmental Monitoring Consultant	20	Continuous training at the Project implementation stage	Tianquan	1.0
Total			/	/	/	/	2.0

It is estimated that the environmental protection and management knowledge training of

the working personnel of the Employers, Construction Contractors and Supervisors for subprojects of World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project will cost 140,000 yuan in total.

6.4 Execution plan for environmental protection measures

6.4.1 Environmental protection measures and cost estimates

The environmental protection investment of each subproject of the Project mainly consists of the following aspects: water pollution prevention and control (adoption of facilities for sedimentation and recycling of construction waste water and facilities for treatment of domestic sewage caused by construction personnel); ambient air pollution prevention and control (watering for suppressing dust and isolation belt greening); noise prevention and control measures (equipment shock-absorbing and sound-insulation facilities, erection of "no horn" signs and other signs, etc.); solid waste treatment (prompt garbage removal and transport, transporting dry sludge to the landfill site for disposal, etc.); water and soil conservation and ecological restoration (vegetation restoration, road greening and landscaping and temporary water and soil conservation measures); environmental management and monitoring (strengthening the supervision of control measures such as construction dust, noise, water and soil loss control by specially-assigned person); environmental monitoring (monitoring of ambient air, surface water, noise, groundwater, etc. in the areas with respect to the Project).

See Table 6-11 for the environmental protection measures and estimate summary of each subproject:

Table 6-11 Summary of environmental protection measures and estimates for subprojects

S/N	Subproject name	Category	Item and construction content	Treatment measures	Investment (10,000 yuan)
1	Baoxing County Subproject	Water pollution control	Water for cooling and washing of construction machinery, for cleaning construction site, for cleaning building materials, for concrete placement & curing and for rinsing	Up-to-standard discharging upon sedimentation and filtering and comprehensive utilization of some parts	12
			Domestic sewage generated by construction personnel	Using existing treatment facilities in rented local house for treatment	3
			Water plant works	Transporting sewage by tank car	7
		Ambient air pollution control	Fuel machinery transportation vehicle and construction dust	Dust reducing by watering, arranging construction time & sequence reasonably and green belt	10.5
		Noise prevention measures	Construction machinery transportation vehicle	Traffic control measures, and using sound insulation facilities and greenbelts in high-noise work area	38
			Road and water plant works	Providing "no horn" signs and speed reducer, reserved noise cost, equipment shock-absorbing, sound-insulation	36
		Solid waste	Constructional garbage	Domestic garbage shall be collected at a designated place, and will be disposed uniformly with a small amount of construction wastes by local sanitary department.	38.5
			Solid wastes in	Drying sludge will be transported to	

S/N	Subproject name	Category	Item and construction content	Treatment measures	Investment (10,000 yuan)
			production area of water purification plant are drying sludge and office and domestic garbage	the landfill for disposal; office and domestic garbage shall be collected in a concentrated manner and disposed uniformly by local sanitary depart.	
		Soil and water conservation and ecological recovery	Temporary spoil yard works	Soil and water conservation measures and dust reducing by watering	43
			Construction excavation and permanent & temporary land occupation	Compensation and recovery	38
			Recovery and reconstruction of construction site and disposal yard	Vegetation recovery	35
		Environmental management and supervisory control	Construction period	Implement construction environmental supervision system, adopt contract constraint mechanism, incorporate relevant environmental protection measures into production quality management systems and acceptance index systems at various stages, strengthen specially-designated personnel supervision of construction dust, noise, water and soil loss control measures, etc. and promote laws and regulations on environmental protection.	55
		Environmental monitoring cost	Operation period	Ambient air and traffic noise monitoring	30
		Ecological measures	Road and water platn works	Greening	5
		Subtotal			351
2	Lushan County Subproject	Ecological environment	Water and soil loss control	Cover temporary disposal stacking yard with dustproof cloth	179
			Road works and emergency refuge square	Greening	12
		Noise	Construction machinery noise	Arrange construction time reasonably and strengthen management	6.5
			Traffic noise	Strengthen traffic control and set “no horn” and speed limit signs	10
		Water pollutant	Water for cooling and washing of construction machinery, for cleaning construction site, for cleaning building materials, for concrete placement & curing and for rinsing	Up-to-standard discharging upon sedimentation and filtering and comprehensive utilization of some parts	8
			Domestic sewage and fecal sewage	Used as farmyard manure	2
		Atmospheric pollutant	Fuel machinery transportation vehicle and construction dust	Using tarpaulin as construction enclosure, dust reducing by watering, arranging construction time and	20

S/N	Subproject name	Category	Item and construction content	Treatment measures	Investment (10,000 yuan)
				sequence reasonably, greenbelt and sludge & odor prevention	
		Solid wastes	Demolition garbage and constructional garbage	Demolition garbage shall be cleaned and transported timely; domestic garbage shall be collected at a designated place, and will be disposed uniformly with a small amount of construction wastes by local sanitary department.	12
			Garbage generated during operation period	Set categorized garbage collecting bins and treat garbage uniformly by the sanitary department.	7
		Environmental management and supervisory control	Construction period	Implement construction environmental supervision system, adopt contract constraint mechanism, incorporate relevant environmental protection measures into production quality management systems and acceptance index systems at various stages, strengthen specially-designated personnel supervision of construction dust, noise, water and soil loss control measures, etc. and promote laws and regulations on environmental protection.	20
		Environmental monitoring	Construction & operation period	Area ambient noise and air quality	65
		Subtotal			341.5
3	Mingshan District Subproject	Ecological environment	Water and soil loss control	Cover temporary disposal stacking yard with dustproof cloth	8
			Vegetation recovery	Reclamation or complementarily planting trees and flowers	5
		Noise	Construction machinery noise	Arrange construction time reasonably and strengthen management	6.5
			Traffic noise	Strengthen traffic control and set “no horn” and speed limit signs	10
		Water pollutant	Water for cooling and washing of construction machinery, for cleaning construction site, for cleaning building materials, for concrete placement & curing and for rinsing	Up-to-standard discharging upon sedimentation and filtering and comprehensive utilization of some parts	6
			Domestic sewage generated by construction personnel	Using existing treatment facilities in rented local house for treatment	2
		Atmospheric pollutant	Fuel machinery transportation vehicle and construction dust	Dust reducing by watering, arranging construction time & sequence reasonably and green belt	18
		Solid wastes	Demolition garbage and constructional garbage	Demolition garbage shall be cleaned and transported timely; domestic garbage shall be collected at a designated place, and will be disposed uniformly with a small	12

S/N	Subproject name	Category	Item and construction content	Treatment measures	Investment (10,000 yuan)
				amount of construction wastes by local sanitary department.	
			Garbage generated during operation period	Set categorized garbage collecting bins and treat garbage uniformly by the sanitary department.	4
		Environmental management and supervisory control	Construction period	Implement construction environmental supervision system, adopt contract constraint mechanism, incorporate relevant environmental protection measures into production quality management systems and acceptance index systems at various stages, strengthen specially-designated personnel supervision of construction dust, noise, water and soil loss control measures, etc. and promote laws and regulations on environmental protection.	20
		Environmental monitoring	Construction & operation period	Area ambient noise, air quality and emergency surface water monitoring	65
		Subtotal			156.5
4	Yingjing County Subproject	Ecological environment	Water and soil loss control	Cover temporary disposal stacking yard with dustproof cloth	8
			Vegetation recovery	Reclamation or complementarily planting trees and flowers	5
		Noise Water pollutant	Construction machinery noise	Arrange construction time reasonably and strengthen management	6.5
			Traffic noise	Strengthen traffic control and set “no horn” and speed limit signs	10
			Water for cooling and washing of construction machinery, for cleaning construction site, for cleaning building materials, for concrete placement & curing and for rinsing	Up-to-standard discharging upon sedimentation and filtering and comprehensive utilization of some parts	6
			Domestic sewage generated by construction personnel	Using existing treatment facilities in rented local house for treatment	2
		Atmospheric pollutant Solid wastes	Fuel machinery transportation vehicle and construction dust	Using tarpaulin as construction enclosure, dust reducing by watering, arranging construction time and sequence reasonably, greenbelt and sludge & odor prevention	21.5
			Demolition garbage and constructional garbage	Demolition garbage shall be cleaned and transported timely; domestic garbage shall be collected at a designated place, and will be disposed uniformly with a small amount of construction wastes by local sanitary department.	12
			Garbage generated during operation period	Set categorized garbage collecting bins and treat garbage uniformly by the sanitary department.	4.5

S/N	Subproject name	Category	Item and construction content	Treatment measures	Investment (10,000 yuan)
		Environmental management and supervisory control	Construction period	Implement construction environmental supervision system, adopt contract constraint mechanism, incorporate relevant environmental protection measures into production quality management systems and acceptance index systems at various stages, strengthen specially-designated personnel supervision of construction dust, noise, water and soil loss control measures, etc. and promote laws and regulations on environmental protection.	20
		Environmental monitoring	Construction & operation period	Area ambient noise, air quality and emergency surface water monitoring	65
		Subtotal			160.5
5	Shimian County Subproject	Ecological environment	Water and soil loss control	Cover temporary disposal stacking yard with dustproof cloth	211.8
			Vegetation recovery	Reclamation or complementarily planting trees and flowers	
		Noise	Construction machinery noise	Arrange construction time reasonably and strengthen management	5.5
			Traffic noise	Strengthen traffic control and set “no horn” and speed limit signs	18
		Water pollutant	Water for cooling and washing of construction machinery, for cleaning construction site, for cleaning building materials, for concrete placement & curing and for rinsing	Up-to-standard discharging upon sedimentation and filtering and comprehensive utilization of some parts	3
			Domestic sewage generated by construction personnel	Using existing treatment facilities in rented local house for treatment	3
			Operation period	Transporting sewage by tank car, regular maintenance of water supply and drainage pipe network	3
		Atmospheric pollutant	Fuel machinery transportation vehicle and construction dust	Dust reducing by watering, arranging construction time & sequence reasonably and green belt	39
		Solid wastes	Demolition garbage, constructional garbage and boring mud form bridge pile	Demolition garbage shall be cleaned and transported timely; domestic garbage shall be collected at a designated place, and will be disposed uniformly with a small amount of construction wastes by local sanitary department.	48
			Garbage generated during operation period	Set categorized garbage collecting bins and treat garbage uniformly by the sanitary department.	5
		Environmental management and supervisory control	Construction period	Implement construction environmental supervision system, adopt contract constraint mechanism, incorporate relevant environmental	40

S/N	Subproject name	Category	Item and construction content	Treatment measures	Investment (10,000 yuan)
				protection measures into production quality management systems and acceptance index systems at various stages, strengthen specially-designated personnel supervision of construction dust, noise, water and soil loss control measures, etc. and promote laws and regulations on environmental protection.	
		Environmental monitoring	Construction & operation period	Area ambient noise, air quality and emergency surface water monitoring	25
		Subtotal			401.3
6	Yucheng District Subproject	Water pollution control	Construction wastewater, rinsing wastewater, curing wastewater and domestic sewage	Comprehensive utilization upon sedimentation and filtering and treating domestic sewage by surrounding existing facilities	1.5
			Road and water during operation period	Discharging via rainwater pipe network and regular cleaning	3.0
		Ambient air pollution control	Transportation vehicle and construction dust during construction period	Dust reducing by watering, covering transportation vehicles and arranging construction time and sequence reasonably	6.0
			Vehicle exhaust during operation period	Strengthen management and greening on both sides, and prohibiting vehicles with excessive emission of tail gas from driving on the road	3.0
		Noise prevention measures	Machinery transportation vehicle during construction period	Arrange construction time reasonably and inspect construction equipment regularly	5.0
			Traffic noise during operation period	Strengthening management and regular monitoring	3.0
		Solid wastes	Waste earth-stonework and domestic garbage generated during construction period	Domestic garbage shall be collected at a designated place, while waste earth-stonework shall be transported to the designated disposal yard in Ya'an City	4.8
			Domestic garbage generated during operation period and garbage along the road	Domestic garbage shall be treated by the local sanitary department and road along the line shall be cleaned overtime by the curing team	4.5
		Environmental management and monitoring	Construction & operation period	Conduct environmental management and monitoring work	65.0
		Total			95.8
7	Tianquan County Subproject	Water and soil conservation	Construction period	Temporary protection measures	680.6
		Noise control	Construction period	1.8m high colored steel plate	141.77
		Ambient air protection	Construction period	Sprinkling water and providing tarpaulin for construction site and roads	10.0
			Operation period	Road cleaning	0.3
		Solid waste management	Construction period	Transportation of construction waste and provision of garbage can or	4.48

S/N	Subproject name	Category	Item and construction content	Treatment measures	Investment (10,000 yuan)
				garbage bin	
			Operation period	Road garbage clearance	0.3
		Environmental monitoring	Construction & operation period	Air & noise environmental monitoring	24.0
		Environmental protection acceptance			25.0
		Total			887.05

6.4.2 Execution plan for environmental protection measures

Incorporate environmental protection measures into the Bidding Documents and the Contract, and strengthen construction organization and environmental management during operation period to better implement environmental protection measures at various stages.

