E4461 V2 REV

Environmental Management Plan

For

Shaanxi Small Towns Infrastructure Project

By Using World Bank Loans

（EMP）

Owner:	**Foreign loan supporting project management office of Shaanxi province**
Evaluated by:	**Shaanxi Zhongsheng Environmental Technology Development Co., Ltd.**

March, 2014

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1. General

1.1 Project background

At present, Shaanxi Province is in the key period of rapid economic growth and the rapid development of urbanization. In 2012, the GDP growth rate of Shaanxi Province was 12.9%, the increase ranked fifth in the country; the per capita GDP was increased from 10,594 yuan in 2005 to 38,557 yuan in 2012; the per capita income of urban and rural residents had reached 20734 yuan and 5763 yuan respectively, the relative average annual growth rates were 13.6% and 14.6%. Although the growth rate population urbanization rate is very high, but Shaanxi Province is still lagging behind the national average per capita GDP and urbanization growth rate because of the weak economic foundation. Among the 83 counties in the province, there are only 19 county seats that the population exceeds 100,000 people; among the 838 towns, the population in 90% of them is less than 10,000 people.

According to the survey, the existing towns in the Shaanxi Province are generally seen with broken road pavement or potholes, or even with sand-gravel surface, and most sections are built without the supporting stormwater/sewage pipe network; there is no unified water supply pipe network in most towns, it is more common for the villagers to dig wells for water supply, a few towns with water supply pipe network works also have the problems that the coverage is limited, the facilities are imperfect or aged. As it is shown in the relevant statistical data, the investment of Shaanxi Province to the small towns infrastructure has only reached 56% of national average level, which is insufficient, compared with the regions in the east-central China, Shaanxi Province has not given sufficient attention to the development of small towns in the process of urbanization. Additionally, there are shortcomings and defects of "attaching more importance to the short term than planning, attaching more importance to the construction than maintenance and attaching more importance to the quantity than quality" in the Town infrastructure construction and operation management, the development of small towns needs the management to make an innovation in concept. Therefore, the implementation of this project can fill in the gap in the urban infrastructure construction, solve the most outstanding problems in the urban construction and play a significant role to perfect the construction of urban infrastructure, so as to effectively improve the urban environment, create a good living environment and improve the living quality.

Based on the actual situation of the province, the Shaanxi Provincial Utilizing Foreign Loan Project Office (hereinafter referred to as "PPMO") put forward the idea of using the World Bank loans to solve the realistic problem of insufficient funds in the infrastructure construction of some small towns, and prepared the Project Idea Note For Shaanxi Small Towns Infrastructure Construction Project By Using World Bank Loans in early 2012. In the August, 2012, the State Council approved the alternative project planning by using World

Bank loans in China in the 2013-2015 fiscal year. This planning has added 19 new projects and the loan amount is USD 2.49 billion. The Shaanxi Small Towns Infrastructure Construction Project is listed therein, for which USD 150 million is allocated. In order to ensure that the preparation work for the new projects so planned is pushed forward smoothly, the National Development and Reform Commission and the Ministry of Finance, together with the World Bank, held a planned new projects startup conference in Beijing during October 25-26, 2012. During the conference, the National Development and Reform Commission, the Ministry of Finance and the World Bank have given the descriptions and explanations the requirements for the domestic approval of projects, the procedures for the World Bank to make the prophase preparation and the main policies. The World Bank conducted the communication and linkup with each province on the project scheme and first-phase preparations plan. They put forward that they shall carry out the pre-appraisal to he implementation of Shaanxi Small Towns Infrastructure Construction Project in late November, the assessment is planned to be completed in 2013 and the contract is to be concluded for implementation in 2014.

During November 22~23, 2012, the WB mission made the pre-appraisal on the Shaanxi Small Towns Infrastructure Construction Project, which marks that the prophase preparation work of the World Bank to this project is formally started. During the stay in Shaanxi, the mission heard the report from the PPMO on the overall scheme of the project, had discussions with the Provincial Development and Reform Commission, Department of Finance and the design/consulting units, they went to the Guan Shan Town of Yanliang District and Wugong Town of Wugong County to make an on-the-spot investigation. Through the field investigation and linkup, the two parties have reached consensus on the project design, construction area, investment contents and institutional arrangements.

During April 8~12 and May 13 - 15, 2013, the WB mission conducted the appraisal on the Shaanxi Small Towns Infrastructure Construction Project. During this period, the mission had also made field investigation to the project construction sites. Through this field study, both the project site selection and scheme were completed, then, it can transfer into the feasibility study phase. In September, 2013, the consulting company completed the preparation of “Feasibility study report for the Shaanxi Small Towns Infrastructure Construction Project by Using the World Bank Loans (Draft)”.

1.2 Project introduction

The Shaanxi Small Towns Infrastructure Construction Project by Using the World Bank Loans is to be implemented in the towns in totally 9 counties/ districts under 7 municipalities within the whole province, belonging to the municipal infrastructure construction projects, which mainly include the road works, water supply works and drainage works.

1.3 Objects of environmental management plan

The purpose to formulate the EMP is targeted on the inevitable environmental impact of the project to develop a set of environmental cure that is technically feasible, financially sustainable and operable, so as to define the environmental mitigation, environmental management and institution building measures and arrangements for the project contractor, supervisor, operator and environmental management department to implement during the project construction and operation, to eliminate or compensate, as far as possible, the adverse effects of this project on the society and the environment, and reduce it to an acceptable level. The specific objectives shall include:

(1) Define the environmental management obligations of the contractor and operator.

The Shaanxi Provincial Department of Environmental Protection, Environmental Protection Bureaus of each county/district, EIA unit and design unit shall make the field verification and validation to the environmental protection objectives in detail, which should be included in the contract responsibilities of the project construction contractor and operator.

(2) It shall be used as the guidance for the operation of environmental management

The environmental monitoring plans for the construction period and operation period as put forward in the environmental management plan shall ensure the effective implementation of environmental mitigation measures, which should be provided to the construction supervision units, environmental monitoring units and other relevant units as a text for environmental protection, to define the responsibilities and roles of each relevant functional department and administrative organization, and put forward the communication channels and methods among different sectors.

(3) It shall insure the funds for environmental management actions

The environmental management plan shall estimate the funds for the environmental management, environmental monitoring and capacity-building as mentioned and indicate the sources of fund, to ensure that all the environmental management actions can be implemented, of which, the management expenses shall include the salaries for the staff, office expenses and travel expenses.

The function of environmental management plan is to avoid and control the environmental impact caused in the project implementation and operation process, by which it is to put forward the mitigation measures, monitoring measures and legal supervision means to be implemented, as well as the safeguard measures to implement the above measures, at the same time, it is also the key link to link up the impact mitigation measures and alternative measures as described in detail in the environmental impact assessment. For each of environmental management measures, the environmental management plan shall stipulate its

technical contents, investment estimation, implementation plan, functions of government agencies, sources of fund and monitoring scheme. In order to achieve the reduction target, the methods mentioned in the environmental impact assessment report and the environmental management plan must be implemented.

1.4 Preparation of environmental management plan

This report is prepared by the Shaanxi Zhongsheng Environmental Technology Development Co., Ltd. as commissioned by the Shaanxi Provincial Utilizing Foreign Loan Project Office, in the preparation process, all the participants have received the relevant training and technical instructions. The environmental management plan for the whole project shall be prepared in strict accordance with the national and provincial environmental management laws and regulations. At the same time, under the precondition that the EIA requirements of China are met, it shall pay special attention to the security regulations of the World Bank. The details refer to the relevant provisions given in Article 4.10 of operation regulation.

The information sources for the environmental management plan of this project are as follows:

(1) The environmental impact assessment (EIA) report for the project

(2) The feasibility study report for the project

(3) The resettlement plan for the project

(4) Pre-appraisal of the World Bank delegation, formal appraisal meeting minutes

1.5 Design of environmental management plan

In order to describe in detail the contents of environmental management, environmental supervision and environmental monitoring, the environmental management plan so developed shall be a guiding document for the environmental management in the process of project implementation, the action plan thereof shall include the following contents:

(1) Setting of environmental management system and its responsibilities: the environmental supervision actions taken to ensure the synchronous implementation of environmental protection measures and project construction.

(2) The summary of major environmental issues and environmental protection measures for this project: the major environmental impact during the project construction period and operation period, which are the engineering measures and management measures taken to prevent or mitigate the adverse environmental impacts caused by the project.

(3) Technical support and the environmental management training: the knowledge and skills

training provided to the managerial staff, environmental supervision personnel, full-time or part-time environmental managerial personnel in the project implementation to ensure the implementation of environmental management plan.

(4) Environmental monitoring plan: the environmental monitoring actions taken to eliminate the environmental pollution during construction and operation period, ensure the safe operation of the project and improvement of environmental status within the construction area.

(5) Environmental management work report.

(6) Guarantee of environmental management costs and expenditures.

1.6 Technical details of preparation

The environmental management plan is prepared on the basis of the " Environmental impact report for Shaanxi Small Towns Infrastructure Construction Project By Using World Bank Loans" and the comments from the WB experts. As a separate document, this environmental management plan has included all the environmental management action to be implemented during the project construction period and operation period, to have provided an action guidance and work framework for implementation of impact mitigation measures, environmental supervision, environmental management and environmental monitoring in the construction period and operation period.

2. Policy and laws/regulations documents

2.1 Overview

Through the comprehensive analysis on the project type/scale, location selected, environmental sensitivity, as well as the characteristics and size of potential environmental impact, the policies, laws and regulations mainly referred to or involved in the environmental impact assessment of this project include:

(1) The environmental protection laws and regulations;

(2) The relevant rules and norms for environmental protection, local regulations;

(3) The technical guidelines and specifications for environmental impact assessment;

(4) The environmental quality standards;

(5) The pollution discharge standard;

(6) The safeguard policy of the World Bank.

The above policies, laws/regulations and standards have formed the policy and laws/regulations document framework to guide and standardize the environmental assessment (EIA and EMP) of this project.

