SFG1192

Project Financed by the World Bank

World Bank Financed Hubei Xiaogan Logistics Park Infrastructure Project

Environmental Management Plan

Hubei Academy of Environmental Sciences

Construction Office of World Bank Financed Hubei Xiaogan Logistics Park Infrastructure Project

June 2015

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1 Preface

The *Environmental Management Plan* (EMP) is prepared by Hubei Academy of Environmental Sciences (HAES) for World Bank Financed Hubei Xiaogan Logistics Park Infrastructure Project. EMP is formulated on the basis of the main conclusions and suggestions of Environmental Impact Assessment (EIA), mainly containing: setting up of organization for implementing EMP, key environmental issues in project implementation and operation, environmental mitigation measures at each project phase, monitoring plan and reporting system, training plan and expense budget. In project evaluation phase, EMP will be reviewed and approved by the Construction Office of World Bank Financed Hubei Xiaogan Logistics Park Infrastructure Project, fully implemented in project implementation phase.

Environmental assessment is to forecast the potential impacts of proposed projects on social and natural environment and to formulate environmental impact mitigation plan, which is essential to the preparation of the proposed project. In project preparation phase, EIA is prepared to ensure that all the environmental issues it mentioned can be solved and taken into consideration in each project phase; while EMP is formulated to put forward the measures and methods that can reduce, mitigate or relieve adverse environmental impacts to an acceptable level. As a part of environmental assessment, EMP has already been carried out. Final plan will be determined upon considerations such as engineering, cost and minimum impact on environment during project design and environmental assessment phase.

As a part of project preparation and evaluation, EIA works has already been conducted. As a part of EIA, EMP is formulated on the basis of the findings of environment impact assessment, especially those adverse impacts identified in project construction and operation. EMP also puts forward corresponding mitigation measures which could lower the impacts to be in compliance with national and local environment standards and applicable security policies of the World Bank. EIA documents, including the EMP, combine project design with protection plan for environmentally sensitive items. The implementation of EIA documents will minimize the potential impacts of the proposed project on environment and society.

In order to implement EMP effectively and practically, in project preparation phase,

expense budget for environmental measures will be incorporated into project budget, environmental mitigation measures into technical specification documents of engineering procurement, training cost and consultation fee for the implementation of EMP into the total investment estimate of the project. In the meantime, the project construction department of Urban Development Investment Company entrusts external monitoring consultant (EMC) to conduct external monitoring, so as to propose better suggestions to owner for strengthening environmental management in project construction and operation.

1.1 Project objectives

Proposed World Bank Financed Hubei Xiaogan Logistics Park Infrastructure Project is located in Xiaogan, Hubei. The project received a World Bank loan of 100 million USD. The project development objectives (PDO) are, by way of constructing passageway engineering, public logistics information platform and environmental logistics, to enhance the construction of intelligent transportation system, improve the infrastructure and promote the investment environment of logistics park, lower the overall cost and enhance the service of logistics, strengthen industrial management, establish a tangible, orderly, competitive and open logistics market, enhance the comprehensive transportation system, promote modernization of logistics in the logistics park and eventually promote the economic development of the Airport economic zone and Xiaogan City.

Locations of Hubei Province, Xiaogan City and the Airport economic zone are shown in Figure 1.1-1. Locations of Xiaogan Airport economic zone and Xiaogan City, Wuhan City are showin in Figure 1.1-2, Locations of Xiaogan Airport economic zone and urban area of Xiaogan, urban area of Wuhan, Wuhan-Xiaogan Airport Zone (Wuhan Greater Airport Zone) are shown in Figure 1.1-3. Location of the infrastructure project is shown in Figure 1.1-4.