1. Environmental protection measure execution plan for project design stage

Table 6-12 Environmental protection measure execution plan for design stage

Environmental elements	Item and construction content	Treatment measures	Execution description	Executor	Implementation stage	Supervision & management organizations
Ecological environment	Water and soil loss control	Protection of temporary spoil stacking yard, slope protection and drainage design	Optimize scheme at design stage and incorporate it into engineering control measures	Designer	Design	Sichuan Project Office of World Bank and Subproject Employers
	Vegetation recovery	Reclaiming temporary land or complementarily planting trees and flowers, and comprehensive ecological management of riverbank	Optimize scheme at design stage and incorporate it into engineering control measures	Designer	Design	
Noise	Construction machinery noise	Arrange construction time reasonably and strengthen management	Make reasonable requirements for measures and suggestions at design stage	Designer	Design	
	Traffic noise during operation period	Strengthen traffic control, set “no horn” and speed limit signs, and reserve sound insulation measures and protection distance	Optimize scheme at design stage and incorporate it into engineering control measures, and propose reasonable suggestions and requirements	Designer	Design	
Water pollutant	Construction muddy water	Upon simple sedimentation, supernatant clean	Optimize scheme at design stage	Designer	Design	

		water shall be discharged into the agricultural irrigation ditch.	and incorporate it into engineering control measures			
	Machinery rinsing water	Oil separation, sedimentation and recycling	Optimize scheme at design stage and incorporate it into engineering control measures	Designer	Design	
	Domestic sewage and fecal sewage	Used as farmyard manure	Make reasonable requirements for measures and suggestions at design stage	Designer	Design	
Atmospheric pollutant	Dust generated by building demolition	Provide closed networks such as dust-proof cloth around the building complex	Optimize scheme at design stage and incorporate it into engineering control measures, and propose reasonable suggestions and requirements	Designer	Design	
	Dust	Protect temporary stacking yard by dust-proof cloth and clean the site	Make reasonable requirements for measures and suggestions at design stage	Designer	Design	
	Vehicle dust	Reduce dust by watering and set washing places for vehicles passing in and out	Make reasonable requirements for measures and suggestions at design stage	Designer	Design	
	Odor from waste treatment plant	Protection distance and strengthening greening	Optimize scheme at design stage and incorporate it into engineering control measures, and propose reasonable suggestions and requirements	Designer	Design	
	Vehicle exhaust	Plant roadside trees, etc.	Optimize scheme at design stage and incorporate	Designer	Design	

			it into engineering control measures, and propose reasonable suggestions and requirements			
Solid wastes	Construction spoil	Optimize allocation and set disposal yard	Optimize scheme at design stage and incorporate it into engineering control measures, and propose reasonable suggestions and requirements	Designer	Design	
	River sludge	Soil for greening, etc.		Designer	Design	
	Domestic garbage	Uniform treatment by the sanitary department	Make reasonable requirements for measures and suggestions at design stage	Designer	Design	
	Sporadic roadbuilding wastes	Local recycling or timely collection	Make reasonable requirements for measures and suggestions at design stage	Designer	Design	
Environmental management and supervisory control	Implement construction environmental supervision system, adopt contract constraint mechanism, incorporate relevant environmental protection measures into production quality management systems and acceptance index systems at various stages, strengthen specially-designated personnel supervision of construction dust, noise, water and soil loss control measures, etc. and promote laws and regulations on environmental protection.		Propose reasonable suggestions and requirements at design stage	Designer	Design	
Environmental monitoring	Construction & operation period	Area ambient noise and air quality	Propose reasonable suggestions and requirements at design stage	Design	Design	

2. Environmental protection measure execution plan for project construction period

Table 6-13 Environmental protection measure execution plan for construction period

Environmental elements	Item and construction	Treatment measures	Execution description	Executor	Implementation stage	Supervision & management

	content					organizations
Ecological environment	Water and soil loss control	Protection of temporary spoil stacking yard, slope protection and drainage design	Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	Sichuan Project Office of World Bank and Subproject Employers, environmental protection bureau and construction supervisor
	Vegetation recovery	Reclaiming temporary land or complementarily planting trees and flowers, and comprehensive ecological management of riverbank	Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	
Noise	Construction machinery noise	Arrange construction time reasonably and strengthen management	Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	
Water pollutant	Construction muddy water	Upon simple sedimentation, supernatant clean water shall be discharged into the agricultural irrigation ditch.	Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	
	Machinery rinsing water	Oil separation, sedimentation and recycling	Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	
	Domestic sewage and fecal sewage	Used as farmyard manure	Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	
Atmospheric pollutant	Dust generated by building demolition	Provide closed networks such as dust-proof cloth around the building complex	Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	

	Dust	Protect temporary stacking yard by dust-proof cloth and clean the site	Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	
	Vehicle dust	Reduce dust by watering and set washing places for vehicles passing in and out	Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	
	Vehicle exhaust	Plant roadside trees, etc.	Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	
Solid wastes	Construction spoil	Optimize allocation and set disposal yard	Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	
	River sludge	Soil for greening, etc.		Construction Contractor (Contractor)	Construction period	
	Domestic garbage	Uniform treatment by the sanitary department	Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	
	Sporadic roadbuilding wastes	Local recycling or timely collection	Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	
Preservation of cultural relics	Take effectively protection measures for the Shimian County Subprojects involving a suspension bridge on Dadu River in Xinmian which is a Municipality Protected Historic Site, such as strictly controlling the construction operation zone; develop special construction schemes; forbid construction by large-size		Strictly comply with the requirements of approved EIA documents (statements) and design documents	Construction Contractor (Contractor)	Construction period	

	machinery; make the supervision of construction area as the priority; protect the site and immediately report to relevant departments if underground cultural relics or historical remains are found in the construction process.					
Environmental management and supervisory control	Implement construction environmental supervision system, adopt contract constraint mechanism, incorporate relevant environmental protection measures into production quality management systems and acceptance index systems at various stages, strengthen specially-designated personnel supervision of construction dust, noise, water and soil loss control measures, etc. and promote laws and regulations on environmental protection.		Supervise and manage the implementation of various environmental protection measures by the Construction Contractor	The Employer and construction supervisor	Construction period	
Environmental monitoring	Construction & operation period	Area ambient noise, air quality and water and soil loss	Implement noise, air and water and soil loss monitoring during construction period	Construction Contractor (Contractor) and environmental monitoring department	Construction period	

2. Environmental protection measure execution plan for project operation period

Table 6-14 Environmental protection measure execution plan for operation period

Environmental elements	Item and construction content	Treatment measures	Execution description	Executor	Implementation stage	Supervision & management organizations
Ecological environment	Water and soil loss control	Protection of temporary spoil stacking yard, slope protection and drainage design	Maintain vegetations during operation period and observe slope drainage, etc.	The Employer (operation management organization)	Operation period	Environmental protection bureaus of each county/district
	Vegetation recovery	Reclaiming temporary land or complementarily planting trees and flowers, and comprehensive ecological management of riverbank		The Employer (operation management organization)	Operation period	
Noise	Traffic noise during operation period	Strengthen traffic control, set “no horn” and speed limit signs, and reserve sound insulation	Comply with the requirements of approved EIA documents	The Employer (operation management organization)	Operation period	

		measures and protection distance	(statements) and design documents			
Exhaust gas	Vehicle exhaust	Plant roadside trees, etc.	Maintain vegetations during operation period and limit entering of overrun vehicle	The Employer (operation management organization)	Operation period	
Solid wastes	Drying sludge from water purification plant	Sent to the landfill	Comply with the requirements of approved EIA documents (statements) and design documents	The Employer (operation management organization)	Operation period	
Environmental monitoring	Operation period	Area ambient noise and air quality	Implement noise and atmospheric monitoring during operation period	The Employer (operation management organization), environmental protection bureaus of each county/district and environmental monitoring department	Operation period	

6.5 Monitoring plan

6.5.1 Purpose of environmental monitoring

To do environmental protection work of project area well, generation and discharging of wastewater, exhaust gas, noise and disposal and environmental quality of assessed area during construction & operation period shall be timely mastered, and hazards of emergency pollution accident on environmental shall be prevented to provide a scientific basis for environmental protection and pollution control as well as environmental supervision and environmental management during construction & operation period.

6.5.2 Environmental monitoring plan

(1) Water environmental monitoring plan

Table 6-15 Summary of water environmental monitoring plan

S/N	Subproject name	Construction period			Operation period		
		Monitoring point	Monitoring item	Monitoring frequency	Monitoring point	Monitoring item	Monitoring frequency
1	Baoxing County Subproject	5 monitoring sections of Baoxing River and Donghe River, upstream and downstream of the Project and	Fecal coliform, pH, ammonia nitrogen, CODcr, petroleum and SS	Once in low and high flow periods respectively	1 monitoring section of Shanmugou intake	Fecal coliform, pH, ammonia nitrogen, volatile phenol, CODcr,	Once in low and high flow periods respectively

		Shanmugou intake				BOD5, petroleum and SS	
2	Lushan County Subproject	6 monitoring sections of Luxigou, Xichuan River, Lushan River and upstream and downstream of the Project area	pH, ammonia nitrogen, CODcr, petroleum and SS	Once in low and high flow periods respectively			
3	Mingshan District Subproject	4 monitoring sections of Mingshan River, Huaixi River, and upstream and downstream of the Project area	pH, ammonia nitrogen, CODcr, petroleum and SS	Once in low and high flow periods respectively			
4	Yingjing County Subproject	4 monitoring sections of Yinghe River, Jinghe River, and upstream and downstream of the Project area	pH, ammonia nitrogen, CODcr, petroleum and SS	Once in low and high flow periods respectively	/	/	/
5	Shimian County Subproject	4 monitoring sections of Nanya River and Dadu River	pH, ammonia nitrogen, CODcr, petroleum and SS	Once in low and high flow periods respectively	/	/	/
6	Yucheng District Subproject	4 sections of Qingyi River and Longxi River	pH, ammonia nitrogen, CODcr, petroleum and SS	Once in low and high flow periods respectively	/	/	/
7	Tianquan County Subproject	2 monitoring sections of upstream and downstream of Tianquan River	pH, ammonia nitrogen, CODcr, petroleum and SS	Once in low and high flow periods respectively	/	/	/

(2) Atmospheric environmental monitoring plan

Table 6-16 Summary of atmospheric environmental monitoring plan

S/N	Subproject name	Construction period			Operation period		
		Monitoring point	Monitoring item	Monitoring frequency	Monitoring point	Monitoring item	Monitoring frequency
1	Baoxing County Subproject	Air monitoring points for construction site, major schools near the project and densely populated area	PM_{10}	Monitored once each year in construction peak period	Major schools, densely populated areas, etc.	PM_{10}, NO_2 and SO_2	Once every year
2	Lushan County Subproject	Air monitoring points for construction site, major	PM_{10}	Monitored once each year in construction	Major schools, densely populated areas, etc.	PM_{10}, NO_2 and SO_2	Once every year

		schools near the project and densely populated area		peak period			
3	Mingshan District Subproject	Air monitoring points for construction site, major schools near the project and densely populated area	PM_{10}	Monitored once each year in construction peak period	Major schools, densely populated areas, etc.	PM_{10}, NO_2 and SO_2	Once every year
4	Yingjing County Subproject	Air monitoring points for construction site, major schools near the project and densely populated area	PM_{10}	Monitored once each year in construction peak period	Major schools, densely populated areas, etc.	PM_{10}, NO_2 and SO_2	Once every year
5	Shimian County Subproject	Air monitoring points for construction site, major schools near the project and densely populated area	PM_{10}	Monitored twice every year, each time for 3 days, sampled during construction	Major schools, densely populated areas, etc.	PM_{10}, NO_2 and SO_2	Once every year
6	Yucheng District Subproject	Air monitoring points for construction site, major schools near the project and densely populated area	PM_{10}	Monitored twice every year, each time for 3 days, sampled during construction	Major schools, densely populated areas, etc.	PM_{10}, NO_2 and SO_2	Once every year
7	Tianquan County Subproject	Air monitoring points for construction site, major schools near the project and densely populated area	PM_{10}	Monitored once each year in construction peak period	Major schools, densely populated areas, etc.	PM_{10}, NO_2 and SO_2	Once every year

(3) Acoustic environmental monitoring plan

Table 6-17 Summary of acoustic environmental monitoring plan

S/N	Subproject name	Construction period			Operation period		
		Monitoring point	Monitoring item	Monitoring frequency	Monitoring point	Monitoring item	Monitoring frequency
1	Baoxing County Subproject	Noise monitoring points for construction site, major schools near the project and densely populated area	Equivalent sound level A	Twice each year in construction peak period, each time for 2 days in both daytime and nighttime	Major schools, densely populated areas, etc.	Equivalent sound level A	Once half a year, each time for 2 consecutive days

2	Lushan County Subproject	Noise monitoring points for construction site, major schools near the project and densely populated area	Equivalent sound level A	Twice each year in construction peak period, each time for 2 days in both daytime and nighttime	Major schools, densely populated areas, etc.	Equivalent sound level A	Once half a year, each time for 2 consecutive days
3	Mingshan District Subproject	Noise monitoring points for construction site, major schools near the project and densely populated area	Equivalent sound level A	Twice each year in construction peak period, each time for 2 days in both daytime and nighttime	Major schools, densely populated areas, etc.	Equivalent sound level A	Once half a year, each time for 2 consecutive days
4	Yingjing County Subproject	Noise monitoring points for construction site, major schools near the project and densely populated area	Equivalent sound level A	Twice each year in construction peak period, each time for 2 days in both daytime and nighttime	Major schools, densely populated areas, etc.	Equivalent sound level A	Once half a year, each time for 2 consecutive days
5	Shimian County Subproject	Noise monitoring points for construction site, major schools near the project and densely populated area	Equivalent sound level A	Twice each year in construction peak period, each time for 2 days in both daytime and nighttime	Major schools, densely populated areas, etc.	Equivalent sound level A	Once half a year, each time for 2 consecutive days
6	Yucheng District Subproject	Noise monitoring points for construction site, major schools near the project and densely populated area	Equivalent sound level A	Twice each year in construction peak period, each time for 2 days in both daytime and nighttime	Major schools, densely populated areas, etc.	Equivalent sound level A	Once half a year, each time for 2 consecutive days
7	Tianquan County Subproject	Noise monitoring points for construction site, major schools near the project and densely populated area	Equivalent sound level A	Twice each year in construction peak period, each time for 2 days in both daytime and nighttime	Major schools, densely populated areas, etc.	Equivalent sound level A	Once half a year, each time for 2 consecutive days

6.5.3 Supervisory control and monitoring report procedures

Monitoring results are submitted to the Employer's environmental protection office (submitted to the Operator's environmental protection office during operation period) in formal written materials twice per year and sorted out & kept by the Employer. These reports are basis for assessing environmental protection work and environmental impacts of various sections and increasing environmental protection measures in case of exceeding expected workload and impacts by administrative department for environmental protection and the World Bank.