2.2 Environmental protection laws and regulations

(1) "Environmental Protection Law of the People's Republic of China" (1989-12)

(2) "Environmental Impact Assessment Law of the People's Republic of China" (2003-9)

(3) "Law of the People's Republic of China on Prevention and Control of Water Pollution" (2008-2 revision)

(4) "Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution" (2000-4 revision)

(5) "Law of the People's Republic of China on Prevention and Control of Pollution From Environmental Noise" (1996-10)

(6) "Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Wastes" (2005-4)

(7) "Urban and Rural Planning Law of the People's Republic of China" (2008-1)

(8) "Law of the People's Republic of China on Protection of Cultural Relics" (2002-10)

(9) "Land Administration Law of the People's Republic of China" (2004-8 2nd revision)

(10) "Water and Soil Conservation Law of the People's Republic of China" (2011-3 revision)

(11) "Water Law of the People's Republic of China" (2002-10)

(12) "Flood Control Law of the People's Republic of China" (1998-1)

(13) "Regulation of River Administration of People's Republic of China" by the Sate Council (1988-6)

(14) "Regulations of the People's Republic of China on Wild Plants Protection" by the Sate Council (1996-9, Decree No. 204)

(15) "Regulations on the Administration of Construction Project Environmental Protection" by the Sate Council (1998-11, Decree No. 253)

(16) "Regulations on the Protection of Basic Farmland" by the Sate Council (1999-1, Decree No. 162)

(17) "Regulations on scenic spots" by the Sate Council (2006-12, Decree No. 474)

(18) "Regulation on Land Reclamation" by the Sate Council (1988-11, Decree No. 19)

2.3 Local regulations

(1) "The implementation measures of Shaanxi Province on the Environmental Impact Assessment Law of the People 's Republic of China" (2007-4)

(2) "Ecological function zoning of Shaanxi Province"（File No. SZBF [2004]105）（2004-11）

(3) "Water function zoning in Shaanxi Province" （File No. SZBF [2004]100）（2004-9）

(4) "Regulations of Shaanxi Province on the environmental protection in the urban drinking water source protection area" (2002-3)

(5) "Regulations of Shaanxi Province on energy saving（2006-12）

(6) "Water saving measures by Shaanxi Province"（2003-9）

(7) "Water consumption quota for industries in Shaanxi Province" （File No. SZF [2004]18）

(8) "Regulations of Shaanxi Province on the protection of wild plants" (2010-10)

(9) "Regulations of Shaanxi Province on the protection and control of cultural relics (2004 revision)

2.4 Technical guidelines and norms for environmental impact assessment

(1) "Technical guidelines for environmental impact assessment - General programme" （HJ 2.1-2011）

(2) "Technical guidelines for environmental impact assessment - Atmospheric Environment" (HJ2.2-2008)

(3) "Technical Guidelines for Environmental Impact Assessment - Surface water environment" （HJ/T2.3-93）

(4) " Technical Guidelines for Environmental Impact Assessment - Acoustic environment" （HJ2.4-2009）

(5) "Technical Guidelines for Environmental Impact Assessment - Ecological impact （HJ19-2011）

(6) " Technical Guidelines for Environmental Impact Assessment - Groundwater environment" （HJ610-2011）

(7) "Technical guideline for environmental risk assessment of construction project" （HJ/T169-2004）

(8) "Temporal method for public participation in the environmental impact assessment" (File No. HF 2006[28])

2.5 Environmental quality standards

(1) The ambient air quality for Xi'an City, Xianyang City, Weinan City, Ankang City and Hanzhoung City is to implement the secondary standard as given in the "Ambient air quality standards" (GB 3095-1996) and its modification list (File No. HF [2000]1); the Baoji City and Tongchuan City is to implement the secondary standard as given in the "Ambient air quality standards" (GB 3095-2012);

(2) The environmental quality of surface water in Tongchuan City is to implement the standard for Category III as given in the "Environmental quality standards for surface water" (GB 3838-2002); the environmental quality of surface water in the Weihe River basin of Xianyang City is to implement the standard for Category IV as given in the "Environmental

quality standards for surface water" (GB 3838-2002); the rest is to implement the standard for Category III as given in the "Environmental quality standards for surface water" (GB 3838-2002);

(3) The environmental quality of groundwater in all cities to implement the standard for Category III as given in the "Quality standard for ground water" (GB/T14848-93);

(4) The sound environmental quality within 35m range of traffic trunk lines in the urban area and the red line of municipal roads shall implement the Category 4a standard for zone Category 4 as stipulated in the "Environmental quality standard for noise" (GB 3096-2008); the sound environmental quality outside the 35m range of red line of traffic trunk lines in the urban area and municipal roads, for the rural living environment, as well as for the specially sensitive buildings, such as the school, kindergarten and hospital within the assessment range, shall implement the standard for Category 2 as provided for in the "Environmental quality standard for noise" (GB 3096-2008).

2.6 Emission standard of pollutants

(1) The emission standard of air pollutants in all cities shall implement the secondary standard as provided for in the "Integrated emission standard of air pollutants"（GB 16297-1996）.

(2) Discharge standard of water pollutants: ① Baoji City requires that the wastewater discharge within the water collecting range of sewage treatment plant shall implement the Grade II standard as provided for in the "Yellow River Basin Integrated Wastewater Discharge Standard (Shaanxi segment)" (DB 61-224-2011) and the Grade III standard as provided for in "Integrated wastewater discharge standard" (GB 8978-1996); while the wastewater discharge outside the water collecting range of sewage treatment plant shall implement the Grade I standard as provided for in the "Yellow River Basin Integrated Wastewater Discharge Standard (Shaanxi segment)" (DB 61-224-2011) and the Grade I standard as provided for in the "Integrated wastewater discharge standard" (GB 8978-1996). ② Xianyang City requires that all the construction wastewater shall be reused without discharge; the wastewater discharge within the water collecting range of sewage treatment plant shall implement the Grade I standard as provided for in the "Yellow River Basin Integrated Wastewater Discharge Standard (Shaanxi segment)" (DB 61-224-2011) and the Grade I standard as provided for in the "Integrated wastewater discharge standard" (GB 8978-1996). ③ Tongchuan City requires the zero discharge of wastewater. ④ Weinan City, Ankang City and Hanzhoung City require that the sewage collected by the sewage pipe network must be treated to the emission standard in the corresponding sewage treatment facilities before discharged, it is prohibited to discharge the sewage directly into the surface water bodies; the discharge standard for the sewage treatment facilities so relied on must

comply with the requirement of “Discharge standard of pollutants for municipal wastewater treatment plant” (GB 18918-2002) and the sewage receiving requirements of the receiving water body.

(3) The construction noise shall implement the standard given in the "Emission standard of environment noise for boundary of construction site" (GB 12523-2011);

(4) The general solid waste shall be subject to the requirements given in the "Standard for pollution control on the storage and disposal site for general industrial solid wastes" (GB 18599-2001), the living garbage shall be subject to the requirements given in “Administrative Measures for Urban Living Garbage” by the Ministry of Construction (Decree No. 157) and "Technical specification for operation and maintenance of municipal solid waste transfer station"（CJJ 109-2006）.

2.7 Safeguard policies of the World Bank

(1) WB Operational Policy/Procedures “Environmental assessment” (OP/BP4.01)

(2) WB Operational Policy/Procedures “Natural habitat” (OP/BP4.04)

(3) WB Operational Policy/Procedures “Pest management” (OP4.09)

(4) WB Operational Policy/Procedures “National minority” (OP4.10)

(5) WB Operational Policy/Procedures “Material and cultural resources” (OP4.11)

(6) WB Operational Policy/Procedures “Involuntary resettlement” (OP/BP4.12)

(7) WB Operational Policy/Procedures “Forestry” (OP4.36)

(8) WB Operational Policy/Procedures “Dam safety” (OP/BP4.37)

(9) WB Operational Policy/Procedures “International waterway project” (OP7.50)

(10) WB Operational Policy/Procedures “Disputed area project” (OP7.60)

(11) WB Procedures “Disclosure of information” (BP 7.15)

The WB safeguard policies in connection with this project refer to Items (1), (5), (6) and (11).

3 Project descriptions

3.1 Project construction targets

The Shaanxi Small Towns Infrastructure Construction Project by Using the World Bank Loans is to be implemented in the towns in totally 9 counties/ districts under 7 municipalities, the specific construction targets for each subproject are shown in Table 3.1-1.

Table 3.1-1 Summary table for project areas

No.	Name of Subproject	Name of Item	Unit	Quantities	Remarks
1	Yanliang District subproject	Road works	m	12447.954	Including road pavement, drainage, greening and lighting, etc.
		Water supply works	m	19950	Including water supply pipe and sluice valve well, etc.
		Sewage pipe	m	8503.71	Including laying of sewage pipe and manhole, etc.
		rainwater pipe	m	3639.1	Including laying of rainwater pipe and manhole, etc.
2	Chencang District Guozhen Town Subproject	Road works	m	9138	Including laying of road, water supply and drainage, greening, lighting and traffic facilities, etc.
		Water supply works	m	8523	Including laying of sewage pipe and manhole, etc.
		Sewage pipe	m	8918	Including laying of rainwater pipe and manhole, etc.
		rainwater pipe	m	9784	Including laying of rainwater pipe and manhole, etc.
3	Wugong County Wugong Town Subproject	Road works	m	10004	Including laying of road, water supply and drainage, greening, lighting and traffic facilities, etc.
		Water supply works	m	20784	Including the water plant, water well and water supply pipe, etc.
		Sewage pipe	m	19452	Including laying of sewage pipe and manhole, etc.
		rainwater pipe	m	2879	Including laying of rainwater pipe and manhole, etc.
4	Xunyi County Subproject	Road works	m	7672	Including the road pavement, greening and lighting, etc.
		Water supply works	m	4265	Including the water supply pipe and sluice valve well.
		Sewage pipe	m	5235	Including laying of sewage pipe and manhole, etc.
		rainwater pipe	m	5622	Including laying of rainwater pipe and manhole, etc.
5	Chunhua	Road	m	12090	Including the road pavement, greening and

No.	Name of Subproject	Name of Item	Unit	Quantities	Remarks
	County Runzhen Town Subproject	works			lighting, etc.
		Water supply works	m	13942	Including the water supply pipe and sluice valve well
		Sewage pipe	m	24102	Including laying of sewage pipe and manhole, etc.
		rainwater pipe	m	10175	Including laying of rainwater pipe and manhole, etc
6	Chengcheng County Chengguan Town Subproject	Road works	m	8213	Including the road pavement and lighting, etc.
		Drainage works	m	14174	Including laying of rainwater and sewage drainage pipe and manhole, etc.
7	Yintai District Subproject	Road works	m	14216	Including laying of road, water supply and drainage, greening, lighting and traffic facilities, etc.
		Sewage pipe	m	7280	Including laying of sewage pipe and manhole, etc.
		rainwater pipe	m	7320	Including laying of rainwater pipe and manhole, etc.
8	Hantai District Puzhen Town Subproject	Road works	m	7107	Including laying of road, water supply and drainage, greening, lighting and traffic facilities, etc.
		Sewage pipe	m	7360	Including laying of sewage pipe and manhole, etc.
		rainwater pipe	m	9953	Including laying of rainwater pipe and manhole, etc.
9	Hanyin County Chengguan Town Subproject	Road works	m	3757	Including laying of road, water supply and drainage, greening, lighting and traffic facilities, etc.
		Water supply works	m	6550	Including the water supply pipe, sluice valve well and reservoir, etc.
		Sewage pipe	m	4341	Including laying of sewage pipe and manhole, etc.
		rainwater pipe	m	2572	Including laying of rainwater pipe and manhole, etc.

3.2 Construction contents

The specific construction contents of this project are shown in Table 3.2-1.