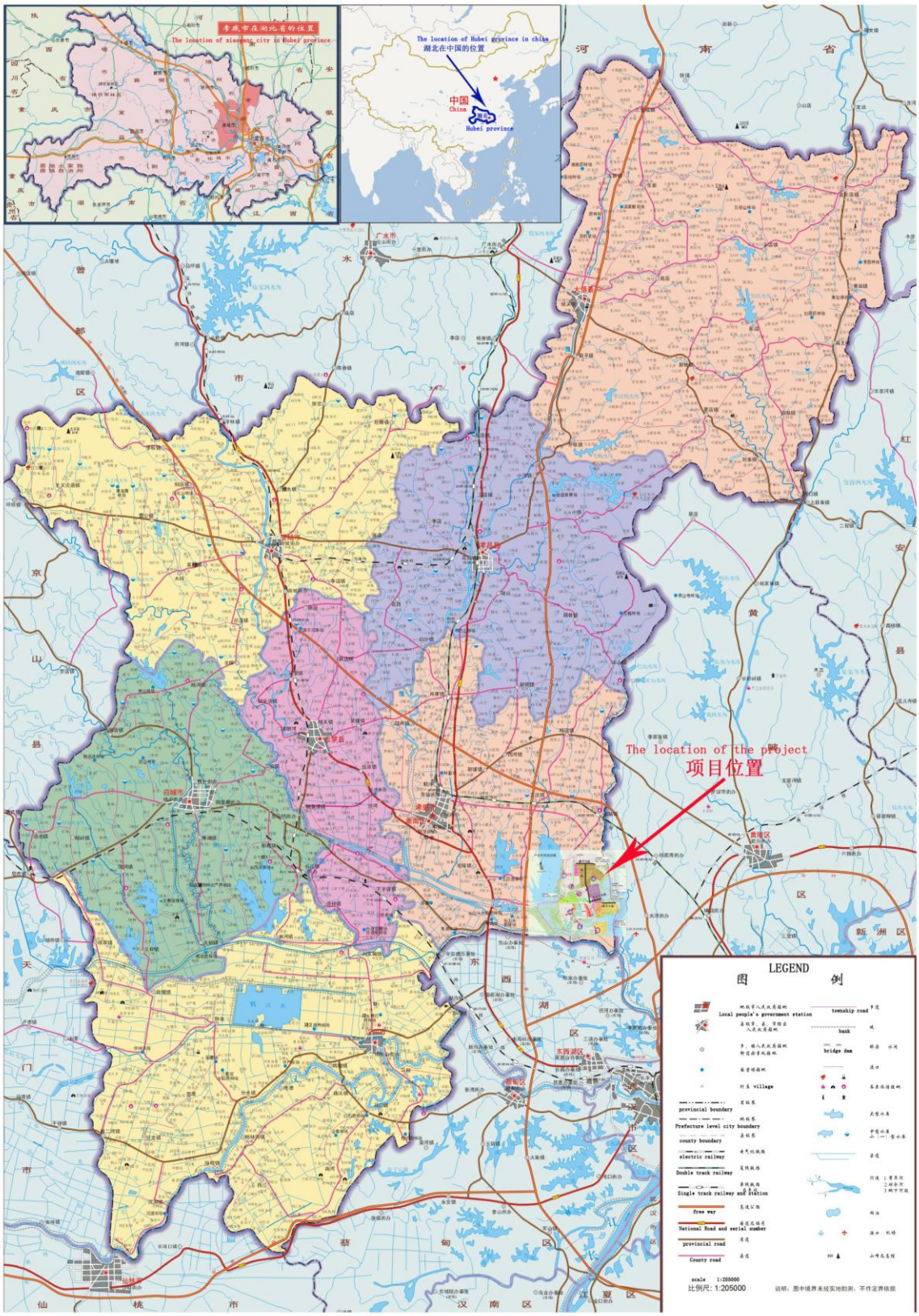

Figure 1.1-1 Location of Project, Hubei Province and China

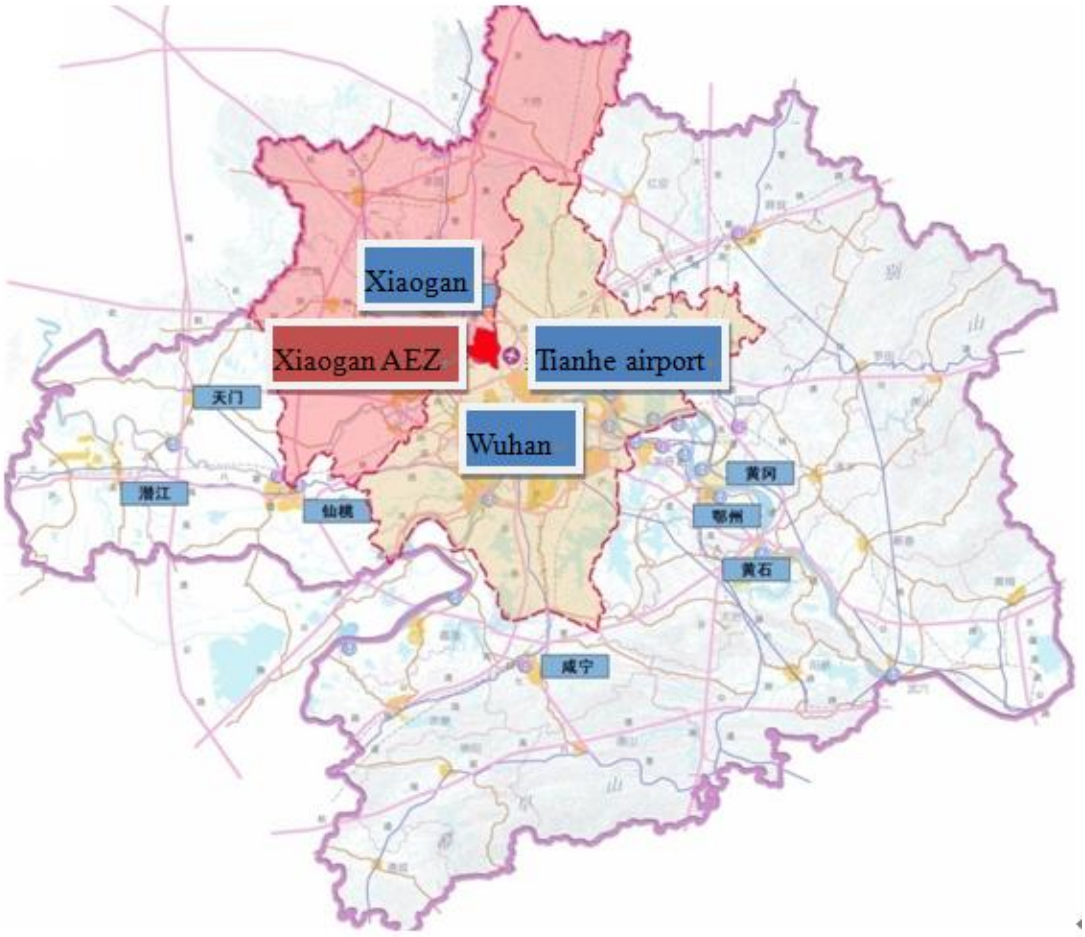

Figure 1.1-2 Location of Xiaogan Airport economic zone

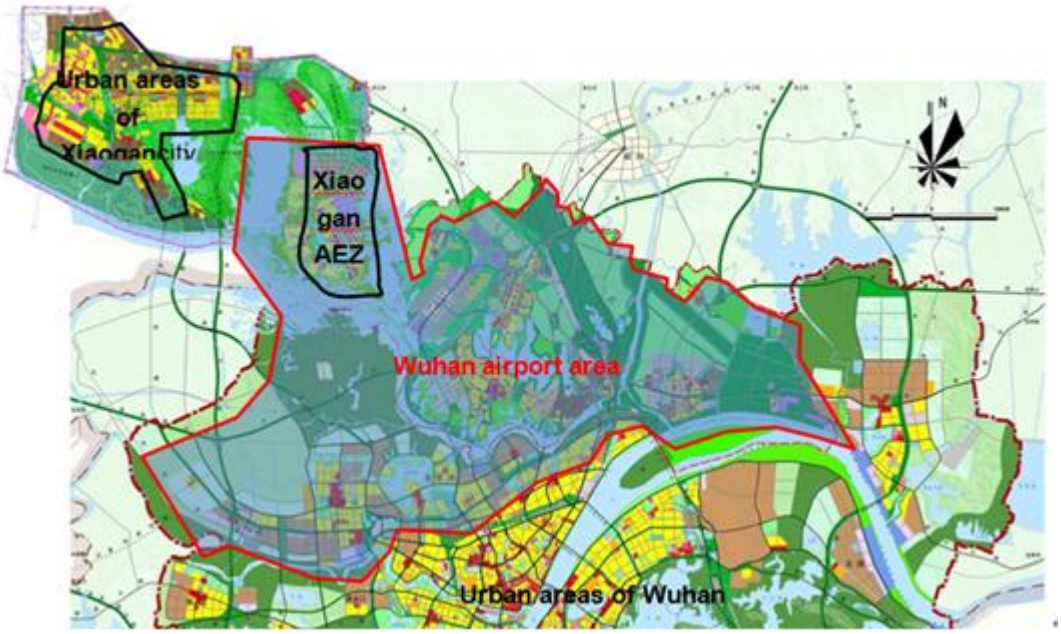

Figure 1.1-3 Location of Xiaogan Airport economic zone

Figure 1.1-4 Location of the project in the planned road network

1.2 Summary of project

The proposed Hubei Xiaogan logistics park infrastructure construction project is located in Xiaogan, Hubei Province, including three sub-projects: road connection engineering, public logistics information platform, and green logistics. The road connection engineering includes construction of Vertical Road No. 1 (starts from Chentian avenue to Horizontal Road No. 8, total length of 5372m, planned width of 42m, planned speed limit 50km/h), Horizontal Road No. 8 (starts from Xiaohan Avenue in the west to Vertical Road No. 2 in the east, total length of 2626m, planned width of 32m, planned speed limit of 50km/h), and Branch Road No. 50 (starts from Vertical Road No. 1 to Baishui lake avenue, total length of 1692m, planned width of 20m, planned speed limit of 30km/h), and drainage, greening, lighting and transportation supporting facilities etc. The public information platform includes public logistics management building, public information platform, and institutional capacity construction. The total land area of the management building is 62790 m^2, and the total floor area is 31396.72 m^2. The green logistics is an intelligent transportation management and construction project.

For this project, permanent occupied area is 48.54 hm², total investment is about 2 billion dollars (about 12.28 billion Yuan), and construction period is 5 years (2015-2010). The preliminary estimation of one-time environment protection investment is 12039200 Yuan, which accounted for 0.98% of project's total investment.