6.5.4 Implementation suggestions on public participation during construction period

1. Information publicity

   Prior to commencement of the Project, the general public shall be informed of basic information on the Project, the Employer's, the Construction Contractor's and Supervisor’s basic information and telephone numbers for public consultation and complaints by TV, newspaper and notice posting.

2. Public consultation and environmental protection compliant handling

   Set telephone numbers and organizations for public consultation and complaints during construction period to make the general public know environmental protection measure implementation and concerns fed back from the general public easily. For public interests and concerns, negotiate with the general public and reach the consensus.

Chapter 7 Conclusions

World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project is a project to build resilient infrastructures, strengthen development of disaster prevention, mitigation and emergency response capabilities and ensure safe, sustainable development of cities, and is in compliance with the World Bank security policies, national industrial policies and master plans for various towns. Besides, it is of great construction significance and supported by most of people. Various subproject construction areas are free from obvious environmental constraints. For environmental impacts caused by the Project construction, corresponding environmental protection measures and environmental management methods are proposed in EIA Report (Statement). The strict implementation of environmental protection measures in EIA Report (Statement) and strengthening environmental management during construction period can avoid and mitigate impacts of the Project implementation on environment. Based on analysis on environmental protection, World Bank Loaned Lushan Earthquake Reconstruction and Risk Reduction Project is feasible.

Attached Figures

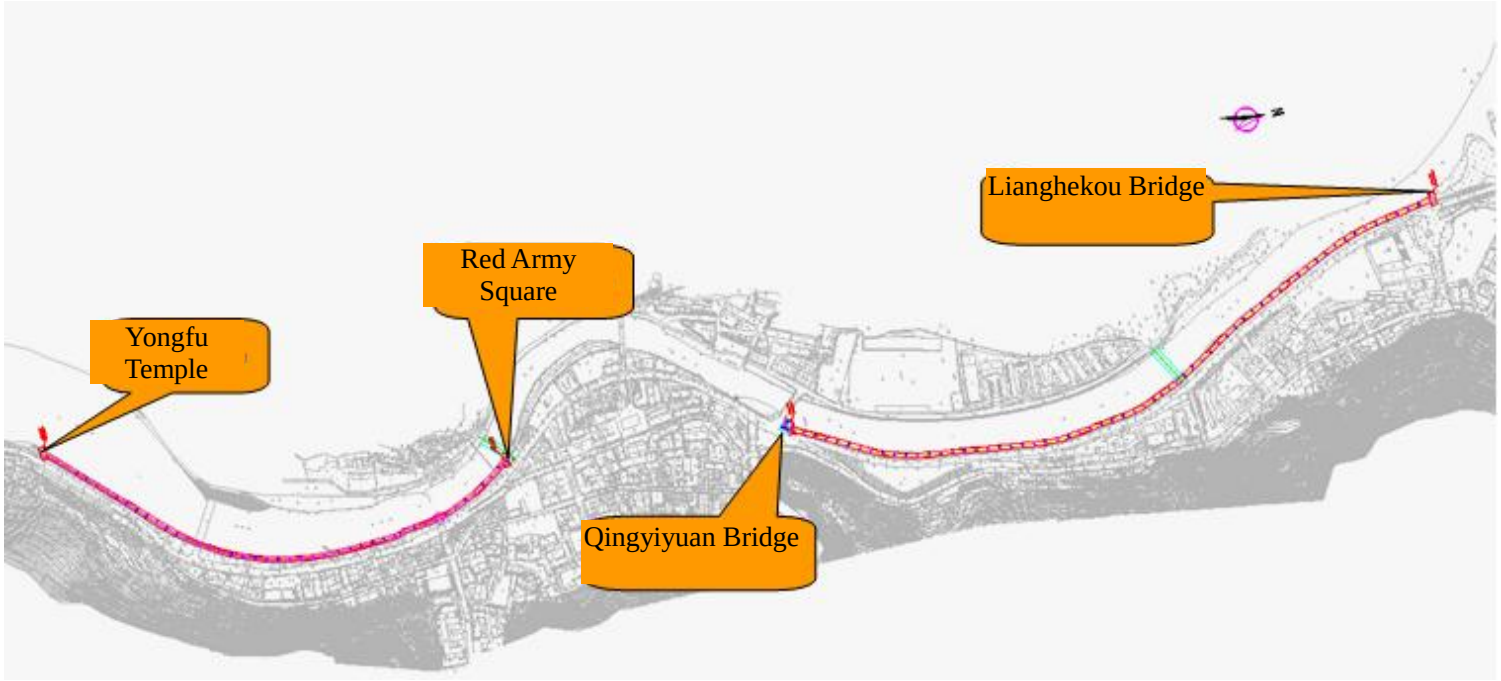

Fig. 1-1 General layout of emergency refuge passage along Yanjiang Road in Baoxing County