Table 3.2-1 Table for the construction components of this project

No.	Project County/District	Project Construction Content		
		Water supply and Sewage Project	**New Road works**	**Drainage and Road Reconstruction Works**
1	**Xi'an** Yanliang District	① Shuibei Water Plant to Wutong and Guanshan Water Transmission Project with length of 13300m; ② Chengdong water distribution plant to Wutun water supply project with pipe of 3300m long.	North Guangyang Street construction works: L=808.224m, W=12m; water supply pipe: 780m, rainwater pipe: 772.84m,and sewage pipe: 750m. One for city by road grade level III.	① L=1245m,W=30m,water supply pipe:1250m,rainwater pipe:1230m,sewage pipe:1245m. ②West Ring Road, L=2413m,W=30m; water supply pipe:1320m,sewage pipe:2413.71m,rainwater pipe:1369.1m. ③South Guangyang Street, L=1045m,W=9m; water supply pipe:1000m,sewage pipe:1045m,rainwater pipe:1040m. ④ Hongyao Road, L=10293m,W=18m,water supply pipe:10293m; sewage pipe:3525m. ⑤Guangsan Road, L=1346.505m,W=12m,water supply pipe:1346m,rainwater pipe:259.86m,sewage pipe:275m.
2	**Baoji** Chencang District		① Beikai Road, L=755m,W=24m ; sewage pipe:734m,rainwater pipe:705m,water supply pipe:755m. One for city by road grade level III. ② North Longhai Road, L=3494m,W=24m, sewage pipe:3816m,rainwater pipe: 3770m,water supply pipe: 3490m. One for city by road grade level III. ③ Heping Road, L=1313m, W=24m,rainwater pipe:1203m. One for city by road grade level III.	①West Shuilian Road, L=843m,W=15m,sewage pipe:888m,rainwater pipe:853m,water supply pipe:840m. ② South Gate Road of Brewery,L=923m,W=18m ; sewage pipe:955m,rainwater pipe:938m,water supply pipe:920m. ③ Dazhong Road, L=900m,W=24m ; sewage pipe:880m,rainwater pipe: 860m,water supply pipe:900m. ④ Middle Chencang Road, L=1601m,water supply pipe:1601m. ⑤ Dongxin Road, L=910m,W=18m ; sewage pipe:1645m,rainwater pipe:1635m.

3	**Xianyang** Wugong County Wugong Town	①A new water supply plant, three water wells(2 for operation and one for standby) with design water output of 3000m3/d. ②Sewage treatment project: the sewage will be treated in the stabilized pond that occupies an area of 10000m2. It is expected that the sewage treatment project after completion will have treatment capacity of , 450000m3/y.		① Renyi Avenue, L=2063m, 463m of it W=20m,1600m of it with width of 8m. closed conduit for rainwater 880m,sewage pipe:880m, existing bridge: 40m. ②East Street, L=667m, W=15m,open channel to be reconstructed into closed conduit ,sewage pipe:1116m. ③South Street, L=944m, 489mof it is 15m wide and 455m is 20m wide. A new rainwater pipe:490m, sewage pipe:980m. ④ Existing North Xibao Road L=1445m,W=12m,open channel to be reconstructed into closed conduit ,sewage pipe:1295m ⑤Subtotal of lane reconstruction project: 25 lanes with L=4885m, W: 2-8m,open channel to be reconstructed into closed conduit ,sewage pipe:13181m, shall be connected into all the households of residents..
4	**Xianyang** Xunyi County			①North Street, L=268m,W=24m,water supply pipe:373m,rainwater pipe:260m,sewage pipe:258m. ②South Street, L=370m,W=24m,water supply pipe:644m,rainwater pipe:380m,sewage pipe:384m. ③ Taita Road, L=463m,W=24m,water supply pipe:552m,rainwater pipe:432m,sewage pipe:432m. ④ East Hedi Road, L=725m,W=6m,sewage pipe:675m. ⑤ Songjiagou West Hedi Road, L=460m,W=6m,sewage pipe:438m. ⑥ Nanzigou West Hedi Road, L=470m,W=12m,sewage pipe:444m. ⑦ Yangguan Avenue,

				L=2800m,W=26m,rainwater pipe:2248m. ⑧ Zhitian Street, L=1359m,W=26m,water supply pipe:1606m,rainwater pipe:1366m,sewage pipe:1359m. ⑨New Zhitian Street, L=1220m,W=24m,water supply pipe:1090m,rainwater pipe:936m,sewage pipe:1245m.
5	**Xianyang** Chunhua County Runzhen Town	Runzhen-County seat sewage trunk pipe: L=11982m		① Chuangxin Road, L=1149m,W=12m,water supply pipe:1740m,rainwater pipe:550m,sewage pipe:615m. ② North Chuangye Road, L=1385m,W=12m,water supply pipe:1637m,rainwater pipe:1286m,sewage pipe:1359m. ③Huimin Road, L=730m,W=12m,water supply pipe:804m,rainwater pipe:1172m,sewage pipe:1168m. ④ Chuangye Avenue, L=1388m,W=22m,water supply pipe:1680m,rainwater pipe:753m,sewage pipe:1412m. ⑤Runwu Road, L=1383m,W=18m,water supply pipe:1564m,rainwater pipe:1396m,sewage pipe:1480m. ⑥Runbu Road, L=1497m,W=22m,water supply pipe:1619m,rainwater pipe:1490m,sewage pipe:1528m. ⑦ Zhenxing Avenue, L=2040m,W=30m,water supply pipe:2380m,rainwater pipe:1010m,sewage pipe:2040m. ⑧ Lanes, L=2518m,W=5m,water supply pipe:2518m,rainwater pipe:2518m,sewage pipe:2518m.
6	**Weinan** Chengcheng County	Reconstruction of Changning Street drainage: sewage pipe: 2920m.	① Huifu Street, L=3210m,W=27m；draiange connecting pipe: 0.61km, Road level for the urban arterial road level III；	① Dongliu Road, L=665m,W=22m,drainage pipe:1744m. ②Qingzheng Street, L=2206m,W=26m；sewage

			② Dongba Road, L=405m,W=25m,drainage pipe:1110m, One for city by road grade level III; ③ Yangguang Road, L=1727m,W=30m,drainage pipe:4982m, One for city by road grade level III.	pipe:2808m.
7	**Tongchuan** Yintai District		①North section of West Binhe Road, L=3002m,W=15m, rainwater pipe channel 3000m,sewage pipe:2960m, Road level for the urban arterial road level III; ②East Binhe Road ,L=3366m,W=14m, rainwater pipe channel: 3360m,sewage pipe:3360m, For slow road road level; ③ Weiyi Road ～ Weiliu Road, L=1202m,W=12m,rainwater pipe:960m,sewage pipe:960m;（Weiyi, Weier, Weisi, Weiwu and Weiliu Road have 40m long bridge）For the branch road level. ④Improvement of South Shunjin Road traffic safety management facility	①Local reconstruction of Napo-Chenlu Road, L=4466m,W=3m, mainly including adding passing lane and local widening of curve; ② Local reconstruction of Ceramic plant –Chenlu Road, L=2180m,W=3m, mainly including adding passing lane and local widening of curve
8	**Hanzhong** Hantai District		① North Section of Lianfeng Road, L=817m,W=16m ; rainwater pipe:1650m,sewage pipe:999m, Road level for the urban arterial road level III; ② Lianhua Road, L=2364m,W=32m,rainwater pipe:4663m,sewage pipe:2804m; ③Beier Road, L=2867m, W=12m. One for city by road grade Ⅱ level.	① East Street, L=699m,W=6.5m,rainwater pipe:830m,sewage pipe:787m; ② West Street, L=360m,W=6.5m ; rainwater pipe:454m,sewage pipe:426m. ③Lanes, new sewage pipe for 2344m:, new rainwater pipe for 286m, reconstruction of rainwater closed conduit for 2070m and road pavement for 8700 ㎡; ④Traffic safety facility: New South Streetand Puhan Road will be paved with new marking for 577.8 ㎡,43sets of road lamps,9 flashing

				lights,112m vibration marking, buried traffic light pipeline for 64m.
9	**Ankang** Hanyin County	G316 roadside main water supply pipe, L=6550m, serving 60000 people.	① Nanqu Road,L=2357m,W=20/28/23m,rainwater pipe:1468m,sewage pipe:2361m；bridge 1=25m, bridge 2=100m, One for city by road grade level III. ②West Extension of South Binhe Road, L=1400m,W=19m,rainwater pipe:1104m,sewage pipe:1980m；bridge is 10m, For the branch road level.	

4 Setting of environmental management system and the responsibilities thereof

4.1 Environmental management system

According to the administration authority and spirit as provided for in the "Environmental Protection Law of the People 's Republic of China" and "Regulations on the Administration of Construction Project Environmental Protection", the EIA report documents of this project shall be examined and approved by the Shaanxi Provincial Environmental Protection Department. The Shaanxi Provincial Environmental Protection Department is the environmental management agency of this project, its duties are to coordinate the environmental protection management work between different departments and be responsible for the “three-simultaneous” acceptance of environmental protection facilities according to the environmental protection requirements contained in the environmental impact assessment report. Under the overall administrative framework of the project, the Shaanxi Provincial Utilizing Foreign Loan Project Office shall manage the implementation of whole project. In order to ensure the smooth implementation of environmental management action under this project, the PPMO shall entrust the specialized environmental management institutions shall assist the PPMO, Owner, contractors and operators in the specific implementation of environmental management plan during the construction and operation periods.

The PPMO shall be responsible for the project planning and design, carry out supervision and management on the environmental protection of the project by procedures, and organize the skills training to the project environmental management personnel within the whole province; the Environmental Protection Bureau in each county shall mainly be responsible for the daily supervision of environmental management of the project; the environmental monitoring agency as commissioned by the CPMO shall be responsible for the environmental quality monitoring in the project area during the construction and operation periods.

The CPMO is to assign the specialized environmental management personnel to be responsible for the environmental management at all phases, implement the environmental protection regulations and plan, inspect the implementation of environmental protection measures under this project, popularize the application of advanced technology and experience, organize the environmental technology training to the project-related personnel to improve the quality of personnel.

This project would cause the impact on the surrounding environment during both the construction period and operation period, the corresponding environmental protection

measures should be taken according to the environmental impact characteristic during the construction and operation periods respectively to reduce various impacts to the acceptable levels.

The setting of environmental management system in the construction period is shown in Figure 4.1-1.

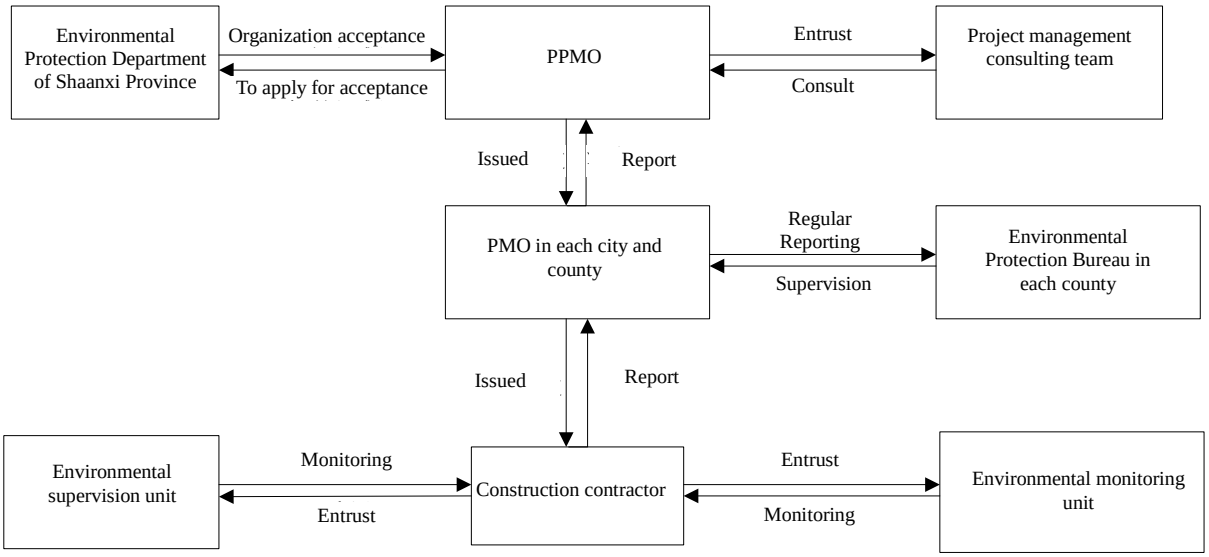

Figure 4.1-1 Chart for setting of environmental management system in the construction period

The setting of environmental management system in the operation period is shown in Figure 4.1-2.