1.3 Framework of China's legal regulations

1.3.1 Laws and regulations

(1) *Environmental Protection Law of the People's Republic of China*, 1.1. 2015;

(2) *Environmental Impact Assessment Law of the People's Republic of China*, 10.28. 2002;

(3) *Air Pollution Prevention and Control Law of the People's Republic of China*, 1. 9. 2000;

(4) *Water Pollution Prevention and Control Law of the People's Republic of China*, 6.1. 2008;

(5) *Solid Waste Pollution Prevention and Control Law of the People's Republic of China*, 4. 1. 2005;

(6) *Noise Pollution Prevention and Control Law of the People's Republic of China*,

3.1. 1997;

(7) *Land Management Law of the People's Republic of China*, 8. 28. 2004;

(8) *The People's Republic of China Highway Law*, 8. 28. 2004;

(9) *Soil and Water Conservation Law of the People's Republic of China*, 6. 29. 1991;

(10) *The People's Republic of China Defense Flood Law*, 1. 1. 1998;

(11) *Law for Preservation of Cultural Relics of the People's Republic of China*, 12. 29. 2007;

(12) *Water Law of the People's Republic of China*, 10. 1. 2002;

(13) *Fisheries Law of the People's Republic of China*, 12. 1. 2000;

(14) *Wildlife Protection Act of the People's Republic of China*, 8.28. 2004;

(15) *Wildlife Protection Regulation of the People's Republic of China*, Decree No. 204th of the State Council, 1. 1. 1997;

(16) *Environment Protection and Management Regulations for Construction Project*, State Council Order No. 253rd, 11.29. 1998;

(17) *Safety Management Regulations for Dangerous Chemicals*, State Council Order No. 254th;

(18) *Rules for Implementation of the law on Water Pollution Prevention and Control of the People's Republic of China*, State Council Order No. 284th;

(19) *Basic Farmland Protection Regulation*, State Council Order No. 257th;, 12. 27. 1998;

(20) *Regulations of Scenic Spots*, State Council, 9. 19. 2006;

(21) *The National Key Protected Wild Plant Directory (*the first batch*(The National Forestry Administration*, the Ministry of Agriculture 4th order) ;

(22) *Methods for Environmental Protection and Management of Traffic Construction Projects*, Ministry of Transport, order No. 5 in 2003, 5. 13. 2003;

(23) *Urgent Notice for Resolutely Stopping Using Basic Farmland for Planting and Other Acts*, (State Council G. F.M.D.[2004]1) , 3. 21. 2004;

(24) *Notice of Environmental Noise in Environmental Impact Assessment for Highway, Railway (including light rail) and Other Construction Projects* (National Environmental Protection Administration H.F.[2003] #94) ;

(25) *Interim Measures for Public Participation in Environmental Impact Assessment*, (H.F. [2006] #28), 3. 18. 2006;

(26) *Comments on Further Basic Farmland Protection Related Work* (G.Z.F. [2005]

#196) ;

(27) *Notice of Several Views for the Most Stringent Farmland Protection System in Highway Construction* (J.G.L.F [2004] #164) ;

(28) *Notice of Carrying out Environmental Supervision for Traffic Engineering* (J. H.F. [2004] #314) ;

(29) *Directory of Environmental Protection Classification for Construction Projects*, National Environmental Protection Administration, 2003.1.1;

(30) *Regulations for Water and Soil Conservation of Highway Construction Projects*, (S.B[2001] #12) ;

(31) *Several Views on Implementation of the Most Stringent Farmland Protection System in Highway Construction*, Ministry of Transport, 4. 2004.

1.3.2 Technical Standards

(1) *Technical Guide for Environmental Impact Assessment——General Programme* (HJ2.1-2011) ;

(2) *Technical Guide for Environmental Impact Assessment——Atmospheric Environment* (HJ2.2-2008) ;

(3) *Technical Guide for Environmental Impact Assessment——Surface Water Environment* (HJ/T2.3～93) ;

(4) *Technical Guide for Environmental Impact Assessment——Acoustic Environment* (HJ2.4-2009) ;

(5) *Technical Guide for Environmental Impact Assessment——Ecological Impact* (HJ19-2011) ;

(6) *Technical Guide for Environmental Impact Assessment——Groundwater Environment* (HJ610-2011) ;

(7) *Standard for Environmental Impact Assessment of Highway Construction Projects* (JTJ005-96) ;

(8) *Code for Highway Environmental Protection Design* (JTJ/T006-98) ;

(9) *Standard for Design of City Public Transport Station, Field, and Factory* (CJJ15-87) ;

(10) *Technical Standards for Highway Engineering* (JTGB01-2003) ;

(11) *Specification for Urban Road Design* (CJJ37-90) ;

(12) *Notice of Related Issues on Environmental Noise in Environmental Impact Assessment for Highway, Railway* (including light rail) and Other Construction Projects,

(H.F. [2003] #94) ;

(13) *Letter of Executive Standards for Environmental Impact Assessment of Hubei Xiaogan Logistics Park Infrastructure Construction*, Xiaogan Environmental Protection Agency, January 2015.

1.3.3 Related Planning

(1) Xiaogan City Master Plan(2008-2020) ;

(2) Xiaogan Airport economic zone Master Plan(2010-2030) ;

(3) Xiaogan Water Environment Function Regionalization (2004) ;

(4) Xiaogan Environment Function Regionalization;

(5) Xiaogan Related Statistical Yearbook and Statistical Bulletin

1.3.4 Project Files

(1) Project authorization letter(Appendix 1) ;

(2) *Hubei Xiaogan Logistics Park Infrastructure Construction Project Proposal*, Germany Deutsche Post (DHL), 2014.5;

(3) *Feasibility Study Report for Hubei Xiaogan Logistics Park Infrastructure Construction Project*, China Municipal Engineering Zhongnan Design & Research Institute Co. Ltd. , 2014.10;

(4) *Report of Programme for Soil and Water Conservation of Hubei Xiaogan Logistics Park Infrastructure Construction Project(Approval Draft)* , Xiaogan Water Conservancy Research Institute, 2014.12;

(5) *Immigrant Resettlement Plan of Hubei Xiaogan Logistics Park Infrastructure Construction Project*, Wuhan University Involuntary Immigration Research Center, 2014.10;

(6) *China: Memorandum of Preparation for Hubei Xiaogan Logistics Park Infrastructure Construction Project* (October 20-23, 2014) ;

1.3.5 Applicable Standard

According to Xiaogan environmental function zoning in project area and <<Reply of Executive Standards for Environmental Impact Assessment of World Bank Financed Hubei Xiaogan Logistics Park Infrastructure Project>> (issued on Jan. 14, 2015) of Xiaogan Environmental Protection Agency, the applicable standards for environmental impact assessment of this project is as follows:

1.3.5.1 Water Environment

Domestic sewage produced during construction period of this project is discharged into surrounding farmland after septic tank treatment. Wastewater produced during operation period is discharged into city sewage pipe network and into city wastewater treatment plant finally. The wastewater discharge standard the third grade standard in <<Wastewater Comprehensive Discharge Standards>> GB8978-1996) is implemented. The specific standards values are shown in Table 1.3-1.

Table 1.3-1 Wastewater comprehensive discharge standards (GB8978-1996)

Standard #	Name of standards	Standard value and grade	Pollutants	Standard value(mg/L)
GB8978-1996	**Wastewater Comprehensive Discharge Standards**	The third grade	pH	6～9
			SS	400
			BOD_5	300
			COD	500
			Petroleum	20
			Animal & vegetable oil	100
			Ammonia nitrogen	/
			LAS	20

1.3.5.2 Atmospheric Environment

The second grade standard in << Environmental Air Quality Standards>> (GB3095-1996) is implemented in assessment area of project. And the second grade standard in <<Integrated Emission Standard of Air Pollutants>> (GB16297-1996) is implemented for air pollutant emission. All standard values are shown in Table 1.3-2 and 1.3-3.