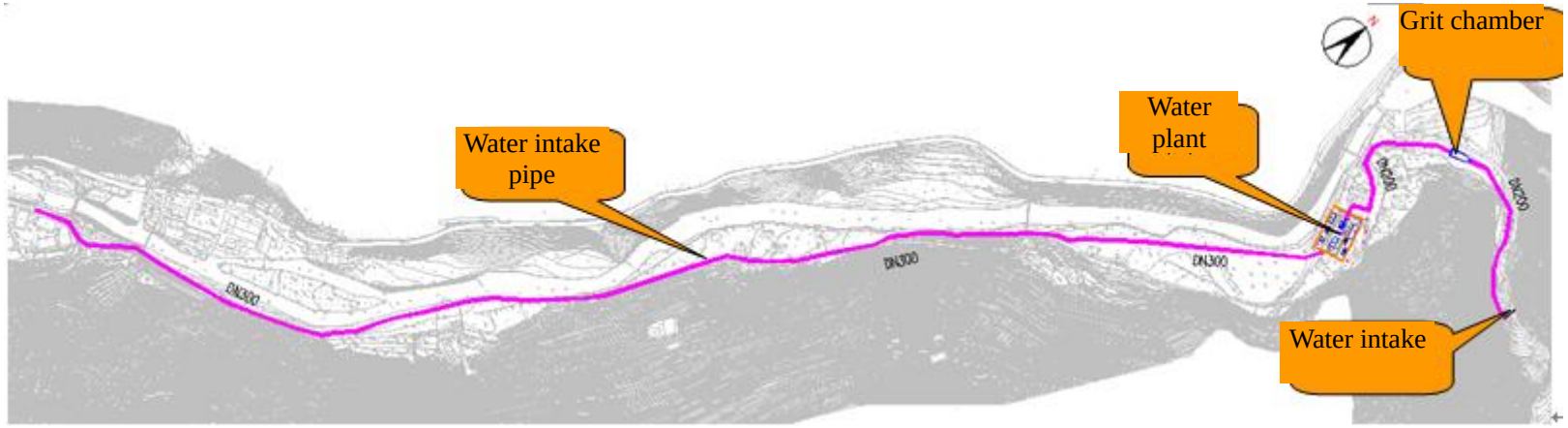

Fig. 1-2 General layout plan of Lianghekou Water Plant in Baoxing County

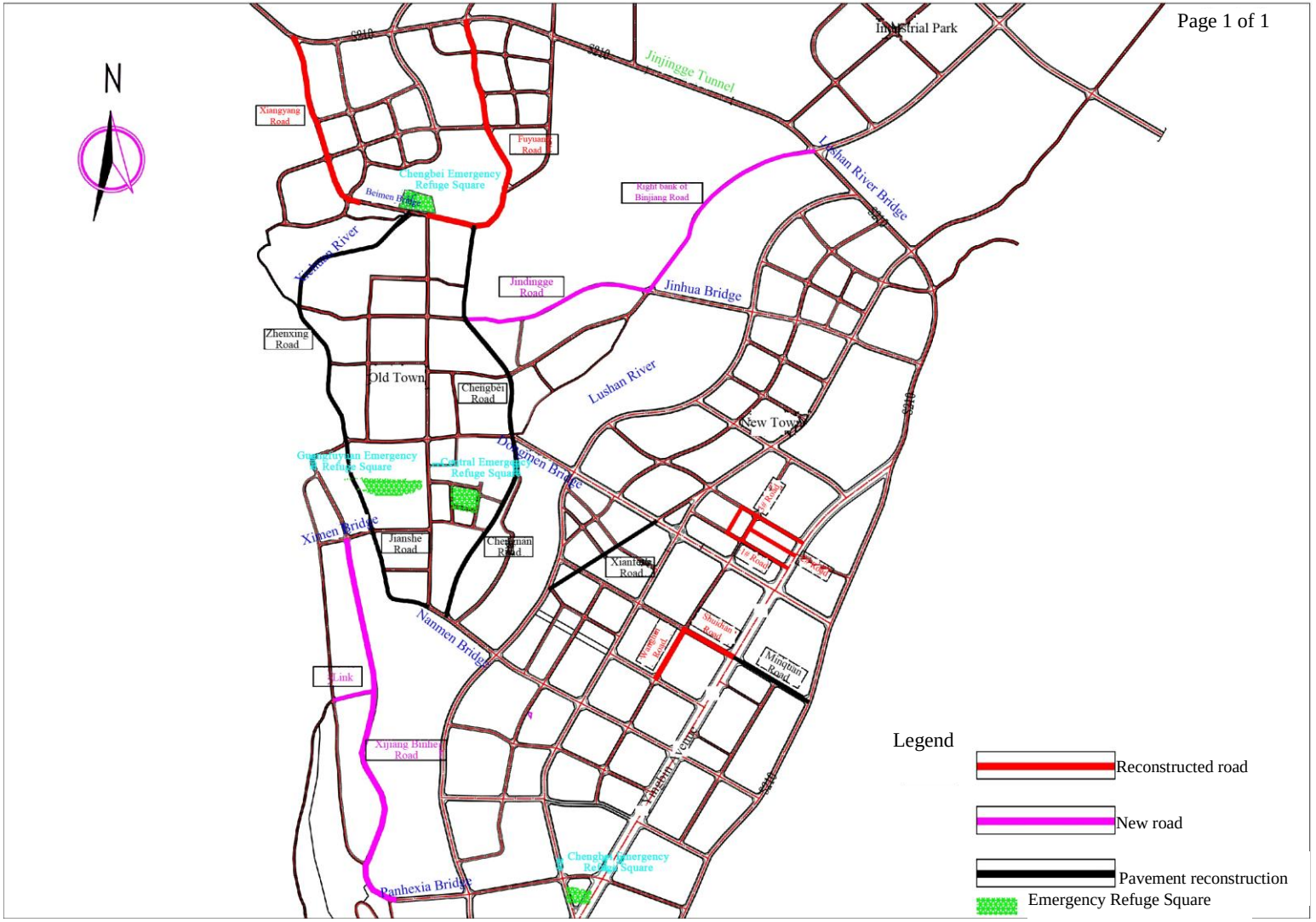

Fig. 2 General layout plan of Lushan County

Fig. 3 General plane layout of Mingshan District

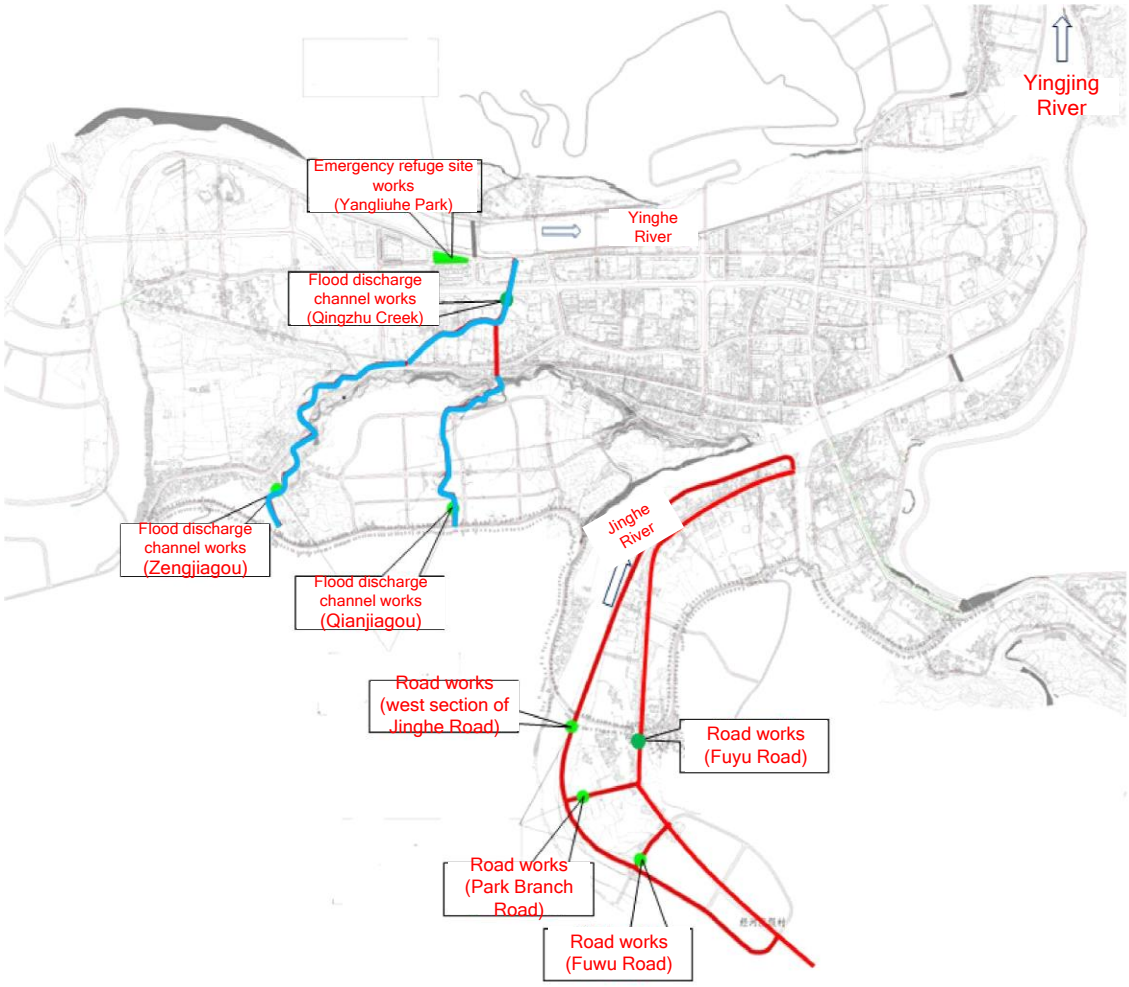

Fig. 4 General layout plan of Yingjing County

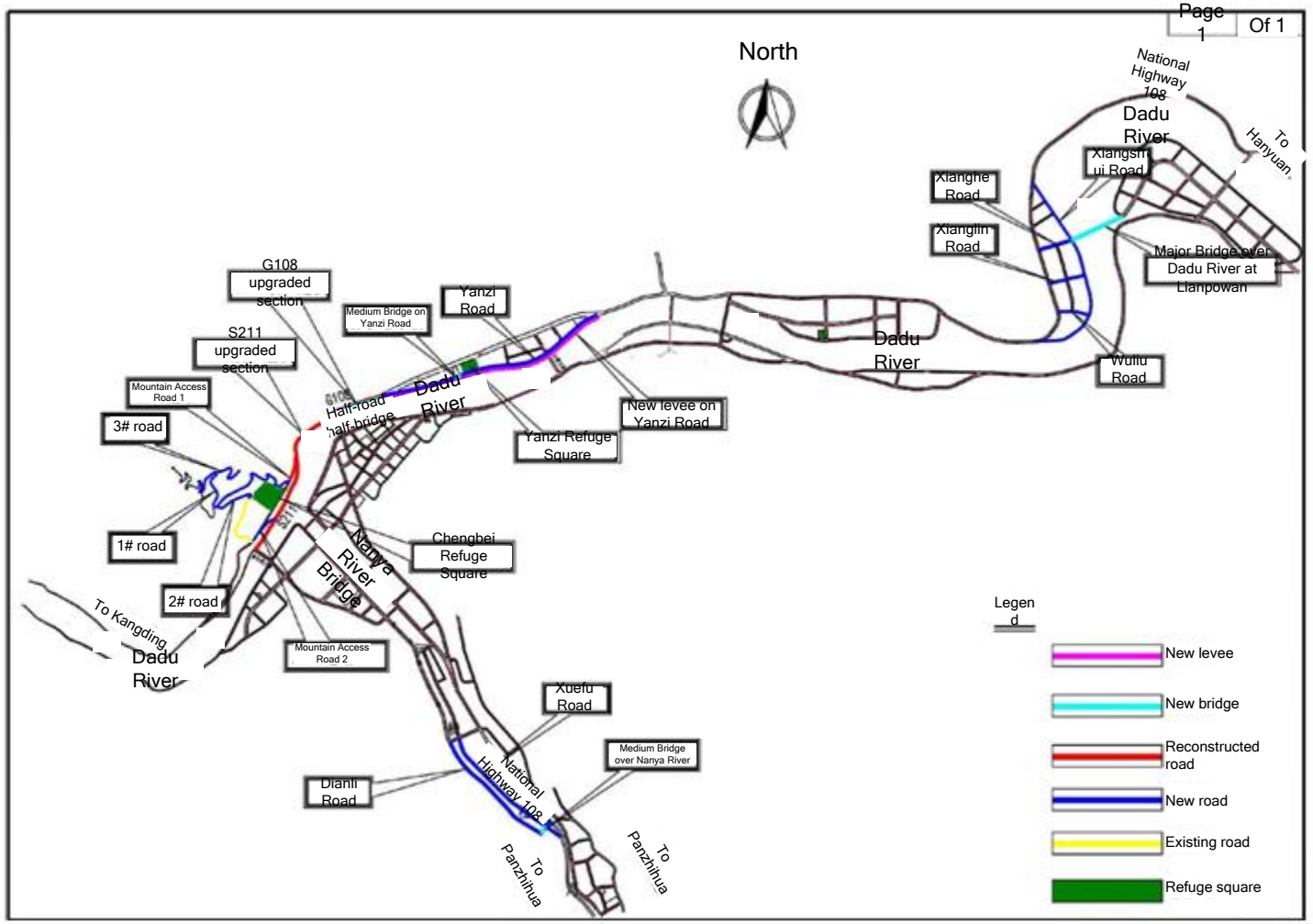

Fig. 5 General layout plan of Shimian County

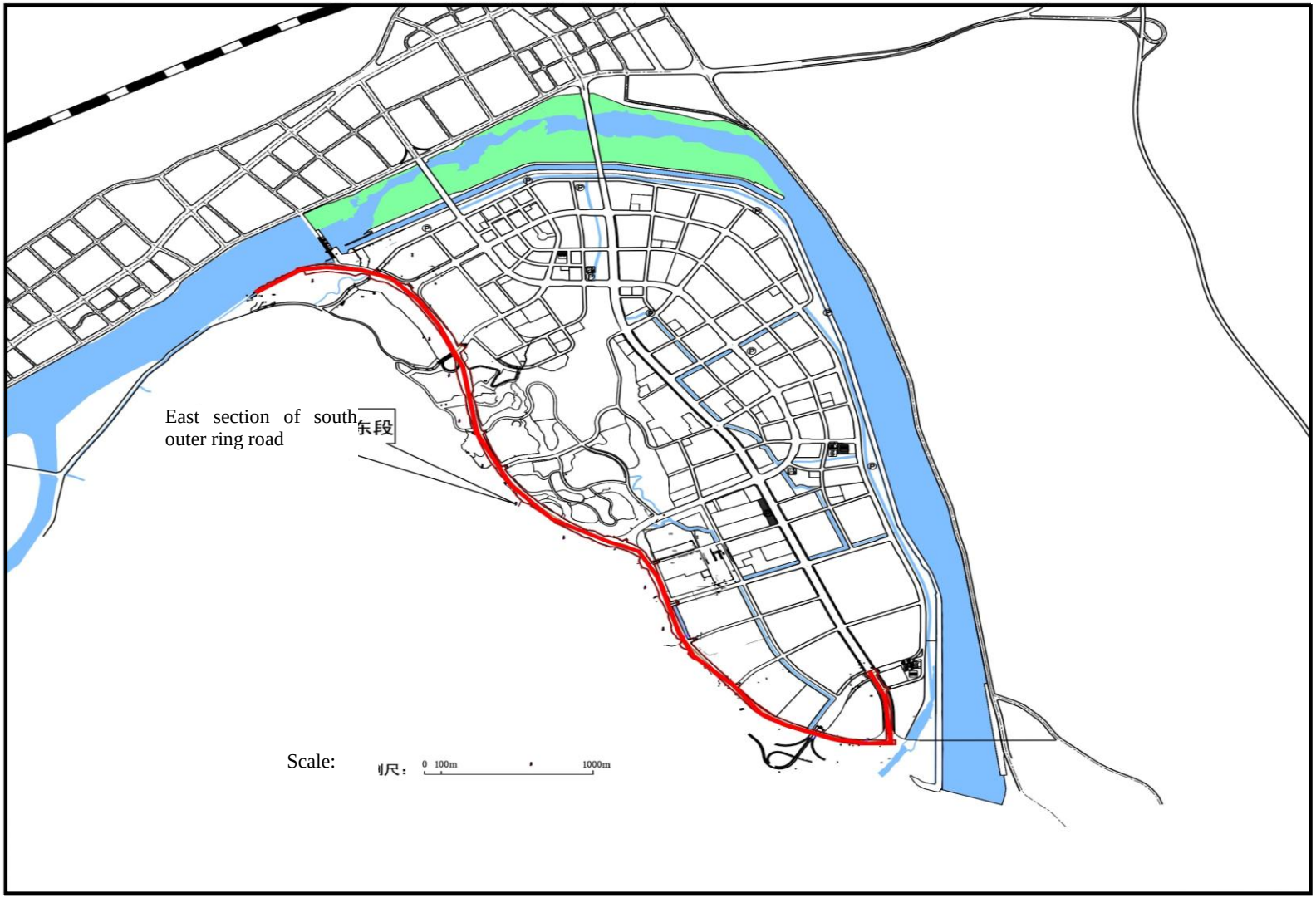

Fig. 6 General layout plan of roads in Yucheng District

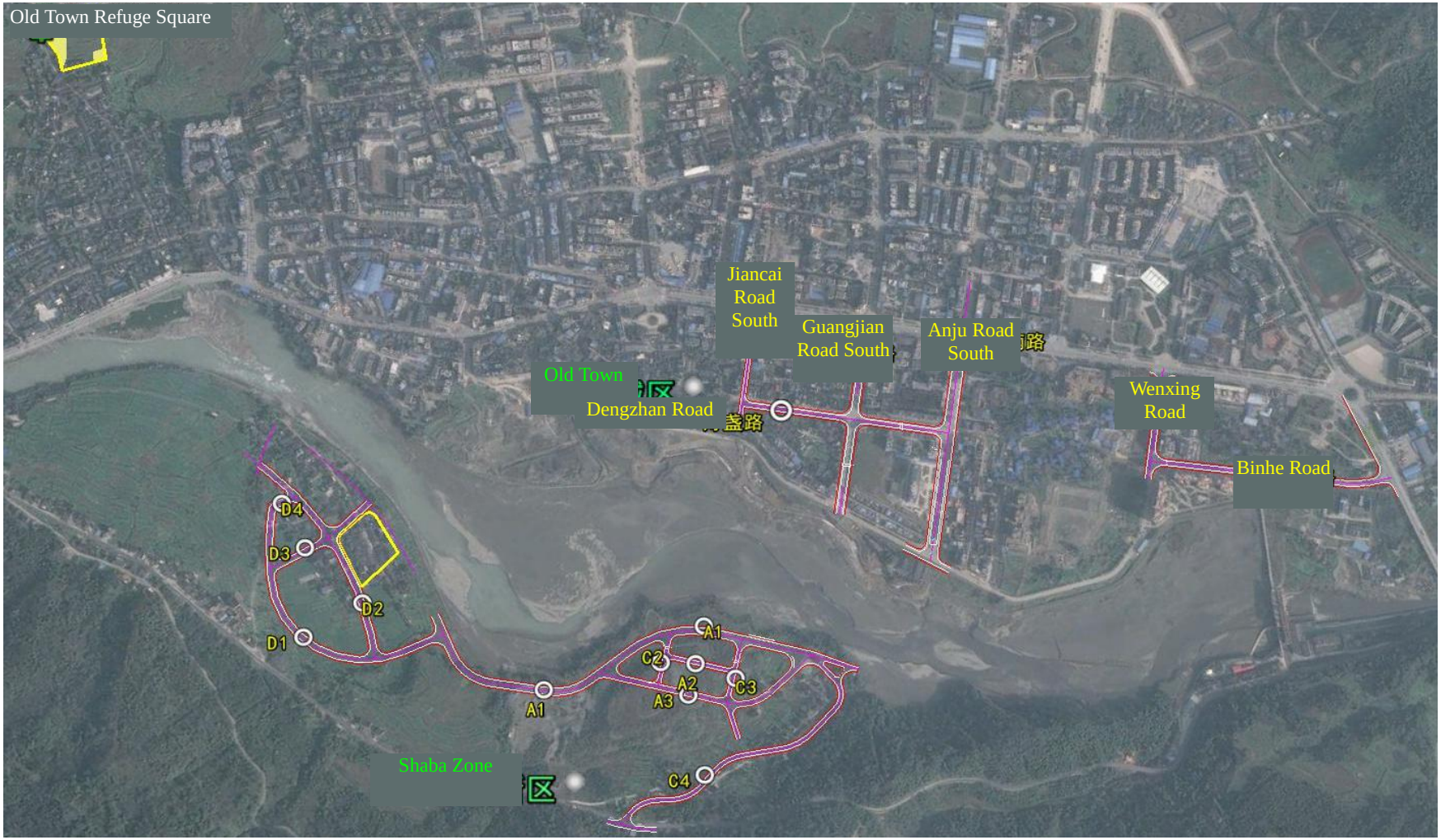

Fig. 7 General layout plan of refuge site in Tianquan County

Schedules

Schedule 1: Estimate on traffic noise level during the operation period of roads

Schedule 1-1 Results of estimate on noise level of sensitive sites in Baoxing County