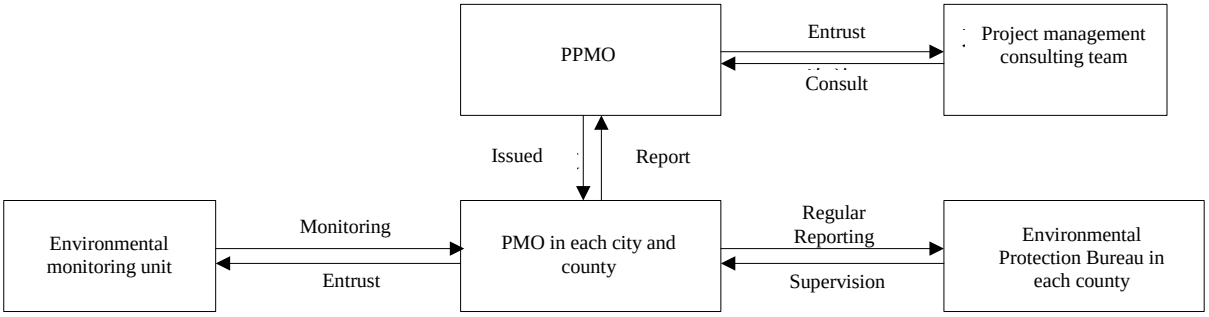

Figure 4.1-2 Chart for setting of environmental management system in the operation period

4.1.1 Environmental management during design period

PPMO design of the entire project supervision and environmental management. Responsible for project environmental management, responsible for organizing the project feasibility study, the development of the project work plan for environmental protection.

Provincial Environmental Protection Office of Environmental Management Plan project implementation supervision. Review and approval of environmental impact assessment

documents, preliminary design audit environmental measures.

4.1.2 Environmental management during construction period

The environmental management during the construction period consists of the builder environmental management and contractor environmental management, with the environment supervision and management of builder as the focus.

(I) Environmental management of builder

(1) Management agency

It is to establish an integral Environmental Management System with the PPMO as the center to be responsible for the implementation of environmental management plan under this project.

1) The PPMO shall establish an environmental group, specifically responsible for the environmental management;

2) The project management office (PMO) of each county shall designate a special person to be responsible for environmental management of project in his own county.

3) The PPMO shall employ the environmental consulting experts to provide technical support for the environmental management of this project;

4) Each project county shall engage an environmental monitoring institution to undertake the environmental monitoring work of the project county; appoint one environmental protection staff to be responsible for the implementation and supervision of construction project in the county;

(2) Management tasks

The builder shall be responsible for the environmental protection management from the beginning of construction to the completion and acceptance during the construction period, undertake the environmental protection and management responsibilities for the whole project area, including the preparation of environmental protection measure implementation planning,

Protect environment for the organization and implementation and supervision plan, consignation of preliminary design work and review, bidding design, construction organization, environmental monitoring, environmental supervision, completion acceptance, as well as the implementation and supervision in each link.

1) Environmental design and management

① It shall prepare the “Environmental Protection Measures Implementation Planning in the Construction Period for the Shaanxi Small Towns Infrastructure Construction Project by

Using the World Bank Loans" in accordance with the environmental impact report approved and the related documents.

② Commission a design unit with relevant design qualification to carry out the design work of environmental protection and environmental protection facilities works according to the "Environmental Protection Measures Implementation Planning in the Construction Period".

③ After the preliminary design results of environmental protection facilities are approved by the environmental protection department, carry out the bidding design and measure design work according to the approved design documents;

2) Bidding management of Environmental protection

Be responsible for the editing and review of environmental protection term in the bidding documents and contracts to ensure that all the environmental protection measures so approved are incorporated in the bidding documents and contracts; based on the environmental protection facilities design results and progress, the open bidding should be conducted in time for each project, to ensure that all the environmental protection facilities can be completed as scheduled.

3) Environmental monitoring management

① Prepare the environmental monitoring planning in accordance with the environmental impact report approved and related documents;

② Be totally responsible for the examination of environmental monitoring unit qualification, management of environmental monitoring contract, inspection and assessment of test room in the environmental monitoring unit. Be responsible for the review of monitoring report from the monitoring unit, analyze the reliability of monitoring results and the environmental problems given in the monitoring results.

③ Make rational use of monitoring results to check the implementation effect of environmental protection and water conservation measures, for the outstanding environmental impact problems reflected in the monitoring results, cause the contractor to develop and implement the corresponding solutions.

4) Routine management contents in the construction period

① Develop the annual plan for environmental protection.

② Examine and arrange the annual environmental protection funds.

③ Supervise the contractors on the implementation of environmental protection measures.

④ Coordinate with environmental protection and other relevant departments.

⑤ Handle the environmental pollution accidents and pollution disputes of this project, which should be reported to the superior department.

⑥ Prepare the annual environmental protection work report and submit the monthly, quarterly and yearly reports.

⑦ Organize the environmental protection publicity, education and training.

5) Manage the completion acceptance of environmental protection facilities.

① Entrust the evaluation unit with relevant qualification to carry out the “Completion Acceptance Investigation Report for the Shaanxi Small Towns Infrastructure Construction Project by Using the World Bank Loans”

② Be responsible for the organization of individual works acceptance, special environmental protection works acceptance, and acceptance at the construction phase.

③ Carry out the special or comprehensive environmental protection acceptance while making the main works acceptance in accordance with the "Three-simultaneous" principle.

④ Invite the local environmental protection authority to preside over the acceptance according to the environmental protection acceptance procedures.

(II) Environmental management of contractor

(1) Management agency

The Contractor shall set up an environmental protection management office as the main liable agency and implementing agency responsible for the environmental protection during the construction period, to actually implement the environmental protection tasks to be assumed by the builder in strict accordance with the environmental protection requirements given in the contract and bidding documents.

(2) Management tasks

The management tasks for the environmental management of contractor shall be responsible for environmental protection work in the construction and production activities engaged in by his own enterprise, which includes the following contents:

① The Contractor shall have at least 1 full-time environmental staff. The said environmental staff should accept the training as contained in the training plan so as to be competent for their work.

② Develop the annual work plan for environmental protection.

③ Check the construction progress, quality, as well as the operation and testing

conditions of environmental protection facilities, and handle the problems in the implementation process.

④ In the process of construction, the Contractor shall make the communication and consultation with the mass in the project areas, set up bulletin boards in each construction unit to inform the public of the concrete construction activities and the construction time. At the same time, provide the contact and telephone number for the public to lodge complaints on the construction activities or provide advices.

⑤ Check the annual usage of environmental protection funds.

⑥ Report on the implementation of environmental protection clause in the contract. Require the Contractor to monitor his environmental activities, and submit a daily or weekly environmental performance report. The PMO and construction supervision team shall supervise and examine the reports.

⑦ The Contractor shall reserve the guarantee deposit in the contract funds in accordance with the annual budget for environmental management, the amount of which should account for about 3% of budget.

4.1.3 Environmental management during operation period

The environmental management consists of management center environmental management and management station environmental management, who shall be responsible for the implementation of the environmental management plan.

The detailed responsibilities are as follows:

① Manage the execution of environmental protection measures for the project.

② Coordinate with the environmental supervision and management department and the surrounding residents on the environmental problems concerned.

③ Entrust the environmental monitoring station to conduct the routine monitoring on the three wastes discharged from the project facilities and the regional environmental quality.

④ In case of an environmental accident, make the emergency handling to the environmental risk.

⑤ Be responsible for the submitting the relevant information on the enterprise environment management to the Shaanxi Provincial Environmental Protection Department and PPMO.

⑥ Document and archive the files for environmental management of enterprises.

4.2 Main responsibilities of environmental management agencies

4.2.1 Overall management

PPMO shall conduct the comprehensive management on the whole project and be responsible for the coordination and supervision of environmental management. The Project Owner shall be responsible for the implementation of related environmental management plan within the project with assistance from the environmental supervision engineer in implementation, and the construction should have at least one environmental supervision engineer. The responsibilities of environmental management plan implementation and inspection agencies:

① The PPMO shall be totally responsible for the management of environmental protection of the project, be responsible for the organization of project feasibility study, develop the environmental protection work plan for the project, coordinate the environmental management between the competent department and builder, guide the builder to implement various management measures, and be responsible for the project preparation and operation issues.

② The professional personnel of PPMO shall be responsible for the environmental protection plan and environmental management at the design phase.

③ The Project Owner shall be responsible for implementation and management of environmental protection measures during the construction period and operation period.

④ The Provincial Environmental Protection Department shall conduct the supervision on the implementation of environmental management plan under this project.

The specific implementation agencies of environmental management plan are mainly of the Owner and Contractor, whose responsibilities are shown in Table 4.2-1.

Table 4.2-1 Main responsibilities of project implementing agencies

Agency name	Main responsibilities

Owner	a. Accept the supervision of environmental protection departments at all levels, PMO and the World Bank on the environmental protection. b. Implement the environmental protection measures as provided for in the environmental protection laws/regulations and the EIA report, as well as the work plan for environmental protection. c. Ensure the normal operation of environmental protection facilities, the environmental protection department shall make the self-inspection, establish the environmental protection archives, and submit reports to the PMO and environmental protection departments at all levels. d. Execute the consignment agreement/contract for monitoring with the environmental monitoring department to allocate the implementation of environmental management plan. e. Provide fund for the environmental protection inspection or selective examination. The Contractor shall play a crucial role in the implementation of environmental management, pollution control and prevention measures in the process of project construction. f. Entrust and allocate the environmental supervision, and the environmental monitoring plan should be incorporated into the construction contract. g. Select the contractor with strength and qualification, and the environmental management plan should be written into the contract to ensure the effective execution of environmental management plan.
Contractor	a. Require that the Contractor and construction supervisor must receive the training on environmental protection and management before construction. b. The environmental impact mitigation measures during the construction period should be included in the bid documents of the Contractor, which should also be included in the contraction contract as contract requirement to the Contractor. c. Require the Contractor to monitor his environmental activities and provide regular environmental performance log. The PMO and construction supervision team shall supervise and examine these records. d. The Contractor shall have 1 full-time environmental staff for the project, the said staff should receive the training as contained in the training plan so as to be competent for their work.