Table 1.3-2 Environmental Air Quality Standards (GB3095-2012)

Standard #	Name of standards	Standard value & grade	Pollutants		Standard values(mg/m³)
GB3095-2012	**Environmental Air Quality Standards**	The second Level	TSP	Annual average value	0.2
				Daily average value	0.3
			NO_2	Annual average	0.05
				Daily average	0.10
				Hourly average	0.25
			CO	Daily average	4.0
				Hourly average	10.0

Table 1.3-3 Air pollutant emission standards(GB16297-1996)

Pollutants	Maximum allowable emission conc.(mg/m³)	Maximum allowable emission rate(kg/h)		Fugitive emission monitoring conc. limited point(mg/m³)
		Height of exhaust funnel(m)	Second grade	

Pollutants	Maximum allowable emission conc.(mg/m³)	Maximum allowable emission rate(kg/h)		Fugitive emission monitoring conc. limited point(mg/m³)
		Height of exhaust funnel(m)	Second grade	
Particulate matter	120	15	3.5	The high conc. point of external cordon1.0
		20	5.9	
		30	23	

1.3.5.3 Acoustic environment

The second grade standard in <<Acoustic Environment Quality Standards>> (GB3096-2008) is implemented in concentrated residential points of villages and towns in assessment area of this project. The 4a standard in <<Acoustic Environment Quality Standards>> (GB3096-2008) is implemented in region within 25m outside the red line of both sides of evaluating highways, and the second standard is implemented in areas such as residential points, culture & education, and hospitals etc. 35m outside the redline, and the third standard is implemented in planned industrial area etc. 25m outside the redline. The specific standard values of <<Acoustic Environment Quality Standards>> (GB3096-2008) are shown in Table 1.3-4.

The related standards in <<Environmental Noise Emission Standards for Building Construction Field>> (GB12523-2011) implemented in construction field during construction period are shown in Table 1.3-5.

Table 1.3-4 Acoustic environment quality standards (GB3096-2008)

Categories	Daylight dB(A)	Night dB(A)
2	60	50
3	65	55
4a	70	55

Table 1.3-5 Environmental Noise Emission Standards for Building Construction Field (GB12523-2011)

Daylight	Night
70 dB	55 dB

1.4 The World Bank Security Policy

Table 1.4-1 Project list that involved or not involved in policies of the World Bank

World Bank policies	Involved or not	Reason
Environmental Assessment(OP/BP4.01,1999.1)	√	Environmental and social impact assessment report
Natural Habitats (OP4.04, 2001.6)	√	Partial section going through defined general habitats, the policy is applied in part of it.

Pest Management(OP4.09,1998.12)	×	The project doesn't involve in pest and disease
Indigenous People(OP4.10,1991.9)	×	No Aboriginal that defined in OP4.10 was found, this policy is not applicable.
Physical Cultural Resources(OP4.11,1999.8)	×	Doesn't involve in cultural heritage and tourist attractions
Involuntary Resettlement(OP4.12,2001.12)	√	The project is involved in demolition, the policy will be applied
Forests (OP4.36,1993.9)	×	The project doesn't involve in requisition of forest land
Safety of Dams(OP4.37,2001.10)	×	The project doesn't involve in dam
Projects on International Waterways(OP7.50,2001.6)	×	The project doesn't involve in international waterways
Projects in Disputed Areas(OP7.60,2001.6)	×	The project doesn't involve in this policy
Disclosure of Information(BP17.50,1993.9)	√	Disclosure of information is required by the World Bank for all projects
<<Environmental, Health, and Safety Guidelines>> International Finance Corporation(IFC) , World Bank(WB)	√	The project is environmental and social impact assessment report, which is involved in this policy.
Notes: √ represents involving. × represents not involving		

1.5 Environmental sensitive sites

1.5.1 Ecological protection targets

After investigation, the ecological sensitive targets such as nature reserve, scenic area, forest park, cultural relics protection units, basic farmland protection zone etc. are not in assessment area of this project.

1.5.2 Protection targets for environmental air and acoustic environment

According to defined assessment area and planning in project area, the protection targets of noise and air environment during construction period of this project are Luwan in Pengxing Village, Qiaojia Wan, Chengjiayuanzi, Anjingmiao Village, Yangjiatian, Tangjiawan, Minji, Yupantaowan, Gaomiao village, Yiwan in Gaomiao Village, Wangtuhuwan, Chenjiayuanzi, Yaoxiwan, Yangxingwan Village etc. 14 sensitive sites, while only Minji community is protection target of noise and air environment during operation period due to relocation of villagers.

Detailed information is shown in Table 1.5-1.

1.5.3 Protect targets of water environment

Jie River belongs to water body category III. There is no intake (ground and underground) of drinking water resources in the assessment area of this proposed project. The protection objects of surface water involved in the proposed project is shown in Table 1.5-2 and Figure 1.5-1.

Table 1.5-2 Distribution of protection objectives of surface water environment

Order #	Sensitive objectives	Pile No.	Location corresponding to highway	Functional category	Function of water body
1	Minji water plant	Vertical Road No. 1 K1+740	Road side 25m	-	From underground water
Water intake volume is 120 t/day, water intake depth is 20m, Population served is 5000, all the water sources are underground water.					

Figure 1.5-1 Current situation of Minji water plant

Table 1.5-1 The protection targets of noise and air environment in assessment area of proposed construction roads

Roads	Order #	Sensitive sites	Mileage	Minimum distance(m)			Location corresponding to roads	Summary of sensitive sites	Environmental impacts	Photos
				With road axis	With redline of road	Height distance				
Horizontal Road No. 8	1	Pengxing Village Luwan	K0+080-K0+140	30	14	0	Right side, right opposite	1-3 floor, brick concrete structure, 30 households	Traffic and social life noise	
Horizontal Road No. 8	2	Chengjia yuanzi	K0+960-K1+120	44	28	0	Left side, right opposite	1-3floor, brick concrete structure, 10 households	Social life noise	
Horizontal Road No. 8	3	Qiaojiawan	K2+240-K2+260	74	58	0	Right side, right opposite	1-3floor, brick concrete structure, 20 households	Social life noise	
Vertical Road No. 1	4	Anjingmiao Village	K0+300-K0+440	30	9	0	Both sides, right opposite	1-3 floor, brick concrete structure, 30 households	Traffic and social life noise	

Roads	Order #	Sensitive sites	Mileage	Minimum distance(m)			Location corresponding to roads	Summary of sensitive sites	Environmental impacts	Photos
				With road axis	With redline of road	Height distance				
Vertical Road No. 1	5	Yangjiatian	K0+800-K1+200	50	29	0	Right side, opposite side	1-3 floor, brick concrete structure, 34 households	Social life noise	
Vertical Road No. 1	6	Tangjiawan	K1+460-K1+600	90	69	0	Right side, opposite side	1-3floor, brick concrete structure, 26 households	Traffic and social life noise	
Vertical Road No. 1	7	Minji	K1+420-K1+800	40	19	0	Left side, opposite side	80 households	Traffic and social life noise	
Vertical Road No. 1	8	Yupantaowan	K2+350-K2+400	30	9	0	Left side, opposite side	10 households	Traffic and social life noise	
Vertical Road No. 1	9	Gaomiao village	K4+020-K4+160	40	19	0	Left side, opposite side	30 households	Traffic and social life noise	