Road section	Name of sensitive site	Position relationship (m)			Period	Background value (dB)	Ambient noise prediction (dB)			Superscalar (dB)		
		Direction	Distance from road centerline	Altitude difference			Short-term	Mid term	Long-term	Short-term	Mid term	Long-term
Section 3 of Zhongling Road North	Resettlement residential area in Group 2, Jianlian Village	Left side of road	45	-1	Day	54.3	54.97	55.15	55.32	/	/	/
					Night	44.5	47.48	48.35	50.47	/	/	/
Section 2 of Zhongling Road North	Zhongba Primary School of Baoxing County	Left side of road	20	1	Day	59.6	60.6	60.85	61.8	0.6	0.85	1.8
Section 1 of Zhongling Road North	Lingguan Town Health Center	Left side of road	98	-1	Day	53.5	53.76	53.83	53.89	/	/	/
					Night	43.2	44.63	45.14	45.49	/	/	/
Section 1 of Zhongling Road North	Lingguan Middle School	Left side of road	120	-4	Day	52.8	53.29	53.3	53.4	/	/	/
					Night	44.3	45.77	46.33	46.78	/	/	/
Section 1 of Zhongling Road North	Residential area at No. 20, Lingguan Road North	Left side of road	37	-2	Day	59.4	59.99	60.15	60.21	/	/	/
					Night	48.7	51.27	52.05	52.56	/	/	/

Schedule 1-2 Results of estimate on noise level of sensitive sites in Lushan County

Name of sensitive site	Road to which it belongs	Position relationship (m)			Period	Background value (dB)	Ambient noise prediction (dB)			Superscalar (dB)		
		Direction	Distance from road centerline	Altitude difference			Short-term	Mid term	Long-term	Short-term	Mid term	Long-term
Group 3 of Luxi Village	Xiangyang Road	East of the road	6	0	Day	52.9	53.71	53.94	54.42	0	0	0
					Night	44.0	45.96	46.10	46.91	0	0	0
Residential area of Luxi Village	Xiangyang Road	East of the road	194	0	Day	54.0	54.3	54.97	55.57	0	0	0
					Night	44.3	44.85	44.98	45.35	0	0	0
Xinmin Group in	Fuyuan Road	East of the road	8	0	Day	54.4	55.11	55.19	55.72	0	0	0
					Night	43.1	43.38	43.88	44.39	0	0	0

Daban Village												
Residential area of Daban Village in Heren Township	Fuyuan Road	Southeast of the road	12	0	Day	54.7	55.02	55.13	56.15	0	0	0
					Night	44.7	44.88	44.92	44.94	0	0	0
Group 1 of Xijiang Village	Xijiang Binhe Road	West of the road	65	2	Day	54.8	55.51	56.07	56.28	0	0	0
					Night	48.50	48.70	49.82	50.04	0	0	0.04
Group 2 of Xijiang Village	Xijiang Binhe Road	West of the road	74	2	Day	58.2	58.31	58.76	58.86	0	0	0
					Night	43.6	46.76	46.85	46.96	0	0	0
Group 3 of Xijiang Village	Xijiang Binhe Road	West of the road	68	3	Day	55.2	56.21	56.38	56.52	0	0	0
					Night	43.8	46.61	46.84	47.25	0	0	0
Group 4 of Xijiang Village	Link road of Xijiang Road	West of the road	4	0	Day	55.0	58.85	59.09	59.21	0	0	0
					Night	43.8	50.5	51.14	51.69	0.5	1.14	1.69
Residential area along Community Group Road	Community Group Road	North of the road	10	0	Day	54.3	54.81	55.00	55.23	0	0	0
					Night	44.4	44.95	45.13	45.30	1	1	1
People's Hospital of Lushan County	Community Group Road	South of the road	116	0	Day	59.4	59.53	54.35	54.89	0	0	0
					Night	47.8.	48.19	48.20	48.24	0	0	0
Center for Disease Control of Lushan County	Community Group Road	Southwest of the road	12	0	Day	59.4	59.52	59.71	59.89	0	0	0
					Night	47.8.	47.82	48.34	48 .83	0	0	0

All sensitive sites of acoustic environment of the road works under this subproject shall meet the requirements for Class 2 regions. Except slight exceedance of noise level in Group 1 and Group 4 of Xijiang Village, other sensitive sites are all in compliance with the standard limits for Class 2 regions specified in *Environmental Quality Standard for Noise* (GB3096-2008) during the operation period in the near term (2018), mid term (2025) and long term (2033).

Schedule 1-3 Results of estimate on noise level of sensitive sites in Mingshan District

Name of sensitive site	Road to which it belongs	Position relationship (m)			Period	Background value (dB)	Ambient noise prediction (dB)			Executive standard	Superscalar (dB)		
		Direction	Distance from road centerline	Altitude difference			Short-term	Mid term	Long-term		Short-term	Mid term	Long-term
Residential area along Jiangbian Street	Pingqiao Road 6	Southeast of the road	63	0	Day	55.9	56.26	56.42	56.52	Class 2	0	0	0
					Night	46.8	47.70	47.85	48.00	Class 2	0	0	0
No. 2 Middle School of Mingshan District	Pingqiao Road 6	Southeast of the road	194	+3	Day	54.5	54.65	54.74	54.79	Class 2	0	0	0
					Night	44.8	45.28	45.37	45.46	Class 2	0	0	0
Chengdong Township Government	Pingqiao Road 6	East of the road	130	+2	Day	57.1	57.24	57.31	57.34	Class 2	0	0	0
					Night	46.3	46.81	46.90	46.99	Class 2	0	0	0
Residential area along Dongjiang Road	Pingqiao Road 5 and Pingqiao Road 6	Southeast of the road, Southwest of the road	124, 73	0	Day	58.0	58.32	58.46	58.55	Class 2	0	0	0
					Night	44.4	46.28	46.62	46.92	Class 2	0	0	0
Residents along Yuehua Street	Pingqiao Road 5	Southwest of the road	115	0	Day	56.9	57.07	57.16	57.51	Class 2	0	0	0
					Night	45.9	46.45	46.68	46.82	Class 2	0	0	0
Mingdu Compound	Pingqiao Road 3	West of the road	157	+2	Day	56.7	56.88	56.97	56.70	Class 2	0	0	0
					Night	46.4	46.91	47.09	47.19	Class 2	0	0	0
Mngshan Middle School	Extension line of Minsheng Road	East of the road	150	+5	Day	53.9	54.28	54.43	54.57	Class 2	0	0	0
					Night	41.9	43.33	43.76	44.15	Class 2	0	0	0
Experimental Primary School of Mingshan County	Extension line of Minsheng Road	East of the road	140	+5	Day	57.8	57.97	58.02	58.11	Class 2	0	0	0
					Night	44.2	45.15	45.46	45.75	Class 2	0	0	0
Minyi Compound	Extension line of Minsheng	West of the road	10	0	Day	53.8	57.91	58.89	59.72	Class 4a	0	0	0
					Night	43.4	50.93	52.09	53.01	Class 4a	0	0	0

	Road												
Miaomiao Kindergarten	Extension line of Minsheng Road	East of the road	78	+3	Day	53.3	54.10	54.38	54.67	Class 2	0	0	0
					Night	42.7	44.80	45.38	45.90	Class 2	0	0	0
Residential area along Minsheng Road	Extension line of Minsheng Road	East of the road	82	0	Day	56.9	57.25	57.38	57.52	Class 2	0	0	0
					Night	42.3	44.48	45.07	45.59	Class 2	0	0	0

Except Minyi Compound for which Class 4a is adopted, other targets of protection for acoustic environment during the operation of the road works under the subproject shall meet the requirements for Class 2. The specific impacts of road works of the subproject on totally 11 sensitive sites are as follows:

Class 2 sensitive sites can satisfy the standard limits for Class 2 regions specified in *Environmental Quality Standard for Noise* (GB3096-2008) during the operation period in the near term (2018), mid term (2025) and long term (2033). Class 4a sensitive sites can satisfy the standard limits for Class 2 regions specified in *Environmental Quality Standard for Noise* (GB3096-2008) during the operation period in the near term (2018), mid term (2025) and long term (2033).

Schedule 1-4 Results of estimate on noise level of sensitive sites in Yingjing County

Name of sensitive site	Road to which it belongs	Position relationship (m)			Period	Background value (dB)	Ambient noise prediction (dB)			Executive standard	Superscalar (dB)		
		Direction	Distance from road centerline	Altitude difference			Short-term	Mid term	Long-term		Short-term	Mid term	Long-term
Residential area along west section of Jinghe Road	Fuyu Road	On both sides of the road	8.5	0	Day	57.2	59.07	60.65	65.91	Class 4a	0	0	0
					Night	45.6	49.33	51.86	57.92	Class 4a	0	0	0
Group 3 of Nanluoba Village	Fuyu Road	West of the road	13	1	Day	54.9	57.06	58.8	64.31	Class 4a	0	0	0
					Night	44.1	47.83	49.48	56.40	Class 4a	0	0	0
Group 1 of Nanluoba Village	Park branch	North of the road	44	0	Day	55.7	57.64	58.86	59.95	Class 2	0	0	0
					Night	45.1	48.74	49.80	49.86	Class 2	0	0	0
Group 5 of Nanluoba Village	Fuyu Road	East of the road	13	1	Day	55.9	56.59	57.31	57.81	Class 4a	0	0	0
					Night	42.8	46.94	46.75	47.60	Class 4a	0	0	0
Tuanjie Group of Nanluoba Village	West section of Jinghe Road	North of the road	14	1	Day	54.7	62.85	65.44	69.36	Class 4a	0	0	0
					Night	42.0	56.78	57.58	61.61	Class 4a	0	0	1.61

Group 6 of Nanluoba Village	Fuyu Road	North of the road	16	0	Day	54.6	63.89	62.25	64.5	Class 4a	0	0	0
					Night	41.1	56.32	54.54	56.86	Class 4a	0	0	0
County Maternal and Child Care Service Center	Fuyu Road	South of the road	25.5	0	Day	56.8	61.84	60.21	62.45	Class 4a	0	0	0
					Night	47.6	52.27	52.5	54.82	Class 4a	0	0	0
Nanluoba Village Clinic	Fuyu Road	East of the road	7.5	0	Day	56.7	60.80	62.65	62.69	Class 4a	0	0	0
					Night	47.1	54.79	54.53	54.62	Class 4a	0	0	0
Fucheng Township Health Center	Fuyu Road	West of the road	11.5	0	Day	52.9	65.35	63.72	65.96	Class 4a	0	0	0
					Night	47.1	57.78	56.01	58.33	Class 4a	0	0	0
Central Primary School of Fucheng Township	Fuyu Road	West of the road	19.5	0	Day	55.7	63.02	61.38	63.63	Class 4a	0	0	0
					Night	43.6	55.45	53.67	55.99	Class 4a	0	0	0
County Vocational Middle School	Fuyu Road	East of the road	101.5	0	Day	55.7	55.83	54.19	56.44	Class 2	0	0	0
					Night	43.6	48.26	46.49	48.80	Class 2	0	0	0
Aixin Kindergarten	West section of Jinghe Road	East of the road	148	3	Day	55.7	56.21	56.78	59.69	Class 2	0	0	0
					Night	45.1	46.08	47.11	49.90	Class 2	0	0	0
Wuxian Township Primary School	Fuwu Road	West of the road	10.5	0	Night	57.4	58.65	59.83	64.39	Class 2	0	0	4.39
					Day	43.5	47.37	49.88	56.03	Class 2	0	0	6.03

The predicted noise values both in the daytime and in the nighttime of six spots (County Maternal and Child Care Service Center, Nanluoba Village Clinic, Fucheng Township Health Center, Central Primary School of Fucheng Township, Wuxian Township Primary School, Tuanjie Group of Nanluoba Village) among the 15 sensitive spots in the Project during the operation period in the short term (2018), mid term (2025) and long term (2033) exceed the Class 2 and Class 4a limits specified in *Environmental Quality Standard for Noise*. Therefore it is suggested that soundproof glass be installed for the County Maternal and Child Care Service Center, Nanluoba Village Clinic, Fucheng Township Health Center, the teaching building of Central Primary School of Fucheng Township, the teaching building of Wuxian Township Primary School, and the residential houses of Tuanjie Group of Nanluoba Village. Meanwhile, traffic control shall be enhanced after the road is finished and put into operation to prevent excessive noise due to traffic jamming. Noise monitoring shall be strengthened for vehicles. High-noise vehicles shall be prohibited from getting on the road, nor overspeed driving is permitted.