4.2.2 Supervision and management

The environmental supervision agencies for this small towns project include the PPMO, Shaanxi Provincial Environmental Protection Department and Environmental Protection Bureau of each city and county. The PPMO shall be totally responsible for the environmental supervision and management work, while the concrete supervision shall be executed by the

Shaanxi Provincial Environmental Protection Department and Environmental Protection Bureau of each city and county. The management and supervision functions of these agencies at different phases are listed in Table 4.2-2.

Implementation by the supervision agencies in different phases:

(1) The feasibility study phase: it shall be the responsibility of the Shaanxi Provincial Environmental Protection Department and Environmental Protection Bureau of each city and county. The Shaanxi Provincial Environmental Protection Department shall be totally responsible for the environmental supervision and management of the project, examine and approve the environmental impact assessment documents, guide the Environmental Protection Bureau of all counties in the implementation of laws and regulations, and be responsible for the completion acceptance of environmental protection facilities.

The Shaanxi Provincial Environmental Protection Department shall be responsible for the environmental management of the project, examine and approve the environmental impact assessment documents, be responsible for the supervision and management on the environmental protection of the project, organize and coordinate the environmental protection work of related agencies, guide the Environmental Protection Bureau of each city and county on the environmental supervision and management during the construction period and operation period.

(2) Design phase: it is the responsibility of environmental protection departments under the PPMO, which should be supervised by each city and county in the preliminary design review.

(3) Construction phase: it is the responsibility of the Shaanxi Provincial Environmental Protection Department. The Environmental Protection Bureau of each city and county shall accept the guidance of the Shaanxi Provincial Environmental Protection Department, supervise the builder in implementation of environmental action plan, execute the regulations and standards on environmental management, coordinate the environmental protection work among different departments, be responsible for the inspection, supervision and management in the construction, completion acceptance and operation of environmental protection facilities of the project.

(4) Operation phase: it is the responsibility of the PPMO, Shaanxi Provincial Environmental Protection Department and Environmental Protection Bureau of each city and county. Each city and county shall be responsible for the implementation of regulations and standards for environmental protection, develop the regulatory framework for environmental protection and supervise the implementation thereof, understand the environmental aspect in construction, formulate environmental quality control objectives for assessment, put forward the control measures to be submitted to the superior environmental protection department and industrial competent authority, organize the examination and training of environmental protection personnel who should work with the certificate, and be responsible for environmental

technology exchange and scientific researches.

(5) The environmental monitoring in construction period and operation period shall be executed by the environmental monitoring department. The environmental supervision shall executed by the project supervision company of the project area. After the completion of project, it shall establish the environmental management agency to have the full-time staff to be in charge of the environmental protection work of project.

Table 4.2-2 Environmental protection supervision plan for the project

Phase	Agency	Contents for supervision	Purposes of supervision
Feasibility study phase	Shaanxi Provincial Environmental Protection Department and Environmental Protection Bureau of each city and county	Review and approve the environmental impact assessment documents	1. Ensure that the EIA contents are comprehensive, the topic is set proper and key points are highlighted. 2. Ensure that important and potential problems that may take place in this project are reflected. 3. Ensure that the measures to mitigate the environmental impacts have the specific and feasible implementation plan.
Design and construction phase	Shaanxi Provincial Environmental Protection Department and Environmental Protection Bureau of each city and county	1. Review the preliminary design of environmental protection measures. 2. Check the land restoration, vegetation recovery and environmental restoration in the land temporarily occupied by the construction. 3. Check the dust and noise pollution control measures and determine the construction time. 4. Check the emission of air pollutants. 5. Check the discharge and treatment of domestic sewage and construction wastewater on the construction site.	1. Strictly implement the three-simultaneous principle. 2. To ensure that these places can meet the requirements for environmental protection. 3. Reduce the impact of construction on the surrounding environment, implement the related environmental regulations and standards. 4. Reduce the impact of construction on the surrounding environment, implement the related environmental regulations and standards. 5. Avoid causing the loss of soil and water.
Operation phase	Shaanxi Provincial Environmental Protection	1. Check the implementation of the monitoring plan. 2. Check the sensitive points where it is necessary to take the further	1. Implement the monitoring plan. 2. Protect the environment. 3. Strengthen the environmental management for effective protection

	Department and Environmental Protection Bureau of each city and county	environmental protection measures (possible to have the expected environmental problems) 3. Check if the environmental quality in the sensitive points can meet the corresponding quality standards. 4. Strengthen the supervision, prevent accidents, develop the emergency response scheme to eliminate the danger in case of an accident.	of human health. 4. Ensure that the discharge of pollutants can meet the emission standard.

5. Summary of major environmental issues and environmental protection measures

5.1.1 Analysis on the common impact of projects and environmental protection measures

The main contents of this project are of road construction, pipe network laying and water well construction, the small-scaled works are scattered in the project areas of different counties (cities). This project will have a certain disturbance and impact on the environment, but without large-sized excavation or pileup of mass rock and soil, the influence is generally mild, scope is small and time is short. The scope of overall environment influence is limited.

The common environmental protection rules for the project are shown in Table 5.1-1.

Table 5.1-1 Common environmental protection rules for the project

Period	Environmental impact		Mitigation measures	Executer	Supervisor	Funds arranged
Design phase	Environmental impact assessment document		Review and approve the environmental impact assessment documents	PPMO	Provincial Environmental Protection Department	——
	Preliminary design of environmental protection measures		Review the preliminary design of environmental protection measures	PPMO	Provincial Environmental Protection Department	——
Construction period	Water environment	① The wastewater produced during construction mainly include the slime water in the foundation construction, flushing water of building material, vehicle flushing water and other production wastewater, the domestic wastewater produced by the construction personnel, as well as the wastewater containing a lot of silt produced by the runoff on the construction site in the rainy days. ②The production wastewater mainly contains the silt, oil or other pollutants; while the domestic wastewater contains COD, SS, ammonia nitrogen, plant/ animal oil and other pollutants	① It is recommended that the domestic wastewater from the construction personnel should be collected and treated in the septic tank before used for the agricultural irrigation of the surrounding villages. ② For the production wastewater, we should strengthen the management to reduce the production of production wastewater in the construction process (such as the wastewater leakage from concrete mixing and flushing water), and the wastewater should be reused on site as far as possible. ③ For the slime water produced from the foundation construction during the construction period, it shall set up the sedimentation tank, the water so settled can be used for road sprinkling, the material or vehicle flushing water or other wastewater containing oil produced in the course of construction shall be treated in the grease sedimentation tank specially arranged and reused after treatment, the remaining part shall be connected into the nearest drainage pipeline. ④ The stormwater/wastewater pipeline under the main roads and road rehabilitation in the old town area of Wugong County, Xianyang City, the road construction in the Yintai District, Weinan City, and the road construction in the Hanyin County, Ankang City, shall involve in the surface water bodies of Qishui River, Hanjiang River and Yuehe River, it should pay attention to the unified collection and centralized treatment of	The Owner, Contractor	County Environmental Protection Bureau	590000 yuan

			wastewater in the construction process, it is strictly prohibited to discharge it directly into the rivers without treatment. ⑤ The stacking of construction materials (cement, sand, and stone etc.) shall take the shielding measures to prevent the rainfall erosion from causing the surface water and groundwater pollution. If not used for other purposes after the construction is completed, the stacking site should be greened or landscaped. ⑥ The necessary measures should be taken to prevent soil and loose construction materials blocking the existing municipal drainage pipeline.			
	Ambient air	The air pollution in the construction period is mainly of the dust pollution and asphalt smoke pollution. Abundant dust can be scattered into the ambient air environment in the process of transportation, loading/ unloading and mixing of road building materials; the road building materials can cause dust pollution during the stacking period as they are blown by the wind. The roads under this project shall adopt the asphalt concrete pavement structure, which would cause a certain ambient air pollution, also a certain harm to the construction personnel. The greater influence stage of asphalt smoke is the road paving stage.	① The vehicles carrying the construction materials should be covered to reduce the scattering. Shed shall be set up or other measures be taken for the construction materials such as the cement, lime or other easily scattered material, and the storage yard should be sprinkled in time. ② When doing the roadbed construction, water should be sprinkled as required by the compaction of roadbed material. The Contractor must also sprinkle water from time to time after the material is compacted to avoid the re-entrainment of dust. ③ In order to avoid the materials, such as in the soil-lime mixing or spreading process, from producing dust under the windy weather conditions to bring about adverse effects on the environment sensitive points and crops, the soil-lime mixing shall be conducted in a center and the mixer should be shielded by a 3m high temporary fence to prevent the diffusion of fly ash. The site of mixing plant is recommended to be set leeward where there is no environmental sensitive point around. The wet material so mixed should be immediately carried to the site for laying to reduce the occurrence of dust. The wet material should be spread and compacted immediately after arrival. ④ The transportation vehicles and construction machinery should be kept in good working condition, the intact rate is required to be above 90%, and the high quality fuel	The Owner, Contractor	County Environmental Protection Bureau	

			should be used, while the tail gas cleanup unit is mounted to effectively reduce the emissions of exhaust pollutants. ⑤ The Builder shall consider the new road, road rehabilitation, drainage, stormwater pipeline laying and other infrastructures as a whole, to arrange construction time and progress in a rational manner, it shall first conduct the construction of drainage or other underground facilities, followed by the construction of road works, to avoid the repeated excavations and minimize the impact on the environment.			
	Acoustic environment	The noise of the project during the construction period mainly comes from the construction machineries, such as the bulldozers, loaders, excavators and mixer etc.. The noise can be as high as 90～98dB(A) in the place 5m away from the sound source when these machineries are running. These sudden and non-steady noise sources would produce adverse effects to the construction workers and surrounding residents.	① Reasonably arrange the construction site. The reasonable and scientific arrangement of construction site is the main way of reducing construction noise, for example, the fixed vibration sources on the construction site are concentrated to reduce the affected scope; the machinery equipment that can be fixed, such as the air compressor and electric generator, should be installed in the temporary rooms on the construction site, which are equipped with sound insulation board to reduce the noise. The storage yard and material preparation plant for construction should be arranged as far as possible away from the objects of environmental protection. ② Reasonable arrangement of construction time. The noise road building machineries features sudden, irregular, discontinuous and high intensity. Under the precondition that the progress is guaranteed, it shall arrange the construction time in a reasonable manner. It is strictly prohibited to carry out the construction work with strong vibration in the night time. ③ Reasonable arrangement of construction vehicle route and travel time. The reasonable transportation route and time should be determined for the construction vehicles, especially the large-sized transport vehicles, in accordance with the provisions of the competent authority. The main haul road so selected should be as far away from the village, residential areas and other sensitive points as possible, in the	The Owner, Contractor	County Environmental Protection Bureau	