Roads	Order #	Sensitive sites	Mileage	Minimum distance(m)			Location corresponding to roads	Summary of sensitive sites	Environmental impacts	Photos
				With road axis	With redline of road	Height distance				
Vertical Road No. 1	10	Yiwan in Gaomiao village	K4+600-K4+700	40	19	0	Both sides, opposite side	7 households	Traffic and social life noise	
Vertical Road No. 1	11	Wangtuhu wan	K4+960-K4+980	40	19	0	Left side, opposite side	4 households	Traffic and social life noise	
Vertical Road No. 1	12	Chengjiayuanzi	K5+300-K5+320	40	19	0	Left side, opposite side	15 households	Traffic and social life noise	
Branch Road No. 50	13	Yaoxiwan	K0+420-K0+780	30	15	0	Both sides, opposite side, right opposite, back opposite	44 households	Social life noise	
Branch Road No. 50	14	Yangjiayuan village	K1+300-K1+540	20	5	0	Both sides, opposite side, right opposite, back opposite	38 households	Social life noise	

Roads	Order #	Sensitive sites	Mileage	Minimum distance(m)			Location corresponding to roads	Summary of sensitive sites	Environmental impacts	Photos
				With road axis	With redline of road	Height distance				
Vertical Road No. 1	15	Minji community	K0+600-K0+750	120	100	0	Back opposite	About 1500 households	Traffic and social life noise	
Notes	According to <<Airport economic zone developing plan>>, the sensitive sites above will be taken in the process of implementation of the project, so the sensitive sites don't exist during operation period. The new Minji community is 120m away from the planned Vertical Road No. 1.									

2 Organization Set-up of Environmental Management Plan

The effective implementation of Environmental Management Plan (EMP) requires the joint efforts of all concerned parties, including Environmental Protection Bureau (EPB) at each level, project initiator, i.e. Project Management Office (hereinafter referred to as Project Owner or Project Office), contractor, i.e. construction entity (CET), and construction supervision company (CSC) hired by Owner.

In order to realize the objectives of EMP, CSC entrusted by the Project Owner will assign persons to monitor the environment during construction period. In addition, the Project Owner will employ its own fund or the competence building fund of World Bank Loan to hire qualified external monitoring agency to externally monitor the implementation of EMP, and conduct regular and special checks on construction site and environmental supervision. See Figure 2-1 for the organization set-up, organization chart and working system for implementing EMP during construction.

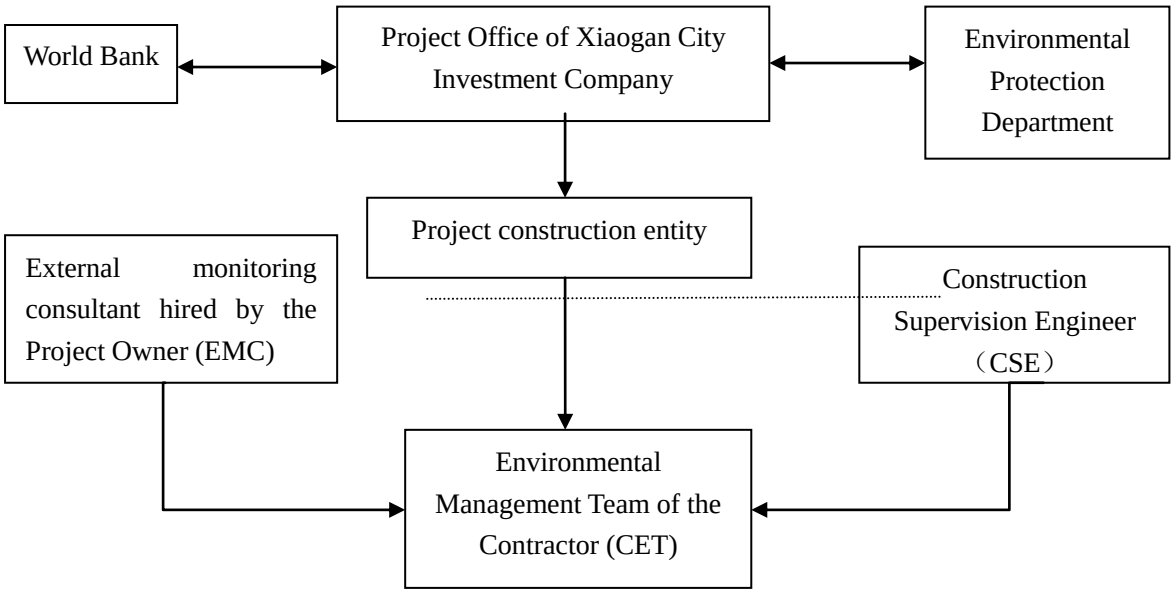

Figure 2-1 Organization Chart of EMP during Construction

See Table 2.1-1 for the main responsibilities of main concerned parties and personnel arrangement in each project phase.

Table 2.1-1 Arrangement and Responsibilities of Project Environmental Management Organization

Phase	Concerned party	Environmental responsibility
Project preparation phase	Hubei Environmental Protection Bureau (HBEPB)	Review and approve EIA

Phase	Concerned party	Environmental responsibility
	Xiaogan Environmental Protection Bureau (XGEPB)	Issue letter of standards for executing EIA; assist Project Office in EIA at project preparation phase.
	Project Management Office (PMO)	Direct, supervise and coordinate; organize overall
		Be responsible for the implementation of EMP; ask design unit to incorporate environmental mitigation measures into technical specifications when they are preparing bidding documents.
Construction period	Project Management Office (PMO)	1. Direct, supervise and coordinate various works during construction; 2. Submit progress report (half-year report and annual report) of the implementation of EMP to the World Bank
	Contractor (CET)	1. Be responsible for the implementation of EMP and other environmental protection measures; 2. Be responsible for organizing environmental protection training for construction personnel.
	Construction Supervision Engineer (CSE)	1. Supervise the construction every day to ensure the implementation of environmental protection measures 2. Actual implementation of environmental protection measures and existing issues shall be recorded in the monthly report of CSE.
	External Monitoring Consultant	Conduct regular monitoring as entrusted by Project Office
	Xiaogan Environmental Protection Bureau (XGEPB)	Inspect environmental management during construction
Operation	PMO and Project Owner	Same as construction period
	Xiaogan City Investment Company	1. Be responsible for the implementation of environmental protection measures and EMP; 2. Be responsible for the normal operation of environmental protection facilities.
	Xiaogan Environmental Protection Bureau	1. Organize the acceptance of environmental protection facilities under the standard of three-simultaneity (works designed, constructed and put-into-operation simultaneously); 2. Check the environmental management during operation.
	Institution with monitoring qualification	Monitor operation and accident.
	Xiaogan Urban & Rural Planning Bureau	Control the construction of sensitive items on the two sides of newly built roads

2.1 Environmental Protection Bureau (EPB)

As the supervising and regulating authority, Environmental Protection Bureau (EPB) at each level shall lay down environmental regulations and policies for project construction and operation, and laws, regulations, standards and guides for all organizations in its

jurisdiction, and shall be responsible for the enforcement of relevant environmental policies.