Schedule 1-5 Results of estimate on noise level of sensitive sites in Shimian County

S/N	Sensitive site	Project name	Pile No.	Functional area of acoustical environment	Altitude difference (m)	Distance from the road boundary (m)	Period	Background value (dB)	Contribution to traffic noise (dB)			Ambient noise prediction (dB)			Superscalar (dB)		
									Short-term	Mid term	Long-term	Short-term	Mid term	Long-term	Short-term	Mid term	Long-term
1	villagers of Group 3 of Shunhe Village	Dianli Road, Nanyahe Medium Bridge	DLK1+140	Class 2	+8	45	Day	55.0	54.2	54.3	54.8	55.45	55.47	55.49	0	0	0
							Night	46.0	49.1	49.2	50.0	46.22	46.43	46.63	0	0	0
2	villagers of Group 4 of Shunhe Village		DLK0+115	Class 2	+10	15	Day	53.7	58.89	59.63	60.37	56.18	56.22	56.45	0	0	0
							Night	46.1	52.99	53.57	54.43	48.84	49.20	49.71	0	0	0
3	Government office building	Xuefu Road	XFK0+000	Class 2	0	92	Day	58.9	53.13	54.03	54.59	59.64	59.72	59.80	0	0	0
							Night	44.7	47.07	47.92	48.62	47.22	47.87	48.26	0	0	0
4	Mingzu Middle School in Shimian County	Dianli Road	DLK0+000	Class 2	0	135	Day	58.0	50.42	51.15	51.89	58.16	58.16	58.18	0	0	0
							Night	46.3	44.51	45.09	45.95	47.21	47.22	47.3	0	0	0
5	Chengbei Settlement Building Compound 9	Road of Chengbei Settlement Building Compound	2DLK0+680	Class 2	0	8	Day	54.2	51.35	53.96	54.81	56.83	58.10	58.56	0	0	0
							Night	44.5	47.73	48.14	48.87	50.62	50.83	51.27	0.62	0.83	1.27
6	Chengbei Settlement Building Compound 4	Road of Chengbei Settlement Building Compound	2DLK0+400	Class 2	-2	18	Day	54.2	48.35	50.96	51.81	55.83	57.10	57.56	0	0	0
							Night	44.5	44.73	45.14	45.87	49.35	49.50	49.78	0	0	0
7	Chengbei Middle School	Road S1	S1 K0+120	Class 2	+6	20	Day	56.0	52.2	54.76	56.35	56.68	56.97	57.24	0	0	0
							Night	45.9	49.19	49.61	50.33	49.39	49.49	49.68	0	0	0
8	Jiuzhoutianshui Mingcheng Compound	Yanzi Road	1YZ K1+360	Class 2	+15	84	Day	58.6	49.3	49.8	50.1	58.62	58.63	58.64	0	0	0
							Night	45.6	42.3	42.7	43.0	45.84	45.85	45.86	0	0	0
9	Zhaoyang Compound	Yanzi Road	1YZ K1+060	Class 2	+20	108	Day	57.5	49.0	49.2	49.3	57.51	57.52	57.52	0	0	0
							Night	47.5	40.9	41.4	41.7	47.56	47.57	47.58	0	0	0
10	Qiyi Middle School, Health Centre for Women and	Yanzi Road	1YZ K0+720	Class 2	+3	88	Day	55.5	49.3	49.8	50.1	55.72	55.82	55.84	0	0	0
							Night	44.9	42.3	42.7	43.0	46.04	46.13	46.21	0	0	0

S/N	Sensitive site	Project name	Pile No.	Functional area of acoustical environment	Altitude difference (m)	Distance from the road boundary (m)	Period	Background value (dB)	Contribution to traffic noise (dB)			Ambient noise prediction (dB)			Superscalar (dB)		
	Children								Short-term	Mid term	Long-term	Short-term	Mid term	Long-term	Short-term	Mid term	Long-term
11	Villagers of Yulong Village	Dadu River Bridge of Lianpowan	XH K0+653	Class 2	+5	60	Day	57.6	57.96	58.58	59.48	59.17	59.15	59.43	0	0	0
							Night	45.6	51.99	52.64	53.49	50.54	50.84	51.26	0.54	0.84	1.26

According to the forecast results, the sensitive spots in compliance with the Class 2 standard in the Project generally can meet the Class 2 limit requirements in *Environmental Quality Standard for Noise* (GB3096-2008). Slight exceedance only comes from the Chengbei Settlement Building Compound 9 and Yulong Village. Affected by the traffic noise during the operation period of the new 2DL road, the exceedance of noise in Chengbei Settlement Building Compound in the short term, mid term and long term is respectively 0.62dB, 0.83dB and 1.27dB. The affected residents are mainly the first row of households (about 48 households (150 people)); affected by the traffic noise during the operation period of the bridge crossing Dadu River, the exceedance of noise in Group 2 of Yulong Village in the short term, mid term and long term is respectively 0.54dB, 0.84dB and 1.26dB, and 5 households (15 people) are affected.

In summary, traffic noise in the operation period of the Project mainly has impacts on the night life and rest of residents of Chengbei Settlement Building Compound 9 and Yulong Village within the assessment scope. Before construction and reconstruction of the Project, the monitored noise value in the nighttime in Chengbei Settlement Building Compound 9 and Yulong Village met the Class 2 standard in *Environmental Quality Standard of Noise* (GB3096-2008). The aforementioned forecast shows that slight exceedance will occur in the short term, mid term and long term after operation of the Project and that the noise impact is acceptable by taking some noise reduction measures.

Schedule 1-6 Calculation parameters of estimate points of road works of Yucheng District

S/N	Sensitive site	Road type	Minimum distance between the first row of houses and the road centerline		Number of households being assessed	Functional area of acoustical environment	Period	Background value (dB)	Contribution value			Predictive value			Over standard		
									Near term	Mid term	Long term	Near term	Mid term	Long term	Near term	Mid term	Long term
1	East Section of South Outer Ring Road k0+140~k0+320	Filling	Left side of road	22	62	Class 4a	Day	48.9	60.81	63.02	65.57	61.08	63.19	65.66	-	-	-
							Night	40.8	55.66	57.87	59.72	55.80	57.95	59.78	0.80	2.95	4.78
2	East Section of South Outer Ring Road k1+080~k1+240	Excavation	Right side of road	28	18	Class 4a	Day	47.7	59.73	61.94	64.49	59.99	62.1	64.58	-	-	-
							Night	40.5	54.58	56.79	58.64	54.65	56.89	58.71	-	1.89	3.71

3	East Section of South Outer Ring Road k1+520~k1+560	Filling	Right side of road	35	10	Class 4a	Day	47.7	58.77	60.98	63.53	59.10	61.18	63.64	-	-	-
							Night	40.5	53.62	55.83	57.68	53.83	55.96	57.76	-	0.96	2.76
4	East Section of South Outer Ring Road K2+340~k2+460	Excavation	Right side of road	38	16	Class 4a	Day	47.8	58.41	60.62	63.17	58.77	60.84	63.29	-	-	-
							Night	40.5	53.26	55.47	57.32	53.48	55.61	57.41	-	0.61	2.41
5	East Section of South Outer Ring Road K3+320~k3+360	Excavation	Right side of road	39	7	Class 4a	Day	47.5	58.29	60.50	63.05	58.64	60.71	63.17	-	-	-
							Night	40.2	53.14	55.35	57.20	53.36	55.48	57.29	-	0.48	2.29
6	East Section of South Outer Ring Road K5+040~k5+080	Filling	Right side of road	38	45	Class 4a	Day	48.6	58.43	60.68	63.19	58.86	60.94	63.34	-	-	-
							Night	40.5	53.29	55.48	57.35	53.51	55.62	57.44	-	0.62	2.44

According to estimate results, noise levels of some of above sensitive targets are out of the limits as they are close to the boundary of the project. According to EIA, roadside windows of buildings with out-of-limit noise levels shall be reconstructed and replaced with ventilation soundproof windows to ensure the noise level of each floor satisfies Class 4a requirements specified in *Environmental Quality Standard for Noise* (GB3096-2008).

Schedule 1.7 Results of estimate on noise level of sensitive sites in Tianquan County

S/N	Name of sensitive site	Location of monitoring points	Distance from road centerline (m)	Distance from house to road boundary (m)	Prediction period	Environmental status quo value		Sound level of environmental background dB(A)		Estimated traffic noise level (dB)		Ambient noise prediction dB(A)		Standard value dB(A)		Superscaler dB(A)		Prediction value-present value	
						Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
1	Commerce and residence compound at No. 10, Anju Road South	At 1.0m from the first floor of the front-row house subject to Class 4	17	3	Short-term	57.8	46.5	49.3	43.3	61.9	52.4	62.1	52.9	70	55	Up to standard	Up to standard	4.3	6.4
			17	3	Mid term	57.8	46.5	49.3	43.3	57.4	55.7	58.0	55.9	70	55	Up to standard	0.9	0.2	9.4
			17	3	Long-term	57.8	46.5	49.3	43.3	58.2	56.3	58.7	56.5	70	55	Up to standard	1.5	0.9	10.0

S/N	Name of sensitive site	Location of monitoring points standards	Distance from road centerline (m)	Distance from house to road boundary (m)	Prediction period	Environmental status quo value		Sound level of environmental background dB(A)		Estimated traffic noise level (dB)		Ambient noise prediction dB(A)		Standard value dB(A)		Superscaler dB(A)		Prediction value-present value	
						Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2	In-patient Department of Tianquan Hospital of Traditional Chinese Medicine	At 1.0m from the first floor of the In-patient Department	44	30	Near term	56.4	49.9	48.7	41.2	54.4	44.9	55.5	46.4	60	50	Up to standard	Up to standard	-0.9	-3.5
			44	30	Mid term	56.4	49.9	48.7	41.2	49.9	48.2	52.4	49.0	60	50	Up to standard	Up to standard	-4.0	-0.9
			44	30	Long-term	56.4	49.9	48.7	41.2	50.7	48.8	52.8	49.5	60	50	Up to standard	Up to standard	-3.6	-0.4
3	Tianquan County Health Bureau	At 1.0 m from the first floor of the office building	15	1	Near term	60.8	54.6	53.5	44	62.5	52.9	63.0	53.4	70	55	Up to standard	Up to standard	2.2	-1.2
			15	1	Mid term	60.8	54.6	53.5	44	57.9	56.2	59.3	56.5	70	55	Up to standard	1.5	-1.5	1.9
			15	1	Long term	60.8	54.6	53.5	44	58.7	56.8	59.9	57.0	70	55	Up to standard	2.0	-0.9	2.4
4	Dependant's area of the TCM Hospital	At 1.0m from the first floor of the front-row house subject to Class 4 standards	17	3	Near term	57.4	51.3	49.1	43.3	61.9	52.4	62.1	52.9	70	55	Up to standard	Up to standard	4.7	1.6
			17	3	Mid term	57.4	51.3	49.1	43.3	57.4	55.7	58.0	55.9	70	55	Up to standard	0.9	0.6	4.6
			17	3	Long-term	57.4	51.3	49.1	43.3	58.2	56.3	58.7	56.5	70	55	Up to standard	1.5	1.3	5.2
5	Outpatient	At 1.0m	30	16	Near	54.	48.9	48.	43.6	58.	48.9	58.	50.0	60	50	Up to	Up to	4.7	1.1

S/N	Name of sensitive site	Location of monitoring points	Distance from road centerline (m)	Distance from house to road boundary (m)	Prediction period	Environmental status quo value		Sound level of environmental background dB(A)		Estimated traffic noise level (dB)		Ambient noise prediction dB(A)		Standard value dB(A)		Superscaler dB(A)		Prediction value-present value	
						Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
	Department of the TCM Hospital	from the outpatient building			term	2		8		4		9				standard	standard		
			30	16	Mid term	54.2	48.9	48.8	43.6	53.9	52.2	55.1	52.7	60	50	Up to standard	2.7	0.9	3.8
			30	16	Long-term	54.2	48.9	48.8	43.6	54.7	52.8	55.7	53.3	60	50	Up to standard	3.3	1.5	4.4
6	Long-distance Communication Bureau Dormitory and surrounding residential buildings	At 1.0m from the office building	12	1	Near term	59.4	53.3	51.8	42.5	55.9	49.9	57.3	50.6	70	55	Up to standard	Up to standard	-2.1	-2.7
			12	1	Mid term	59.4	53.3	51.8	42.5	56.7	50.6	57.9	51.3	70	55	Up to standard	Up to standard	-1.5	-2.0
			12	1	Long term	59.4	53.3	51.8	42.5	57.5	51.4	58.5	52.0	70	55	Up to standard	Up to standard	-0.9	-1.3
7	Dianli Compound	At 1.0m from the first floor of the front-row house subject to Class 4 standards	12	1	Near term	59.7	52.5	50.7	42.1	55.9	49.9	57.0	50.5	70	55	Up to standard	Up to standard	-2.7	-2.0
			12	1	Mid term	59.7	52.5	50.7	42.1	56.7	50.6	57.6	51.2	70	55	Up to standard	Up to standard	-2.1	-1.3
			12	1	Long-term	59.7	52.5	50.7	42.1	57.5	51.4	58.3	51.9	70	55	Up to standard	Up to standard	-1.4	-0.6
8	County Maternal and Child Care Service Center	At 1.0m from the front-row house subject to Class 4	31	20	Near term	54.6	48.5	47.6	39.9	51.2	45.2	52.8	46.3	60	50	Up to standard	Up to standard	-1.8	-2.2
			31	20	Mid term	54.6	48.5	47.6	39.9	52.0	46.0	53.4	47.0	60	50	Up to standard	Up to standard	-1.2	-1.5
			31	20	Long term	54.6	48.5	47.6	39.9	52.8	46.8	54.0	47.6	60	50	Up to standard	Up to standard	-0.6	-0.9