			sensitive point that cannot be avoided it should erect the No Horn sign. ④ Reasonable selection of construction machinery and equipment. In the process of construction, the Builder must select the construction machineries and transport vehicles in line with the relevant national standards, when it is practical, it shall select the construction machinery and equipment of low noise and low vibration, which should be equipped with the ancillary device for noise elimination and sound insulation, pay attention to maintenance, repair and correct use to keep them in the optimum working state and the lowest noise level; it shall avoid using multiple machineries and equipment of high noise in the same place and at the same time. ⑤ Carry out the acoustic environmental monitoring during the construction period and take the corresponding measures to control the noise according to the monitoring results.			
	Solid waste environment	The solid wastes discharged and discarded during the construction period mainly include the construction waste in the construction process and the domestic wastes produced from the resettlement, as well as the domestic wastes produced by the construction personnel. If piled up at will, it shall occupy land, possible to contaminate the soil and water through rain wash, or form a dust pollution in the wind in dry season.	① The construction waste from building demolition shall be carried to the construction waste landfill in a unified manner as required by the sanitation department. ② The domestic waste produced by the construction personnel shall be collected in a classified manner, cleaned and carried to the township waste landfills regularly. ③ The abandoned earth shall be wholly used for the roadbed filling of new road or for land leveling of road reconstruction/expansion works. ④ Strictly control and minimize the remaining materials in accordance with plan and construction procedures. Once there are remaining materials, they should be stored orderly and kept properly to be used for the road construction, pavement repair or constructions in the surrounding places. ⑤ The other solid wastes produced during construction period shall be subject to the quantity reduction treatment by way of recycling, the wastes that can not be recycled should be collected in a centralized manner and carried to the township waste landfill site along the line. Additionally, it should be	The Owner, Contractor	County Environmental Protection Bureau	

			noted in the construction process that the waste oil, asphalt and other solid waste shall not be piled up beside the water body, which should be cleaned and carried away in time.			
	Ecological environment	The roadbed filling and excavation can damage the vegetation along the line to a certain extent, occupy the local farmland, the land surface in the temporary borrow pit and spoil ground is exposed, resulting in a certain change in the local ecological structure in the areas along the line. After the exposed ground surface is washed by the rain, it would cause the soil and water loss within the local range, to affect the stability of local terrestrial ecosystem.	① The temporary land use during the construction period shall be selected within the road land acquisition range as far as possible, to occupy less or no arable land. ② If it is necessary to set up the construction camp, it shall, as it is practical, lease the local private or public houses, or arranged within the road land use range, to prevent the domestic wastewater and domestic wastes from contaminating the farmland or garden. ③ The Builder should strictly control the quantity of temporary land use, the construction road, various storage yards and fabrication yards shall be considered as a whole based on the construction progress, which should be arranged within the road land use range, so far as it is practical. ④ The construction wastewater shall be collected in a temporary sand-basin in the construction process without outward discharge, to prevent the construction wastewater discharged into farmland causing pollution. ⑤ The temporary land use during the construction period shall be arranged within the road land acquisition range as far as possible, and the construction camp shall lease the existing buildings and sites. The land where the vegetation is destroyed and the earth is exposed (both inside and outside the boundary) due to the road construction should be recovered and reused immediately after the completion of construction to restore the vegetation or transform it into cultivated land. ⑥ The construction scheme shall be designed in a rational manner to minimize the covering area of land by the excavation in construction, shorten the stacking time and take the centralized stacking measures.	The Owner, Contractor	County Environmental Protection Bureau	
	Environmental risk	① Some of the construction operation points are near the river, if not properly managed, it is possible for the greasy dirt of	① Earnestly implement the various environmental protection measures against the production wastewater and domestic sewage treatment during construction period, make irregular inspection on the construction site, strictly forbid the	The Owner, Contractor	County Environmental Protection	

		vehicle and equipment, discarded soil or waste rock to enter into the river, causing river water pollution risk; ② The construction points of this project are dispersed, if the construction wastewater, domestic sewage and domestic garbage are not managed properly, it may also cause the river water pollution risk.	production wastewater of domestic sewage to be directly discharged into riverway or riverbed; ② Strengthen the traffic control at the dangerous road sections and vehicle centralized route, erect additional traffic signs, and pay attention to road maintenance, to reduce the probability of risk occurrence. ③ Strengthen the training and supervision to the construction machinery operators and conduct the operation in strict accordance with the operating instructions. ④ Establish the emergency response mechanism, ensure the safe evacuation of related working personnel in case of an accident.		Bureau	
	Cultural relics	① The project does not involve the social concern itself in the region, and the construction of the project has no direct impact on the cultural relics and sites for religious activities. Only the temporary traffic barrier caused by building activities during the construction period could have an indirect impact on the social concerns. ② The indirect adverse effects of the project on social concerns are mainly concentrated in the construction period. The completion and implementation of the project will not adversely impact the local heritage protection and religious activities.	① In order to avoid the time of important activities of residents as much as possible, signs shall be set up to inform the residents of main contents and construction time for the project, and construction signs and guide logo shall be set up in advance. ② Attention should be paid to safety work during the construction period. The safe pedestrian paths for visiting the temple by local residents, visiting the Teta pogoda by tourists and going to church in the mosque, shall be retained as much as possible; the appropriate lighting facilities or the fences shall be set, or the progress of the works in or near mosques, historic monuments and sites, and densely populated areas is accelerated, to minimize the potential impact on local people's travel and transportation. ③ in construction arrangement, temporary land for construction cannot be set in sites for cultural relics and religious activities, and the impact can be minimized by taking measures of site recovery and vegetation restoration.	Owners, contractors	EPB of the counties	
Operation period	Water environment	The construction of water supply/ drainage works under this project will change the original water use habits and ways, stormwater/sewage	① Set a precipitation grille pool at the stormwater outfall to remove sediment and floating debris. ② The construction of stormwater/sewage pipe network must ensure that the wastewater so collected can be discharged into the local sewage treatment plant for unified treatment to	The Owner	County Environmental Protection	1245000 yuan

		collection/discharge patterns, the improved convenience of water use may result in increased water consumption, further causing the increase of domestic sewerage volume; the construction of stormwater/sewage collection pipe network will improve the wastewater/sewage collection rate, which shall also increase the regional domestic sewerage volume.	standard before discharged, the region without sewage treatment plant must ensure that the sewage treatment plant is put into operation before the project is implemented. ③ Strengthen management of vehicles, the vehicles loaded with bulk cargoes, such as coal, lime, cement or earth that are subject to dusting, must be covered by tarpaulin before run on the road, no overloaded vehicle is allowed to run on the road to prevent the cargo scattered on the road from causing the water pollution. ④ Regular inspection and maintenance shall be made on the drainage works facility along the road (such as a drainage ditch), the damaged points should be repaired in time.		Bureau	
	Ambient air	The automobile exhaust is the main source of pollution in ambient air in the operation period of this project, a car running on the road is a flowing source, the major pollutants contained in the automobile exhaust include the CO, NOx, THC (total hydrocarbons) and TSP (total suspended particles).	① Plant trees on road side. It is recommended to plant the arbor and shrub of the native species in the space near both sides of road, especially near the sensitive areas, according to the local climate and soil characteristics. Strengthen the maintenance of green space along the road to retain the pollution reduction function of green space. This is not only helpful to absorb the road dust, protect the ambient air quality along the line, but also can beautify the environment and improve the landscape along the highway. ② Strengthen the road operation management, strictly implement the vehicle management system, strictly enforce the motor vehicle emission limit standards promulgated by the state, restrict the vehicles that the exhaust exceeds the standard, or the vehicles loaded with bulk materials without coverage, to run on the road. ③ Strengthen pavement maintenance and cleaning, keep the road in good operating condition, reduce dust and vehicle exhaust pollution. For the vehicles carrying the goods subject to dusting (such as lime, coal and so on), it should strengthen the management, set up the necessary coverage and keep the uniform speed on the road to avoid the sudden stopping causing the material scattered on the road. ④ Equipped with the sprinkler to sprinkle water and	The Owner	County Environmental Protection Bureau	

			clean the pavement on a regular basis, to reduce dust pollution.			
	Acoustic environment	The noise source of motor vehicles running on the highway belongs to the unstable source. After the project put into operation, when a vehicle is running, its engine, cooling system, drive system and other components will produce noise. In addition, the air turbulence, exhaust system, the friction between the tires and road surface, will also produce noise when it is running. The mechanical noise can be reduced by a moving car depending on the roughness of pavement.	① Low sound source noise radiation. Strictly control the construction quality, and ensure the quality of construction. Especially in the road section with the noise sensitive points around, the roadbed treatment shall take the reinforcing measures to ensure that there is no subsidence, crack, sags and crests or other problems occurred in the road operation period to increase the vehicle noise. ② Control the path of noise transmission, enhance the afforestation and facilities on both sides of road. Combined with the planning of the local ecological construction, strengthen the greening work in the sections for greening within the land acquisition range of road works to be built. The embankment slope and drainage ditch shall be subject to the unified greening engineering design, the road sections passing through villages shall have the green belt of multi-layered structure to form a steric barrier and strengthen the sound insulation and absorbing function against the traffic noise. At the same time, it shall make full use of idle space between the village and highway to create the surrounding forest. ③ Strengthen the motor vehicle management, strictly implement the requirements for speed limit and non-overload, the No Horn sign should be erected in the road section of higher population density. It shall minimize the noise of noise pollution source, gradually restrict the vehicles of poor technical conditions and high noise to run on the road to reduce traffic noise nuisance. ④ The highway engineering maintenance department shall conduct the regular maintenance on the pavement, repair the damaged pavement in time, always maintain the smoothness of pavement, to avoid the poor road conditions causing the vehicle bumps to increase the traffic noise.	The Owner	County Environmental Protection Bureau	
	Solid waste environment	Mainly the domestic waste of residents along the road. The road building waste may also be produced from the road	① Strengthen publicity work of environmental protection to improve people's awareness of environmental protection and eliminate the bad habit of casting waste at will; ② Improve the duty awareness of sanitation staff, the	The Owner	County Environmental Protection	

		maintenance and repair, the wastes generated in the process road cleaning and the wastes removed regularly from the stormwater outfall.	wastes so cast should be cleaned timely.		Bureau	
	Ecological environment	① Analysis on the influence of project land occupation on the land utilization ② The impact on the regional plants in the place of road site	It shall take the vegetation restoration and landscape rebuilding measures within the construction affected areas. The vegetation restoration and landscaping shall depend on the different functional sections and local conditions, based on the economical and reasonable principle, to combine the landscaping closely with the landform earthwork is balanced on the spot, adopt the arbor, shrub, flower and grass to form a multi-layer structure, improve the afforestation coverage rate and ecological benefits, and maximize the comprehensive function of greening.	The Owner	County Environmental Protection Bureau	
	Environmental risk	① The overturn and leakage of vehicles carrying the dangerous chemicals would lead to water pollution; ② The sewage works is not built on time, the sewage direct discharge into river would result in water pollution.	① It is required by the river bank transportation management that only the unit with corresponding qualifications and transport conditions can undertake the transportation of oil and chemicals; the driver must have corresponding transport certificates, the transport vehicles should be kept in good condition; the transport of dangerous goods should avoid the time periods such as the storm, so as not to cause the traffic hidden danger due to poor road conditions. ② Strengthen the pipeline inspection to avoid blockage. If water seepage is discovered, make replacement timely. ③ Strengthen the inspection of water supply facilities in water supply station, to ensure the normal pressure and normal operation of water supply pump	The Owner	County Environmental Protection Bureau	
	Cultural relics	Except for increase in the number of visitors, the operation has less impact on cultural relics.	Constant vigilance and strengthening the training of management personnel in the education and awareness of heritage conservation are necessary for effective protection of cultural relics and historical sites.	Owner	County Environmental Protection Bureau	

5.1.2 Analysis on the impact of specific works and environmental protection measures

The special environmental regulations are mainly aimed at sensitive targets and special projects, which mainly involve schools, cultural relics, rivers, water supply plants, and sewage treatment equipment.