The Ministry of Environmental Protection is the highest authority for environmental protection in China, and it will instruct Hubei Environmental Protection Bureau (HBEPB) to enforce relevant regulations. HBEPB will review and approve EIA and instruct Xiaogan Environmental Protection Bureau for the overall environmental management of the Project. Xiaogan Environmental Protection Bureau will directly take charge of the supervision and enforcement of environmental protection regulations and standards.

The roles and responsibilities of Hubei Environmental Protection Bureau as a provincial environmental supervision and administration agency are as follows:

1) Supervise the implementation of EMP;
2) Enforce applicable laws, regulations and standards;
3) Coordinate environmental protection works among different departments;
4) Inspect and supervise the construction, completion and operation of environmental facilities;
5) Instruct environmental protection bureaus at municipal and provincial level to manage environment.

The roles and responsibilities of Xiaogan Environmental Protection Bureaus are as follows:

1) Supervise the implementation of EMP by construction entity and enforce applicable regulations and standards;
2) Coordinate environmental protection works among different departments;
3) Inspect and supervise the construction, completion and operation of environmental facilities within its power.

2.2 Project Owner (PMO)

The Project Coordination Office is set in Xiaogan City Investment Company Limited to coordinate works among relevant departments of Xiaogan City, and, at the project preparation and implementation phase, communicate and coordinate with the World Bank and the relevant departments of Hubei Province.

The Project Office will be fully responsible for works related to the security polices of the World Bank Financed project during project preparation and implementation phase, including but not limited to the following 5 aspects:

First, organize qualified and experienced institution to prepare EIA report of the project in preparation phase, including providing support to and supervising the compilation of EIA report and EMP which shall meet the requirement of relevant domestic laws, regulations, standards, technical guides, and security policies of the World Bank. Ensure the EIA and EMP approved by local environmental administration departments and security policy department of the World Bank.

Second, guarantee the interaction among EIA consultant, project feasibility study unit and project design unit, so as to incorporate programs and requirements into project design, and cost of environmental measures into total project investment by taking mitigation measures and other environmental considerations into account.

Third, be the ultimate supervisor of environmental mitigation measures and other environmental measures in construction period, including incorporating environmental requirement into construction contract, providing training to contractor, construction supervisor and local PMO, implementing other environmental management programs and conducting regular check on construction site.

Fourth, implement and supervise environment monitoring procedures, review the log record of construction supervision engineer (CSE) and monitoring report of EMP, inspect the environmental performance of contractor, and take necessary actions to timely respond to issues and suggestion provided in external monitoring report, including emergencies and accidents in construction.

Last but not the least, consult local public, people affected by the project, concerned organizations, the World Bank and other parties of interest. Ensure that all the parties mentioned above have completely understood the whole project, potential environmental issues and mitigation measures. Listen to all the parties and respond to their questions and suggestions about environmental protection.

2.3 Contractor (CET)

During construction, project contractor is a key node in environmental management, pollution control and impact mitigation. The Contractor shall be aware of its environmental protection obligations and take a range of measures to guarantee the performance of its obligations. The obligations of contractor and its environmental management personnel include but not limited to the following:

a) The Contractor shall incorporate the mitigation measure listed in EIA into the

bidding documents of civil works, attach them to the construction contract, and strictly implement the measures specified in EMP;

b) The Contractor shall perform its environmental obligations initiatively and submit its environmental performance logs once a day or a week to construction supervisor. PMO and construction supervision engineer shall review these logs and carry out certain rectifying activities;

c) The Contractor shall comply with the requirements of relevant environmental laws;

d) The Contractor shall carry out construction within the scope of contract and other bidding conditions;

e) One specially-assigned person of the Contractor shall be responsible for the implementation of environmental protection measures

f) Upon receiving the instruction of the Project Owner, the Contractor shall stop construction activities which have adverse impacts; if necessary, the Contractor shall adopt another construction method to minimize the environmental impacts.

g) The Contractor shall allow public participation from communities around construction site, set up eye-catching signs & boards at each road to describe main construction contents and construction period at the site. There shall be contract name and name and telephone No. of contact on the boards, so that the public can express their concerns and complaints about construction activities;

h) Prior to the commencement of construction, the Contract shall receive mandatory environmental training, including:

1) National and local laws, regulations and standards;

2) EIA;

3) Environmental mitigation measure

4) Culture, evaluation and protection rules;

5) Emergency measures;

6) Environmental supervision method and requirements specified in contract and reporting procedure;

7) Long-term public consultation and response;

8) Environmental obligations of contractor.

2.4 Construction supervision engineer (CSE)

Construction supervision company shall have supervision engineer to supervise the project construction activities and environmental due diligence of the Contractor during construction, so as to ensure compliance with the requirements of relevant environmental laws, regulations, technical guides, standards, specifications and contract. The duties of CSE are to:

a) Review construction organization design and make sure that it complies with the engineering design of project and EMP, so that corresponding environmental protection and mitigation measure can be put forward. Construction cannot start until environmental measures obtain the approval of supervision engineer;

b) Provide necessary assistance to the Owner in the course of environmental management and supervision;

c) Inspect the environmental management of the Contractor regularly. Ask the Contractor to replace its environmental management personnel if CSE thinks that the environmental management personnel fail to perform its obligations or fail to comply with contract requirements.

d) Require the Contractor to take rectifying measures within specified time limits. If there is default and violent public complaints, CSE shall order the Contractor to rectify, alter or stop its works and report the situation to concerned organization and the Owner.

e) Supervise the operations of the Contractor and ensure that those operations meet the requirements specified in EMP and mitigation measures specified in contract;

f) Instruct the Contractor to take actions to minimize the impacts and prevent default as per the requirements of EMP;

g) In case the Contractor violates environmental requirements, the Contractor cannot get paid until it solves the environmental issue and get approval from CSE within the same month;

h) In case the Contractor discovers cultural relics during construction, CSE shall order the Contractor to protect the site and inform concerned organizations and the Owner;

i) Strictly follow the procedures to investigate complaint.

3 Environmental Protection Measures

3.1 Environmental protection measures

For the various impacts of the Project generated during design, construction and operation phases, specific environmental protection measures are taken to protect environment, as shown in Table 3.1 -1.

Table 3.1-1 List of Environmental Protection Measures

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
1. Design Phase								
	Waste water	Construction camps shall be away from water body as far as possible, in order to avoid the impacts of waste water produced in construction and domestic activities on waters.	Contractor (included in the bidding document by the design unit)	-	-	Leading Office of Xiaogan World Bank Financed Projects	No construction is allowed near water sources	Before the start of construction
	Ecologic sensitive spots are affected; residential houses need to be demolished, and it may require land requisition of farmers	1. Further optimize route plans and comparative selection to reduce the area of land requisition; 2. The determination of resettlement plan shall be based on full consultation with the project affected population; 3. During design stage, temporary land occupation area of temporary works, such as construction camp, construction road and mixing station, shall be minimized, especially the area of occupied green space and water area.	Wuhan University Resettlement Office Contractor (included in the bidding document by the design unit)	Project budget	Leading Office of Xiaogan World Bank Financed Projects	Leading Office of Xiaogan World Bank Financed Projects	1. Engineering route design plan 2. *World Bank OP/ BP 4.12 (Involuntary Resettlement)*	Before construction
	Noise	Requirements in Xiaogan Master Plan shall be strictly followed during project planning and proposal selection. Current status of the project shall be	Design unit	Added in the design expense	Leading Office of Xiaogan World Bank Financed Projects	Leading Office of Xiaogan World Bank Financed Projects	Requirements of overall urban planning of Xiaogan City	Before construction