S/N	Name of sensitive site	Location of monitoring points standards	Distance from road centerline (m)	Distance from house to road boundary (m)	Prediction period	Environmental status quo value		Sound level of environmental background dB(A)		Estimated traffic noise level (dB)		Ambient noise prediction dB(A)		Standard value dB(A)		Superscaler dB(A)		Prediction value-present value	
						Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
9	Government Dormitory	At 1.0m from the first floor of the front-row house subject to Class 4 standards	16	5	Near term	58.6	47.5	49.6	41.4	54.6	48.6	55.8	49.4	70	55	Up to standard	Up to standard	-2.8	1.9
			16	5	Mid term	58.6	47.5	49.6	41.4	55.4	49.4	56.4	50.0	70	55	Up to standard	Up to standard	-2.2	2.5
			16	5	Long term	58.6	47.5	49.6	41.4	56.2	50.2	57.1	50.7	70	55	Up to standard	Up to standard	-1.5	3.2
			16	5	Long term	58.4	47.5	49.5	41.2	54.7	48.7	55.8	49.4	70	55	Up to standard	Up to standard	-2.6	1.9
		At 1.0m from the first floor of the front-row house subject to Class 2 standards	46	35	Near term	56.5	45.2	46.5	38.2	44.1	38.1	48.5	41.2	60	50	Up to standard	Up to standard	-8.0	-4.0
			46	35	Mid term	56.5	45.2	46.5	38.2	44.9	38.9	48.8	41.6	60	50	Up to standard	Up to standard	-7.7	-3.6
			46	35	Long term	56.5	45.2	46.5	38.2	45.7	39.7	49.1	42.0	60	50	Up to standard	Up to standard	-7.4	-3.2
			46	35	Long term	56.5	45	46.5	38	48.3	42.3	50.5	43.6	60	50	Up to standard	Up to standard	-6.0	-1.4
10	Telecommunication Office Building	At 1.0m from the first floor of the	12	1	Near term	58.8	52.5	51.6	40.9	55.9	49.9	57.3	50.4	70	55	Up to standard	Up to standard	-1.5	-2.1
			12	1	Mid term	58.8	52.5	51.6	40.9	56.7	50.7	57.9	51.1	70	55	Up to standard	Up to standard	-0.9	-1.4
			12	1	Long	58.	52.5	51.	40.9	57.	51.5	58.	51.8	70	55	Up to	Up to	-0.	-0.7

S/N	Name of sensitive site	Location of monitoring points	Distance from road centerline (m)	Distance from house to road boundary (m)	Prediction period	Environmental status quo value		Sound level of environmental background dB(A)		Estimated traffic noise level (dB)		Ambient noise prediction dB(A)		Standard value dB(A)		Superscaler dB(A)		Prediction value-present value	
						Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
		office building			term	8		6		5		5				standard	standard	3	
11	Dormitory of Muzong Factory and the surrounding residential areas	At 1.0m from the first floor of the front-row house subject to Class 4 standards	7.5	2	Near term	57.5	46.3	51.7	39.8	56.0	49.9	57.3	50.3	70	55	Up to standard	Up to standard	-0.2	4.0
			7.5	2	Mid term	57.5	46.3	51.7	39.8	56.7	50.7	57.9	51.1	70	55	Up to standard	Up to standard	0.4	4.8
			7.5	2	Long term	57.5	46.3	51.7	39.8	57.5	51.5	58.5	51.8	70	55	Up to standard	Up to standard	1.0	5.5
		At 1.0m from the first floor of the front-row house subject to Class 2 standards	40.5	35	Near term	50.6	40.2	43.3	37.5	42.0	36.0	45.7	39.8	60	50	Up to standard	Up to standard	-4.9	-0.4
			40.5	35	Mid term	50.6	40.2	43.3	37.5	42.8	36.8	46.1	40.2	60	50	Up to standard	Up to standard	-4.5	0.0
			40.5	35	Long term	50.6	40.2	43.3	37.5	43.6	37.5	46.4	40.5	60	50	Up to standard	Up to standard	-4.2	0.3
12	Shuimunianhua Building under construction	At 1.0m from the first floor of the	12	3	Near term	59.4	52.5	52.6	41.3	56.3	50.3	57.9	50.8	70	55	Up to standard	Up to standard	-1.5	-1.7
			12	3	Mid term	59.4	52.5	52.6	41.3	57.1	51.1	58.4	51.5	70	55	Up to standard	Up to standard	-1.0	-1.0
			12	3	Long	59.	52.5	52.	41.3	57.	51.9	59.	52.3	70	55	Up to	Up to	-0.	-0.2

S/N	Name of sensitive site	Location of monitoring points	Distance from road centerline (m)	Distance from house to road boundary (m)	Prediction period	Environmental status quo value		Sound level of environmental background dB(A)		Estimated traffic noise level (dB)		Ambient noise prediction dB(A)		Standard value dB(A)		Superscaler dB(A)		Prediction value-present value	
						Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
		front-row house subject to Class 4 standards			term	4		6		9		0				standard	standard	4	
		At 1.0m from the first floor of the front-row house subject to Class 2 standards	44	35	Near term	54	49.8	47.1	40.9	44.1	38.0	48.8	42.7	60	50	Up to standard	Up to standard	-5.2	-7.1
			44	35	Mid term	54	49.8	47.1	40.9	44.8	38.8	49.1	43.0	60	50	Up to standard	Up to standard	-4.9	-6.8
			44	35	Long term	54	49.8	47.1	40.9	45.6	39.6	49.4	43.3	60	50	Up to standard	Up to standard	-4.6	-6.5
13	Kangchengpinshang	At 1.0m from the first floor of the front-row house subject to Class 4 standards	12	3	Near term	59.6	54.3	48.9	45.1	56.3	50.3	57.1	51.5	70	55	Up to standard	Up to standard	-2.5	-2.8
			12	3	Mid term	59.6	54.3	48.9	45.1	57.1	51.1	57.7	52.1	70	55	Up to standard	Up to standard	-1.9	-2.2
			12	3	Long term	59.6	54.3	48.9	45.1	57.9	51.9	58.4	52.7	70	55	Up to standard	Up to standard	-1.2	-1.6

S/N	Name of sensitive site	Location of monitoring points	Distance from road centerline (m)	Distance from house to road boundary (m)	Prediction period	Environmental status quo value		Sound level of environmental background dB(A)		Estimated traffic noise level (dB)		Ambient noise prediction dB(A)		Standard value dB(A)		Superscaler dB(A)		Prediction value-present value	
						Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
		At 1.0m from the first floor of the front-row house subject to Class 2 standards	44	35	Near term	54.1	48.8	47.3	41.3	44.1	38.0	49.0	43.0	60	50	Up to standard	Up to standard	-5.1	-5.8
			44	35	Mid term	54.1	48.8	47.3	41.3	44.8	38.8	49.3	43.2	60	50	Up to standard	Up to standard	-4.8	-5.6
			44	35	Long term	54.1	48.8	47.3	41.3	45.6	39.6	49.6	43.5	60	50	Up to standard	Up to standard	-4.5	-5.3
14	Feicuihaoting	At 1.0m from the first floor of the front-row house subject to Class 4 standards	28.5	20	Near term	55.3	51.7	52.5	42.8	47.1	41.1	53.6	45.1	70	55	Up to standard	Up to standard	-1.7	-6.6
			28.5	20	Mid term	55.3	51.7	52.5	42.8	47.9	41.9	53.8	45.4	70	55	Up to standard	Up to standard	-1.5	-6.3
			28.5	20	Long term	55.3	51.7	52.5	42.8	48.7	42.7	54.0	45.8	70	55	Up to standard	Up to standard	-1.3	-5.9
			28.5	20	Long term	55.2	51.8	52.2	42.9	47.6	41.6	53.5	45.3	70	55	Up to standard	Up to standard	-1.7	-6.5
		At 1.0m from the first floor of the front-row house	43.5	35	Near term	56.1	49.6	47.3	42.1	40.8	34.8	48.2	42.8	60	50	Up to standard	Up to standard	-7.9	-6.8
			43.5	35	Mid term	56.1	49.6	47.3	42.1	41.6	35.5	48.3	43.0	60	50	Up to standard	Up to standard	-7.8	-6.6
			43.5	35	Long term	56.1	49.6	47.3	42.1	42.4	36.3	48.5	43.1	60	50	Up to standard	Up to standard	-7.6	-6.5

S/N	Name of sensitive site	Location of monitoring points	Distance from road centerline (m)	Distance from house to road boundary (m)	Prediction period	Environmental status quo value		Sound level of environmental background dB(A)		Estimated traffic noise level (dB)		Ambient noise prediction dB(A)		Standard value dB(A)		Superscaler dB(A)		Prediction value-present value	
						Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
		subject to Class 2 standards																	
In the near term (2018), estimated noise levels of both the residential areas and office buildings satisfy the limits for Class 2 and Class 4a separately according to *Environmental Quality Standard for Noise*.																			

Schedule 2: Summary of public participation and information publicity in the Project

Schedule 2-1 Summary of publicizing time & method of each subproject information

S/N	Subproject name	EIA progressing stage	Information release and introduction of content	Information releaser	Date	Website	Webpage screenshot
1	Baoxing County Subproject	After completing environmental screening and determining EIA outline and scheme upon receipt of EIA entrustment	Notifying basic information (e.g. the Employer and EIA Consultant) by Internet	Urban-Rural Planning and Construction and Housing Bureau of Baoxing County	November 17, 2015 – November 30, 2015	Website of People's Government of Baoxing County (website: http://www.baoxing.gov.cn/gov/openview.htm?id=20151117114921545)	
		After completing draft EIA Report	Notifying brief introduction of construction project, potential impacts of construction project on environment, countermeasures and measures to prevent or mitigate adverse environmental impacts, environmental impact assessment conclusions and relevant content of public participation, etc. by Internet, and attaching simplified edition of EIA Report.		December 23, 2015 – January 6, 2016	Website of People's Government of Baoxing County (website: http://www.baoxing.gov.cn/gov/openview.htm?id=20160104174806914)	
2	Lushan County Subproject	After completing environmental screening and determining EIA	Notifying basic information (e.g. the Employer and EIA Consultant) by Internet	Urban-Rural Planning and Construction and Housing Bureau of Lushan County	November 17, 2015 – November 26, 2015	E-government Portal Website of Lushan County (website: http://www.yals.gov.cn)	

S/N	Subproject name	EIA progressing stage	Information release and introduction of content	Information releaser	Date	Website	Webpage screenshot
		outline and scheme upon receipt of EIA entrustment					
		After completing draft EIA Report	Notifying brief introduction of construction project, potential impacts of construction project on environment, countermeasures and measures to prevent or mitigate adverse environmental impacts, environmental impact assessment conclusions and relevant content of public participation, etc. by Internet, and attaching simplified edition of EIA Report.		December 23, 2015 – January 6, 2016	E-government Portal Website of Lushan County (website: http://www.yals.gov.cn)	
3	Mingshan District Subproject	After completing environmental screening and determining EIA outline and scheme upon receipt of EIA entrustment	Notifying basic information (e.g. the Employer and EIA Consultant) by Internet	Urban-Rural Planning and Construction and Housing Bureau of Mingshan District	November 16, 2015 – November 27, 2015	Website of People's Government of Mingshan District http://www.scms.gov.cn	
		After					

S/N	Subproject name	EIA progressing stage	Information release and introduction of content	Information releaser	Date	Website	Webpage screenshot
		completing draft EIA Report	Notifying brief introduction of construction project, potential impacts of construction project on environment, countermeasures and measures to prevent or mitigate adverse environmental impacts, environmental impact assessment conclusions and relevant content of public participation, etc. by Internet, and attaching simplified edition of EIA Report.		December 23, 2015 – January 6, 2016	Website of People's Government of Mingshan District http://www.scms.gov.cn	
4	Yingjing County Subproject	After completing environmental screening and determining EIA outline and scheme upon receipt of EIA entrustment	Notifying basic information (e.g. the Employer and EIA Consultant) by Internet	Urban-Rural Planning and Construction and Housing Bureau of Yingjing County	November 11, 2015 – November 24, 2015	Website of Urban-Rural Planning and Construction and Housing Bureau of Yingjing County (website: http://gjj.yingjing.gov.cn)	
		After completing draft EIA Report	Notifying brief introduction of construction project, potential impacts of construction project on environment, countermeasures and measures to prevent or mitigate adverse environmental impacts,		December 23, 2015 – January 6, 2016	Website of Urban-Rural Planning and Construction and Housing Bureau of Yingjing County (website: http://gjj.yingjing.gov.cn)	

S/N	Subproject name	EIA progressing stage	Information release and introduction of content	Information releaser	Date	Website	Webpage screenshot
			environmental impact assessment conclusions and relevant content of public participation, etc. by Internet, and attaching simplified edition of EIA Report.				
5	Shimian County Subproject	After completing environmental screening and determining EIA outline and scheme upon receipt of EIA entrustment	Notifying basic information (e.g. the Employer and EIA Consultant) by Internet	Urban-Rural Planning and Construction and Housing Bureau of Shimian County	November 13, 2015 – November 28, 2015	Website of People's Government of Ya'an City (website:http://www.yaan.gov.cn/8SMX/OpenInfor/ShowInfo.aspx?id=51035)	
		After completing draft EIA Report	Notifying brief introduction of construction project, potential impacts of construction project on environment, countermeasures and measures to prevent or mitigate adverse environmental impacts, environmental impact assessment conclusions and relevant content of public participation, etc. by Internet, and attaching simplified edition of EIA Report.		December 23, 2015 – January 6, 2016	Website of People's Government of Shimian County (website: http://www.shimian.gov.cn/NewsInfor.aspx?id=71851)	 /