There are totally 10 schools involved, including: the Beitun Central Primary School, Beitun Middle School and Beitun Kindergarten on the Hongyao Road, Wutun Town, Yanliang District, the University Street Primary School on the East Street, Wugong Town, Wugong County, the Run Town Primary School, Run Town Middle School and Run Town Kindergarten on the Chuangye Street, Run Town, Chunhua County, the Chenghe Mining Bureau Primary School, Chenghe Mining Bureau Middle School and Chenghe Mining Bureau Kindergarten in the Chengguan Town, Chengcheng County.

There are 3 sites of cultural relics and religious activities, they are the Town God's Temple in Wugong Town of Wugong County, the Taita Tower in the Chengguan Town of Xunyi County and the Lianfeng Village Mosque in the Pu Town, Hantai District, Hanzhong City.

There are 8 bridges, mainly including: the existing bridge over the Qishui River, 40m long, 20m wide, in the Renyi Road, Wugong Town of Wugong County, the water quality target is of Class III; there is bridge over the Qishui River, 40m long and 12m wide each, in the Wei'er Road, Weisi Road, Weiwu Road and Weiliu Road respectively in the Yintai North Town, Yintai District, Tongchuan City, the water quality target is of Class III; there are two bridges on the Nanqiu Road, Chengguan Town, Hanyin County, Ankang City, of which, the Bridge 1 is 25m long, the Bridge 2 is 100m long, both are 30m wide; the bridge over the Yuehe River in the Binhenan Road West Extension Section is 10m long and 22m wide, the water quality target is of Class III.

It is intended to build a new water supply plant, and 3 wells (2 for operation and one for standby) in Wugong Town, Wugong County, with a design water capacity of 3000m3 / d.

Sewage treatment project for Wugong Town, covers an area of 10000m2, using stabilization pond process. It is expected that it has the treating ability of 450 000 m3 sewage/ year after the project is completed.

In view of these sensitive objects, the professional environmental protection rules proposed for this project are shown in Table 5.1-2.

Table 5.1-2 Professional environmental protection rules for the project

Time period	Environmental impact		Mitigation measures	Executer	Supervisor	Funds arranged
Design period	Environmental impact assessment documents		Review and approve the environmental impact assessment documents	PPMO	Provincial Environmental Protection Department	
	Preliminary design of environmental protection measures		Review the preliminary design of environmental protection measures	PPMO	Provincial Environmental Protection Department	
Construction period	10 School	① The noise of the project during the construction period mainly comes from the construction machineries, such as the bulldozers, rollers, loaders, excavators and mixer etc.. The noise can be as high as 90～98dB(A) in the place 5m away from the sound source when these machineries are running. These sudden and non-steady noise sources would produce adverse effects to the schools. ② The construction activities would cause some adverse effects for the students to go to school such as traffic jam and safety aspects.	① The reasonable arrangement of construction vehicle route and travel time. The reasonable transportation route and time should be determined for the construction vehicles, especially the large-sized transport vehicles, in accordance with the provisions of the competent authority. ② Erect the school, No Horn and speed limit signs. ③ Set the reserved passage for the students to go to/from school, a specially assigned person shall guide the evacuation of students. When necessary, even stop the construction to protect the safety of students. ④ Carry out the acoustic environmental monitoring during the construction period and take the corresponding noise control measures according to the monitoring results.	Owner and Contractor	Yanliang, Wugong, Chunhua, Chengcheng County Environmental Protection Bureau	480000 yuan

	3 Cultural relic	①construction process may affect residents' transportation Temple temple period. ② construction process may affect the number of tourists visiting Teta. ③construction process may affect access to the mosque road environment.	①retain as much as possible the safety of local residents visiting the temple walkway. ②retain as much as possible the safety of foreign tourists visiting Teta walkways. ③ mosque as venues for religious activities in general, belong to the material and cultural resources in the construction of this section, as the local people who retain the security line access to the mosque, and should fully respect the local culture, so as not to impact on national culture.	Owner and Contractor	Wugong, Xunyi, Hantai County Environmental Protection Bureau	
	8 Rivers	The surface water pollution during the bridge construction period mainly comes from the production wastewater from the construction operation and domestic wastewater from the construction personnel. Because bridges involved in this project are all small bridges, there is no large-sized bridge pier to build, so there have no drilling mud to contaminate the water in the river. Additionally, the waste oil from the construction can also cause water pollution. In the on-site pouring process of bridge superstructure, it shall use the formwork and machinery fuel, in case of leakage of machinery fuel or the waste oil is directly abandoned into the water body, it may increase the oil and other substances in the water quality index of the water environment, to degrade the water quality.	In the process of bridge construction, it should never discard the construction wastes, waste oil or waste water into the water body. After the bridge construction is completed, the construction site should be cleaned up to prevent the construction wastes being washed into the river by rainwater. At the same time, we should strengthen the management, the construction materials, such as asphalt, oil, chemicals, should be stacked far away from the riverbed, which should be equipped with the canvas for temporary sheltering to prevent the rainwater scouring. In a word, in the process of bridge construction, it shall strengthen the on-site management of construction machinery and construction materials to avoid and reduce the environmental pollution of surface water along the line by the bridge construction.	Owner and Contractor	Wugong, Yintai, Hanyin County Environmental Protection Bureau	

Operation period	10 School	After the project put into operation, when a vehicle is running, its engine, cooling system, drive system and other components, as well as the surface evenness, will produce noise. These noises can affect the schools.	① Set up the School, No Horn and speed limit signs. ② When the students are going to/from school, vehicles should low down and let the students go first, set the road deceleration strip.	Owner	Yanliang, Wugong, Chunhua, Chengcheng County Environmental Protection Bureau	900000 yuan
	3 Cultural relic	The impact on the cultural relics during the operation period is main that the number of visitors will increase, this would not cause any effect.	The effective protection to the cultural relics need the vigilance all the time, t should strengthen the education on the protection of historical relics and cultivation of awareness to the management personnel.	Owner	Wugong, Xunyi, Hantai County Environmental Protection Bureau	
	8 Rivers	After the completion of this project, there may have the vehicles carrying dangerous chemicals to pass through that it is possible to have the vehicle overturning or leakage of dangerous chemicals to cause the river water pollution, so we should strengthen the prevention.	① Strengthen the propaganda on the safety in vehicle driving. ② Set up the No Passing signs at the sensitive water bodies along the line to forbid the vehicle carrying dangerous chemicals to pass through. ③ Set up the By-Pass signs at the general water bodies along the line for the vehicle carrying dangerous chemicals	Owner	Wugong, Yintai, Hanyin County Environmental Protection Bureau	
	Water Plant	Affect the operation of the water plant, mainly to improve the construction of a secure, stable, reliable source of water, providing water for daily life for the entire township.	①Set water signage. ②water quality indicators for water and water monitoring. ③The project operator centralized management of the water company should strengthen the management of personnel training and education and awareness in the conservation of water resources.	Owner	Wugong County Environmental Protection Bureau	

	oxidation pond	Affect the operation of the oxidation pond, can effectively collect the township sewage pipe network can also continue to improve, the amount collected will be gradually increased.	①sewage treatment facility signage. ②oxidation pond water plant effluent quality indicators and monitoring. ③ in the construction process, treatment should be impermeable to prevent pollution of groundwater. ④centralized management, strengthen the management staff awareness and education.	Owner	Wugong County Environmental Protection Bureau	

6. Technical support and environmental management training

6.1 Technical support

The PPMO shall regularly engage the relevant experts based on the implementation of the project to provide the technical support and environmental consulting services for the project.

6.2 Environmental management training

6.2.1 Training objective

The environmental management training objective is to ensure the smooth and effective conduction of environmental management work, so that relevant personnel can get familiar with the contents and procedures of environmental management, improve the environmental management capacity of environmental management personnel and ensure the effective implementation of the environmental protection measures. The main objects of the environmental capacity building are the environmental stewards and environmental supervisor, the training to them is an integral part of project technical support. The training course is also to train the builders and workers in the process of project implementation. Before the project construction is commenced, all the builders, operators and the construction supervision staff are required to participate in the mandatory environmental, health and safety training.

6.2.2 Targeted trainees

The targeted trainees shall include: the staffs of provincial, municipal and county level environmental management offices, representatives of environmental supervision agency, representatives of environmental monitoring agency, representatives of main contractors and other personnel.

6.2.3 Training contents

(1) Mastery and application of WB’s environmental policy, domestic environmental protection laws and regulations and environmental standards;

(2) The environmental management mode of the Shaanxi Small Towns Infrastructure Construction Project by Using the World Bank Loans and the environmental terms in the loan agreement;

(3) The environmental impact evaluation and environmental management plan for this

project;

(4) The environmental management provisions of this project (the key point is the provisions for the environmental management in the construction period);

(5) The responsibilities of environmental management personnel, environmental supervision personnel, environmental monitoring personnel and Contractor, and the relationship between them;

(6) The preparation of environmental management work report, environmental supervision work report, environmental monitoring report and Contractor's monthly report.

6.2.4 Training plan

(1) The staffs of environmental management office, the staffs of environmental supervision agency, the representatives of project management office

The staffs of provincial, municipal and county level environmental management offices, representatives of environmental supervision agency and representatives of environmental monitoring agency shall be organized by the Provincial Environmental Management Office to receive the training before the implementation of project in a centralized manner, the specific training contents shall be executed by the environmental technology expert. The training time is 3 days, the training contents are as follows:

1) Study the safeguard policy of World Bank and the detailed rules and regulations developed for the construction side;

2) Study the environmental impact of this project and environmental items to monitor;

3) Training on the on-site operating process of the project, including the organization, communication, roles and responsibilities, decision-making process, observation procedures of reports and standards;

4) Study the environmental information archiving, disclosure, exchange and report mechanism of the World Bank;

5) Study the health and safety inspection and reporting process of the World Bank;

(2) The main Contractor representatives

The training of main Contractor representatives shall be organized by the project management office before the implementation of project in a centralized manner, the specific training contents shall be executed by the environmental technology and health experts. The training time is 1 day, the training contents are as follows:

1) Introduce the environmental impact factors associated with environment and environmental

protection measures;

2) Introduction to define the particularly sensitive areas and the problems within the construction areas;

3) Introduce the roles and responsibilities of environmental management personnel and environmental supervisor, as well as the key points for the report of environmental problems;

4) Health and safety knowledge;

5) The fine for violence of the provisions, laws and regulations.

7. Completion acceptance of environmental protection

(1) Standards for completion acceptance

It shall subject to the relevant provisions given in the "Management measures and acceptance of the environmental protection of the construction projects" by the Decree No. 13 of the State Environmental Protection Administration.