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
		considered for the purpose of improving the service quality and overall efficiency of urban transportation facilities, satisfying the demands of industrial structure adjustment and future planning & arrangement, realizing the connection and sharing of traffic within project area and promoting the overall development of the area to allow roads serve for the benefit of regional economy and transport.						
	Dust	Main air pollution prevention & control measures taken during design stage are to select proper soil disposal sites which shall keep away from sensitive spots, such as resident-centralized areas, as much as possible.	Contractor (included in the bidding document by the design unit)	-	-	Leading Office of Xiaogan World Bank Financed Projects	Select soil dumping site rationally and avoid sensitive spots	Before the start of construction
	Solid waste	Earthwork and stonework shall be allocated longitudinally as much as possible. The balance of allocated earthwork and stonework shall combine the project with the whole development area.	Contractor (included in the bidding document by the design unit)	-	-	Planning Bureau of Airport Area, Leading Office of Xiaogan World Bank Financed Projects	Earth-rock allocation	Before the start of construction
2. Construction phase								

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
Waste soil and residue	Dust, soil erosion, landscaping, land occupation	1. Construction unit must complete the procedures for discharging slag and clay residue, and can stack on the specified stacking filed upon approval (Through the coordination of Planning Bureau of Airport Area, 3 pits around roads are selected as disposal sites, covering a total area of 6.54 hm2. The three pits are located in Dahujiawan and along Sanba Road in Yupantaowan and Xiaotianwan. Temporary land area occupied is 1.85 hm2, 1.35 hm2 and 3.34 hm2 respectively. The 3 pits will serve as construction sites after being filled of abandoned dregs.) 2. Stacking yard for filling soil shall be managed well, measures regarding earthwork surface compactness, regular water spraying and covering be prepared. Unnecessary earthwork and stonework as well as construction material disposal slag shall be removed timely. Stacking time shall not be long; soil and materials for	Contractor (included in the bidding document by the design unit)	Included in the project	Project fund included in the contract	Leading Office of Xiaogan World Bank Financed Projects Xiaogan Environmental Protection Bureau Environmental supervision	According to water protection report, soil residue amount of 170.5 thousand m^3, TSP: Class-II of National Ambient Air Quality Standard	Supervision: supervise on a daily basis

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
		construction shall not be piled on surrounding farmlands. 3. The road construction shall be kept within the scope of redlines; 4. The excavation and filling of earthworks shall be assigned in a rational manner. Temporary soil dump shall be protected, and avoid working in rainy days to avoid water and soil loss and water contamination.						
Construction	Construction site	1. Set up warning boards or safety off-limits on the construction site; 2. Construction site floor must undertake curing treatment; 3. When during excavating, drilling, house removal, earthworks backfilling, water shall be sprayed to prevent dust flying; 4. When construction is over, timely recover the roads and plants on the construction-occupied site.	Contractor (included in the bidding document by the design unit)	35.0	Project fund included in the contract	Leading Office of Xiaogan World Bank Financed Projects Xiaogan Environmental Protection Bureau Environmental supervision	1. Public complaints	Supervision: supervise on a daily basis
	Construction waste water	1. Each construction camp shall be provided with septic tanks. Domestic wastewater shall be used for irrigation after treatment	Contractor (included in the bidding document by the design unit)	12.0	Project fund included in the contract	Leading Office of Xiaogan World Bank Financed Projects Xiaogan Environmental Protection Bureau	1. Public complaints	Supervision: supervise on a daily basis

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
		in septic tanks; 2. Waste water produced in construction shall be recycled after treatment in oil separate tank and precipitation and not be discharged into surrounding waters.				Environmental supervision		
	Construction noise	1. Forbid operating machines of high noise and high vibration in the noon or at midnight; the construction unit should use machines of low noise or machines that have sound proofing functions; 2. Timely arrange the time and place of construction; highly noisy working area shall be kept away from sound-sensitive points; 3. Conduct noise monitoring on the surrounding sensitive points during construction at night; 4. Construction at nighttime shall be approved by Xiaogan Bureau for Environmental Protection and filed, and shall be notified to the surrounding residents and other environmental sensitive spots prior to construction.	Contractor (included in the bidding document by the design unit)	26.0	Project fund included in the contract	Leading Office of Xiaogan World Bank Financed Projects Xiaogan Environmental Protection Bureau Environmental supervision Xiaogan Environmental Monitor Station	See Table 5.2 -1 for boundary noise of construction site, and morning and evening noises of sensitive spots in daytime and nighttime	Supervision: supervise on a daily basis

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
		Sound insulation and other noise reducing measures shall be taken during nighttime construction to minimize the environmental impact of construction noises.						
	Construction exhaust	1. Strengthen the watering of construction; 2. Fully-closed construction shall be adopted during construction, and operation routes and time of transportation vehicles shall be planned, avoiding driving near residential houses or other sensitive areas; 3. During construction, it is forbidden to burn the discarded building materials. The site canteen shall use gas or electronic cooking devices instead of oil cookers to cook.	Contractor (included in the bidding document by the design unit)	25.0	Project fund included in the contract	Leading Office of Xiaogan World Bank Financed Projects/Xiaogan Environmental Protection Bureau/Environmental supervision Xiaogan Environmental Monitor Station	Sensitive spots TSP. Refer to Table 5.2 - 1	Supervision: supervise on a daily basis
	Ecological environment	1. Keep the cultivated soil of local farm lands as much as possible for site restoration and road greening; 2. In case construction is carried out around farmland, construction activities shall be restricted in the scope of land	Contractor (included in the bidding document by the design unit)	954.42.0 (4.2442 million for water protection, 5 million for greening)	Project fund included in the contract	Leading Office of Xiaogan World Bank Financed Projects Environmental supervision	1. Degree of water and soil conservation 2. Amount of occupied land 3. Area of greenbelt and quantity of trees replanted.	Supervision: supervise on a daily basis

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
		requisitioned. Temporary land occupation shall be controlled within the red line of planned road. Construction road shall employ road subgrade. All of these will reduce the area of construction activities, minimize the occupation of farmland, and enhance the protection over forest and grassland. New construction camps shall be built in a centralized manner, or shall employ the residential or enterprises houses along the road. Careless or scattering placing shall be avoided as much as possible. Domestic garbage produced by construction personnel shall be processed in a unified manner and transported out of construction site. Littering is not allowed in order to protect local ecological environment. 3. Improve the awareness of protection of construction personnel and prohibit the hunting of wild animals; 4. Water protection measures; 5. Greening						

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
	Social environment	1. Once cultural relics are found during construction, cultural relic authorities shall be informed timely. The construction cannot be resumed until cultural relic authority complete verification; 2. For protection of Minji water plant, management measures are taken to prevent construction workers from entering the plant casually; construction near the water plant shall be implemented strictly within the construction site; 3. Compensation for demolished buildings will be determined by evaluation. Monetary compensation will be given to the enterprise to rebuild and to restore operation on its own. The compensation for production and operation loss during demolition and reconstruction will be determined through negotiation and the operation performance of the recent three years of the enterprise will be the basis	Contractor (included in the bidding document by the design unit)	30.0	Project fund included in the contract	Leading Office of Xiaogan World Bank Financed Projects/Environmental supervision	1. Public complaints	Supervision: supervise on a daily basis