S/N	Subproject name	EIA progressing stage	Information release and introduction of content	Information releaser	Date	Website	Webpage screenshot
6	Yucheng District Subproject	After completing environmental screening and determining EIA outline and scheme upon receipt of EIA entrustment	Notifying basic information (e.g. contact information of the Employer and EIA Consultant) by Internet	Urban-Rural Planning and Construction and Housing Bureau of Yucheng District	November 11, 2015 – November 24, 2015	Urban-Rural Planning and Construction and Housing Bureau of Ya'an City http://yaanjs.0835.com/	
		After completing draft EIA Report	Notifying brief introduction of construction project, potential impacts of construction project on environment, countermeasures and measures to prevent or mitigate adverse environmental impacts, environmental impact assessment conclusions and relevant content of public participation, etc. by Internet, and attaching simplified edition of EIA Report.		January 18, 2016	Urban-Rural Planning and Construction and Housing Bureau of Ya'an City http://yaanjs.0835.com/article/search.asp?Field=Title&keyword=%CE%F7%C3%C5%B2%E8%C0%C8&submit.x=25&submit.y=13&submit=%CC%E1%BD%BB	
7	Tianquan County Subproject	After completing environmental screening and determining EIA outline and scheme upon	Notifying basic information (e.g. contact information of the Employer and EIA Consultant) by Internet	Urban-Rural Planning and Construction and Housing Bureau of Tianquan County	November 23, 2015	Website of People's Government of Tianquan County	

S/N	Subproject name	EIA progressing stage	Information release and introduction of content	Information releaser	Date	Website	Webpage screenshot
		receipt of EIA entrustment					
		After completing draft EIA Report	Notifying brief introduction of construction project, potential impacts of construction project on environment, countermeasures and measures to prevent or mitigate adverse environmental impacts, environmental impact assessment conclusions and relevant content of public participation, etc. by Internet, and attaching simplified edition of EIA Report.		December 17, 2015		

Schedule 2-2 Summary of public consultation time & method of each subproject

S/N	Project name	EIA progressing stage	Date	Information release & public participation and introduction of content	Object	Areas involved	Conversazione photos
1	Baoxing County Subproject	After completing environmental screening and determining EIA outline and scheme upon receipt of EIA entrust	2016.1.4	Distributing public participation questionnaires, conducting random household investigation and posting notices;	Local authorities concerned, enterprises and public institutions, schools, hospitals, residents affected by the Project, etc.	Project-related areas in Muping Town and Lingguan Town of Baoxing County	
			2016.1.6	Convening conversazione			

S/N	Project name	EIA progressing stage	Date	Information release & public participation and introduction of content	Object	Areas involved	Conversazione photos
		ment					
2	Lushan County Subproject	After completing environmental screening and determining EIA outline and scheme upon receipt of EIA entrustment	2016.1.8	Distributing public participation questionnaires, conducting random household investigation and posting notices;	Local authorities concerned, enterprises and public institutions, schools, hospitals, residents affected by the Project, etc.	Project-related areas in Lushan County town	
			2016.1.7	Convening conversazione			
3	Mingshan District Subproject	After completing environmental screening and determining EIA outline and scheme upon receipt of EIA entrustment	2016.1.7	Distributing public participation questionnaires, conducting random household investigation and posting notices;	Local authorities concerned, enterprises and public institutions, schools, hospitals, residents affected by the Project, etc.	Project-related areas in Chengdong Township and Mengyang Town of Mingshan District	
			2016.1.9	Convening conversazione			
4	Yingjing County Subproject	After completing environmental screening and determining EIA outline and scheme upon receipt	2016.1.7	Distributing public participation questionnaires, conducting random household investigation and posting notices;	Local authorities concerned, enterprises and public institutions, schools, hospitals, residents affected by the Project, etc.	Project-related areas in Yingjing County town	
			2016.1.9	Convening conversazione			

S/N	Project name	EIA progressing stage	Date	Information release & public participation and introduction of content	Object	Areas involved	Conversazione photos
		of EIA entrustment					
5	Shimian County Subproject	After completing environmental screening and determining EIA outline and scheme upon receipt of EIA entrustment	2016.1.5	Distributing public participation questionnaires, conducting random household investigation and posting notices;	Local authorities concerned, enterprises and public institutions, schools, hospitals, residents affected by the Project, etc.	Project-related areas in main urban zone of Shimian County	
			2016.1.8	Convening conversazione			
6	Yucheng District Subproject	After completing environmental screening and determining EIA outline and scheme upon receipt of EIA entrustment	2016.1.18	Distributing public participation questionnaires and conducting random household investigation	Local authorities concerned, enterprises and public institutions, schools, hospitals, residents affected by the Project, etc.	Project-related areas in Yucheng District, Ya'an	
			2016.1.18	Convening conversazione			
7	Tianquan County Subproject	After completing environmental screening and determining EIA outline and scheme	——	Distributing public participation questionnaires	Local authorities concerned, enterprises and public institutions, schools, hospitals, residents affected by the Project, etc.	Sensitive objects on both sides of project-related streets	——

S/N	Project name	EIA progressing stage	Date	Information release & public participation and introduction of content	Object	Areas involved	Conversazione photos
		upon receipt of EIA entrustment					

Schedule 2-3 Summary of statistics of public opinions

S/N	Subproject name	Advisory opinions	Statistics on relevant advisory opinions (%)					Number of questionnaires (Nr.)
			①	②	③	④	⑤	
1	Baoxing County Subproject	Are you satisfied with status quo of local infrastructures? ①Satisfied ②Not satisfied	100	\	\	\	\	93
		Do you support the Project construction? ① Support; ②Not support;	100	\	\	\	\	
		Impacts of the Project on local economic development are: ① Advantageous; ② None; ③ Disadvantageous;	89	11	\	\	\	
		At present, main environmental problems in this area are: ① Noise pollution; ② Free from atmospheric pollution; ③ Water pollution; ④ Ecological damage; ⑤None;	22	47	26	5	\	
		What you think main impacts of the Project on local environment: ① Noise pollution; ② Free from atmospheric pollution; ③ Water pollution; ④Ecological damage; ⑤Traffic capacity;	4	15	54	14	13	
		What extent do you think the Project may affect local environment: ①Large impacts; ②A certain acceptable impacts; ③No impacts; ④No idea;	1	98	1	0	\	
		What measures do you suggest to be taken for the Project to reduce the environmental impacts: ① Reasonable layout; ② Strengthening construction management; ③ Strengthening environmental protection measures;	14	32	54	\	\	
2	Lushan County Subproject	Are you satisfied with status quo of local infrastructures? ①Satisfied ②Not satisfied	100	\	\	\	\	99
		Do you support the Project construction? ① Support; ②Not support;	100	\	\	\	\	
		Impacts of the Project on local economic development are: ① Advantageous; ② None; ③ Disadvantageous;	98.99	1.01	\	\	\	
		At present, main environmental problems in this area are: ① Noise pollution; ② Free from atmospheric pollution; ③ Water pollution; ④ Ecological damage; ⑤None;	66.67	29.29	60.61	2.02	3.03	
		What you think main impacts of the Project on local environment: ① Noise pollution; ② Free from atmospheric pollution; ③ Water pollution; ④Ecological damage; ⑤Traffic capacity;	33.33	30.30	3.03	2.02	45.45	
		What extent do you think the Project may affect local environment: ①Large impacts; ②A certain acceptable impacts; ③No impacts; ④No	2.02	46.46	47.47	2.02	\	

S/N	Subproject name	Advisory opinions	Statistics on relevant advisory opinions (%)					Number of questionnaires (Nr.)
			①	②	③	④	⑤	
		idea;						
		What measures do you suggest to be taken for the Project to reduce the environmental impacts: ① Reasonable layout; ② Strengthening construction management; ③ Strengthening environmental protection measures;	16.16	44.44	43.43	\	\	
3	Mingshan District Subproject	Are you satisfied with status quo of local infrastructures? ①Satisfied ②Not satisfied	82.65	17.35				100
		Do you support the Project construction? ① Support; ②Not support;	100					
		Impacts of the Project on local economic development are: ① Advantageous; ② None; ③ Disadvantageous;	95.92	4.08				
		At present, main environmental problems in this area are: ① Noise pollution; ② Free from atmospheric pollution; ③ Water pollution; ④ Ecological damage; ⑤None;	20.95	8.57	36.19	3.81	30.48	
		What you think main impacts of the Project on local environment: ① Noise pollution; ② Free from atmospheric pollution; ③Water pollution; ④Ecological damage; ⑤Traffic capacity;	25	3.7	17.59	2.78	50.93	
		What extent do you think the Project may affect local environment: ① Large impacts; ② A certain acceptable impacts; ③No impacts; ④No idea;	4.09	35.71	58.16	2.04		
		What measures do you suggest to be taken for the Project to reduce the environmental impacts: ① Reasonable layout; ② Strengthening construction management; ③ Strengthening environmental protection measures;	66.99	22.33	10.68			
4	Yingjing County Subproject	Are you satisfied with status quo of local infrastructures? ①Satisfied ②Not satisfied	91.82	8.18	\	\	\	110
		Do you support the Project construction? ① Support; ②Not support;	100	0	\	\	\	
		Impacts of the Project on local economic development are: ① Advantageous; ② None; ③ Disadvantageous;	95.45	4.55	0	\	\	
		At present, main environmental problems in this area are: ① Noise pollution; ② Free from atmospheric pollution; ③ Water pollution; ④ Ecological damage; ⑤None;	14.55	29.09	54.55	13.64	0	
		What you think main impacts of the Project on local environment: ① Noise pollution; ② Free from atmospheric pollution; ③Water pollution; ④Ecological damage; ⑤Traffic capacity;	10.00	33.64	19.09	1.82	36.36	
		What extent do you think the Project may affect local environment: ①Large impacts; ②A certain acceptable impacts; ③No impacts; ④No idea;	0.91	20.91	74.55	3.64	\	
		What measures do you suggest to be taken for the Project to reduce the environmental impacts: ① Reasonable layout; ② Strengthening construction management; ③ Strengthening environmental protection measures;	54.55	50.91	72.73	\	\	
5	Shimian County	Are you satisfied with status quo of local infrastructures? ①Satisfied ②Not satisfied	81	19	\	\	\	100

S/N	Subproject name	Advisory opinions	Statistics on relevant advisory opinions (%)					Number of questionnaires (Nr.)
			①	②	③	④	⑤	
	Subproject	Do you support the Project construction? ① Support; ②Not support;	100	0	\	\	\	
		Impacts of the Project on local economic development are: ① Advantageous; ② None; ③ Disadvantageous;	98	2	\	\	\	
		At present, main environmental problems in this area are: ① Noise pollution; ② Free from atmospheric pollution; ③ Water pollution; ④ Ecological damage; ⑤None;	16	19	5	12	55	
		What you think main impacts of the Project on local environment: ① Noise pollution; ② Free from atmospheric pollution; ③Water pollution; ④Ecological damage; ⑤Traffic capacity;	28	17	3	9	53	
		What extent do you think the Project may affect local environment: ①Large impacts; ②A certain acceptable impacts; ③No impacts; ④No idea;	0	52	44	4	\	
		What measures do you suggest to be taken for the Project to reduce the environmental impacts: ① Reasonable layout; ② Strengthening construction management; ③ Strengthening environmental protection measures;	48	45	39	\	\	
6	Yucheng District Subproject	Are you satisfied with status quo of local infrastructures? ①Satisfied ②Not satisfied	88	12	\	\	\	100
		Do you support the Project construction? ① Support; ②Not support;	100	\	\	\	\	
		Impacts of the Project on local economic development are: ① Advantageous; ② None; ③ Disadvantageous;	96	4	\	\	\	
		At present, main environmental problems in this area are: ① Noise pollution; ② Free from atmospheric pollution; ③ Water pollution; ④ Ecological damage; ⑤None;	1	4	7	5	83	
		What you think main impacts of the Project on local environment: ① Noise pollution; ② Free from atmospheric pollution; ③Water pollution; ④Ecological damage; ⑤Traffic capacity;	49	1	2	21	27	
		What extent do you think the Project may affect local environment: ①Large impacts; ②A certain acceptable impacts; ③No impacts; ④No idea;	3	18	78	1	\	
		What measures do you suggest to be taken for the Project to reduce the environmental impacts: ① Reasonable layout; ② Strengthening construction management; ③ Strengthening environmental protection measures;	9	56	35	\	\	
7	Tianquan County Subproject	Do you know the Project situations? ①Known; ②Heard; ③No idea;	76.77	20.2	3.03	\	\	99
		What do you think of environmental status quo of the Project location? ①Very good; ②Good; ③Fair; ④Not good	55.23	31.75	12.32	0.70	\	
		What impacts the Project implementation will have on existing environmental problems: ①Aggravating; ②Mitigating; ③No impact;	2.02%	80.81%	17.17	\	\	
		Construction will bring inconvenience and interference to your life, so what you think main	9.46	20.67	43.47	15.02	11.38	

S/N	Subproject name	Advisory opinions	Statistics on relevant advisory opinions (%)					Number of questionnaires (Nr.)
			①	②	③	④	⑤	
		impacts will be: ① Noise pollution; ② Dust; ③ Cement mortar; ④ Walking inconvenience; ⑤ Traffic congestion;						
		What do you think the Project-related main environmental problems will be: ① Noise pollution; ② Vegetation damage; ③ Surface water pollution; ④ Air pollution; ⑤ Solid wastes;	12.27	25.43	15.19	18.25	28.86	
		What extent do you think the Project may affect local environment: ① Large impacts; ② Slight; ③Average;	4.15	81.20	14.65	\	\	
		Can you accept environmental problems you focus after adoption of environmental protection measures? ①Can; ②Can not;	81.26	18.74	\	\	\	
		What good impacts do you think the Project construction will have on environment: ①Promoting local economic development; ② Increasing job opportunities; ③ Improving transportation capacity; ④ Bringing travel convenience; ⑤Completing urban infrastructure construction;	20.64	8.42	12.13	35.23	23.58	
		What are your overall attitudes toward the Project? ①Support; ②Oppose; ③Not care	96.97	\	3.03	\	\	