(2) Acceptance scope

All the environmental protection facilities in connection with this project, ecological restoration, environmental greening, and planning scheme of soil/ water conservation measures;

Other environmental protection measures to be taken as required by the EIA documents, approval document, and the related design document;

The acceptance contents of environmental protection: the main contents for the environmental protection acceptance survey are shown in Table 7.1-1.

Table 7.1-1 The acceptance list for the main environmental protection facilities of this project（recommended）

Category	Name of environmental protection facilities	Location	Requirements	Acceptance criteria
Acoustic environment	Speed limit marking, speed restriction board, No Horn board	Schools, cultural relics and so on	Signboards distinct and complete	
Construction waste	Construction waste and domestic waste disposal in construction period	/	Sent to the construction waste landfill and municipal waste landfill for disposal	
Drainage facilities	Construction period production wastewater control	Construction site	Backfill of sedimentation tank, drainage ditch and interception ditch	

Water environment	Speed limit marking, No Passing sign for dangerous chemicals, By-pass sign for vehicles carrying dangerous chemicals	Both sides of bridge	Signboards distinct and complete	
Ecology	The ecological restoration works of temporary roads and construction camp	Construction site	Vegetation restoration and land reclamation after construction is finished	
	Slope protection works drainage works and greening works	Along the road	Slope protection, drainage facilities and greening on both sides of road	
Sociology	Demolition and resettlement	Households for relocation	Carry out in accordance with the relocation and resettlement scheme	
Environmental management	The project shall have 1~2 full-time environmental staff			
	The project shall have 2 full-time greening management personnel			

8. Environmental monitoring plan

In the environmental protection measures for the environmental issues, one part is the environmental monitoring measures, including the supervision and monitoring.

8.1 Supervision and management

(1) Environmental management in construction

1) The project management office of each county shall entrust the corresponding project supervision engineer to execute the on-site supervision and management to the Contractor for compliance of "Regulations for environmental protection in construction";

2) The project management office of province and city shall designate a person or engage a professional technician to make the regular inspection in the construction site on the implementation of "Regulations for environmental protection in construction", any problem so discovered should be corrected in time.

(2) Supervision and management in project operation

1) Each project county shall designate the environmental protection personnel to carry out the supervision and management on the implementation and operation of construction project in its own county.

2) The PMO shall conduct the supervision and inspection on the implementation and operation of this project.

8.2 Environmental monitoring for the environmental issues

8.2.1 Common environmental monitoring project

(1) Environmental monitoring plan during construction period

The environmental monitoring sites, items, factor, frequency, and organization and implementation of the project during construction period are listed in Table 8.2-1.

Table 8.2-1 Table for environmental monitoring plan in construction period

Monitoring items		Monitoring Site	Monitoring Frequency	Executive Body	Supervisory Body
Name	Factor				

Noise	Boundary of construction site Noise LAeq	same as the existing monitoring points for noise	Once every two months	Contractor	EPB of the counties
Ambient air	PM_{10}	Both sides of the road	Once every two months	Contractor	EPB of the counties
Surface water	pH, SS, petroleum, ammonia	Discharge point at outlet of construction site	Once every two months	Contractor	EPB of the counties
1. Environmental monitoring during operation period is performed by professional environmental monitoring organization; 2. Monitoring frequency and requirements shall be in accordance with the relevant national provisions; 3. Main haulage roads are randomly monitored as required.					

(2) Environmental monitoring plan during operation period

The environmental monitoring sites, items, factor, frequency, and organization and implementation of the project during operation period are listed in Table 8.2-2.

Table 8.2-2 Table for environmental monitoring plan in operation period

Monitoring items		**Monitoring site**	**Monitoring Frequency**	**Executive Body**	**Supervisory Body**
Name	**Factor**				
Noise	Noise LAeq	same as the existing monitoring points for noise	Once every two months	Owner	EPB of the counties
Ambient air	PM_{10}	Both sides of the road	Once every two months	Owner	EPB of the counties
Automobile exhaust	PM_{10}	Both sides of the road	Once every two months	Owner	EPB of the counties
Surface water	pH, SS, petroleum, ammonia	Discharge point at outlet of construction site	Once every two months	Owner	EPB of the counties
1. Environmental monitoring during operation period is performed by professional environmental monitoring organization; 2. Monitoring frequency and requirements shall be in accordance with the relevant national provisions; 3. Main haulage roads are randomly monitored as required.					

8.2.2 Environmental Monitoring for specific project

(1) Environmental Monitoring Plan during construction period

Environmental monitoring sites, items, factor, frequency, and organization and

implementation of sensitive targets and special items are listed in Table 8.2-3.

Table 8.2-3 Table for environmental monitoring plan in construction period

Monitoring items		**Monitoring Site**	**Monitoring Frequency**	**Executive Body**	**Supervisory Body**
Name	**Factor**				
Noise	Boundary of construction site Noise LAeq	10 schools and 3 cultural relics on both sides of the road	Once every two months	Owner, Contractor	Yanliang, Wugong, Chunhua, Xunyi, Hantai, Chengcheng County Environmental Protection Bureau
Ambient air	PM_{10}	10 schools and 3 cultural relics on both sides of the road	Once every two months	Owner, Contractor	
Surface water	pH, SS, petroleum, ammonia	Bridge across the river upstream of 8 500m, downstream 1000m	Once every two months	Owner, Contractor	Wugong, Yintai, Hanyin County Environmental Protection Bureau
1. Environmental monitoring during operation period is performed by professional environmental monitoring organization; 2. Monitoring frequency and requirements shall be in accordance with the relevant national provisions; 3. Main haulage roads are randomly monitored as required.					

(2) Environmental monitoring plan during operation period

Environmental monitoring sites, items, factor, frequency, and organization and implementation of sensitive targets and special items are listed in Table 8.2-4.

Table 8.2-4 Table for environmental monitoring plan in operation period

Monitoring items		Monitoring site	Monitoring Frequency	Executive Body	Supervisory Body
Name	Factor				
Noise	Noise LAeq	10 schools and 3 cultural relics on both sides of the road	Once every two months	Owner	Yanliang, Wugong, Chunhua, Xunyi, Hantai, Chengcheng County Environmental Protection Bureau
Ambient air	PM_{10}	10 schools and 3 cultural relics on both sides of the road	Once every two months	Owner	
Automobile exhaust	PM_{10}	10 schools and 3 cultural relics on both sides of the road	Once every two months	Owner	
Surface water	pH, SS, petroleum, ammonia	① Bridge across the river upstream of 8 500m, downstream 1000m ② Oxidation pond outlet discharge point	Once every two months	Owner	Wugong, Yintai, Hanyin County Environmental Protection Bureau
underground water	① Water quality: pH, total hardness, COD, ammonia, nitrate, permanganate index, sulfate, total dissolved solids and total coliform ②water level	①martial arts town water outlet to monitor water quality ②water level changes as well as martial arts town water surrounding villages [martial Town Mountain Village (from the project 1000m) and the village (from the project 900m)]	① Water quality: 12 times / year, once a month ②Water Level: 2 times / year, once every six months	Owner	Wugong, County Environmental Protection Bureau
1. Environmental monitoring during operation period is performed by professional environmental monitoring organization; 2. Monitoring frequency and requirements shall be in accordance with the relevant national provisions; 3. Main haulage roads are randomly monitored as required.					

9. Environmental reporting system

The Environmental Management Office of the Shaanxi Small Towns Infrastructure Construction Project by Using World Bank Loans, Contractor and monitoring unit shall document the construction progress, implementation of environmental management plan (EMP) and monitoring results of environmental quality in the project implementation process and submit reports to the relevant departments in time. The details are as follows:

(1) The monitoring unit shall document in detail the implementation of the EMP by the Contractor and submit reports to the PMO;

(2) The PMO must complete the project progress report (such as semi annual report) in time according to the requirements of the World Bank and submit it the World Bank. The report shall mainly include the following contents:

1) The implementation of environmental protection measures, environmental management and training plans as contained in the EMP;

2) The status quo of project progress, such as construction progress, etc.;

3) Whether there are complaints from the public, if there is any, document the main contents of such complaint, solution and public satisfaction;

4) The plan for implementation of the EMP in the next year.

10. Environmental management costs and funds safeguard

Table 10.1-1 has given the estimations and summary on the funds needed by the environmental management of this project, which include environmental consulting, environmental training, environmental monitoring and other project costs, totaled 3.445 million yuan.

Table 10.1-1 **Summary of environmental management fund for the project**

No.	Item	Location		Unit price (RMB ten thousand yuan)	Funds (RMB ten thousand yuan
1	Environmental training	9 counties		2	18
2	Environmental Monitoring	Yanliang District	Construction period	2 years ×40,000	8
			Operation period	3 years ×60,000	18
		Chencang District	Construction period	2 years ×30,000	6
			Operation period	3 years ×40,000	12
		Wugong County	Construction period	2 years ×60,000	12
			Operation period	3 years ×80,000	24
		Xunyi County	Construction period	2 years ×20,000	4
			Operation period	3 years ×30,000	9
		Chunhua County	Construction period	2 years ×25,000	5
			Operation period	3 years ×40,000	12
		Chengcheng County	Construction period	2 years ×2.5,000	5
			Operation period	3 years ×40,000	12
		Yintai District	Construction period	2 years ×30,000	6
			Operation period	3 years ×40,000	12
		Hantai District	Construction period	2 years ×35,000	7
			Operation period	3 years ×45,000	13.5
		Hanyin County	Construction period	2 years ×30,000	6
			Operation period	3 years ×40,000	12
	Environmental monitoring for	3 schools in Yanliang District3	Construction period	2 years ×30,000	6
			Operation period	3 years ×30,000	9
		1 school in Wugong	Construction period	2 years ×10,000	2

	sensitive targets	County	Operation period	3 years ×10,000	3
		1 school in Chunhua County	Construction period	2 years ×10,000	2
			Operation period	3 years ×10,000	3
		3 schools in Chengcheng County	Construction period	2 years ×30,000	6
			Operation period	3 years ×30,000	9
		Chenghuang Temple of Wugong Town	Construction period	2 years ×10,000	2
			Operation period	3 years ×10,000	3
		Teta of Chengguan Town in Xunyi County	Construction period	2 years ×10,000	2
			Operation period	3 years ×10,000	3
		Mosque in Lianfeng Village of Puzhen town in Hantai District	Construction period	2 years ×10,000	2
			Operation period	3 years ×10,000	3
		Qishuihe River in Wugong County	Construction period	2 years ×15,000	3
			Operation period	3 years ×15,000	4.5
		Qishuihe River in Yintai District	Construction period	2 years ×20,000	4
			Operation period	3 years ×20,000	6
		Moon River in Hanyin County	Construction period	2 years ×15,000	3
			Operation period	3 years ×15,000	4.5
		Water supply plant in Wugong County	Construction period	2 years ×50,000	10
			Operation period	3 years ×100,000	30
		Oxidation pond IN Wugong County	Construction period	2 years ×30,000	6
			Operation period	3 years ×40,000	12
4	**Other**				**5**
5	**Total**				**344.5**

The fees listed in the table do not include the fees for Shaanxi Provincial project office's environmental consulting and the cost required for taking environmental protection measures by the construction Contractor. The cost required for taking environmental protection measures by the Contractor is included in the total price of engineering contract.