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
		for evaluation. The compensation amount will be calculated based on the actual affected area and the time of production halt. 4. Local governments shall be consulted prior to usage of existing roads, in order to avoid traffic jam. Heavy vehicles shuttle in and out of construction site, which increases traffic accident risk. Therefore, signs and other facilities for traffic safety shall be reinforced. Construction time shall be arranged properly to minimize the impact on the lives of residents around project. Warning board or sign of off-limits shall be hung at placed where construction vehicles shuttle in and out. Material transportation routes shall be well selected to avoid travelling through densely populated regions and villages. Billboards shall be set at construction site, stating the main contents and construction period of the project, in order to earn the understanding of people affected by project						

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
		constriction; A publication board shall be set at the entrance of construction site, stating name and phone number of contacts of contractor, construction supervision unit and local environmental protection departments. In this way, people affected by noise, air pollution, traffic inconvenience and other adverse impacts from construction can make contact with relevant departments; an announcement shall be issued through broadcasting, television and newspaper prior to construction. An eye-catching sign shall be provided at the entrance and exit roads of project, warning vehicles to make a detour.						
3. Operation phase								
	Noise	1. Reduce the impact of traffic noise on residential environment and enhance frequency of noise tracking monitoring, so that remedy measures like installing sound-proof windows on first-row houses in Minji	Leading Office of Xiaogan World Bank Financed Projects	-	Project fund included in the contract	Environmental Protection Bureau of Hubei Province/Xiaogan Environmental Protection Bureau/Xiaogan Environmental Monitor	Implementation of noise prevention measures Refer to Table 5.2-1 for the monitored noise values of sensitive	Before operation

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
		Community, can be taken immediately if significant adverse impact occurs; 2. Strengthen road maintenance and ensure that the roads are flat and smooth.				Station	spots	
	Waste water	Wastewater and rainwater in the information building are discharged separately. Rainwater shall be discharged into municipal rainwater pipeline network via rainwater pipeline network in the region. One septic tank of $100m^3$ is provided in the information building. Domestic wastewater shall reach Class III standard of *Integrated Wastewater Discharge Standard* (GB8978-1996) and shall be discharged into water treatment plant.	Leading Office of Xiaogan World Bank Financed Projects	5.0	Project fund included in the contract	Environmental Protection Bureau of Hubei Province/Xiaogan Environmental Protection Bureau	Domestic sewage indicators	Before operation
	Transportation safety	1. Set up zebra crossing and other street-crossing facilities; 2. Maintain the above facilities during operation; 3. Enhance transportation management, take traffic dispersion measures timely to guarantee smooth traffic	Leading Office of Xiaogan World Bank Financed Projects	-	-	Xiaogan Traffic Police Brigade	Traffic safety	On a daily basis

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
	Air pollution	1. Enhance management on vehicles and ensure that the vehicle exhaust reaches standard. 2. Complete construction of green belt according to design and carry out routine maintenance	Leading Office of Xiaogan World Bank Financed Projects	-	Project fund included in the contract	Environmental Protection Bureau of Hubei Province/Xiaogan Environmental Protection Bureau/ Xiaogan Environmental Monitor Station	Vehicle exhaust (NO_2, PM_{10})	Before operation
4. Measures on the accumulated impact of the project								
Item	Constraints in resources and environment	Measures	Implementing unit	Estimated cost	Financial source	Supervising unit	Supervision indicators	Implementation phase
Land	Occupation of farmland: it will change the use of land permanently as the agricultural land will be transformed into industrial land, and will reduce agricultural acreage.	1. To adjust land use plan and achieve overall balance of agricultural land in the area according to the "balance of arable land" principle in the preparation and revision of *Master Plan for Land Use in Xiaogan City*; 2. To make arrangements for the re-employment of relocated and land-lost farmers in the overall development plan according to relevant policies.	Planning Bureau of Airport Area	-	Local Government of Airport Area	Land management department of Airport Area	Planning indicators	To be implemented during the preparation and revision of the Master Plan for Land Use in Xiaogan City
Water resource	Pressure on regional water environment is high.	1. To plan and optimize the use of water resource in the area properly; 2. To set industrial structure	Water Supplies Bureau of Airport Area/Development and Reform Bureau	-	Local Government of Airport Area	Local Government of Airport Area	Water resource utilization efficiency	To be implemented during the implementation

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
		and scale properly and to reduce demand on fresh water.						of airport economic zone plan.
Energy	Demand on heat and power energy is large.	1. To add power supply units in the airport area to enhance power supply capacity; 2. To lay pipelines from Xiaogan City and to use natural gas as the energy source of the demonstration zone.	Development and Reform Bureau of Airport Area	-	Local Government of Airport Area	Local Government of Airport Area	-	Already included in the airport zone plan
Surface water environment	The water environment capacity is limited. Waste water discharged during the construction of the planned area may affect the environmental functions of the surrounding waters.	1. To take water-saving measures such as recycling water and to reduce waste water discharge; To execute class I level B standard specified in GB18918-2002 *Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant* for waste water discharge of wastewater treatment plant in the airport area; 2. To install online monitoring device and implement total emission control; enterprises shall design and build emergency pool, buffer pool , or initial rainwater collecting pool, to collect and treat wastewater in case of an emergency, and ensure that initial	Local enterprises	-	-	Water Supplies Bureau / Environmental Protection Bureau of Airport Area	Whether the regional environmental function zoning standards are satisfied	To be implemented during the environmental planning of the airport zone

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
		rainwater and wastewater produced in an emergency do not enter the surrounding water bodies; 3. Enterprises in the AEZ shall meet relevant standards enacted by the sewage treatment plant and requirements of the *Integrated Wastewater Discharge Standard* class 3. the first type of pollutants shall be sampled at workshops or at outlets of treatment facilities positioned in workshops, and such pollutants' maximum acceptable emissions intensity shall meet the requirement of the *Integrated Wastewater Discharge Standard* (GB8978-1996); 4. Increase enterprises' wastewater pretreatment, help build emergency pools within water treatment plants in demonstration areas, so as to prevent water bodies from being polluted due to sewage treatment plants' abnormal functioning; 5. Improve drainage networks, speed up the installment of sewer main						

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
		pipes, improve the system of drainage networks in the AEZ, separate rainwater from sewage, separate clean water from wastewater; encourage enterprises to recycle wastewater within the enterprises, and gradually develop a system of reusing the recycled water; 6. Proactively reduce pollutants in Xiaogan and in the AEZ; 7. Lift the standard of admission to the AEZ, strengthen the monitoring and administration of enterprises which discharge lots of pollutants into water at demonstration areas; prohibit enterprises from discharging water pollutants if necessary; 8. Speed up the construction of the AEZ' sewage treatment plant and supporting pipe network.						
Groundwater environment	Shallow groundwater is extremely vulnerable to chemical leak	1. Limit the use of land plot; lay a seepage-proofing foundation; 2. Reasonably lay out tank fields and storage areas in the AEZ	Planning Bureau	-	-	Local Government of Airport Area	Planning Environmental Impact Assessment	To be implemented during the preparation and revision of the overall planning of airport

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
								economic zone
Atmospheric environment	The pollution prevention and control on enterprises in the zone are not sufficient, which will result in the emission of harmful gases and may have certain impact on the atmospheric environment quality or may change the environmental functions of atmosphere in the area.	1. Adjust and optimize the structure of energy utilization. Promote the application of clean energy, such as natural gas, liquefied petroleum gas, bio-energy and other renewable energy; 2. Centralized Heating shall be provided; auxiliary pipeline network shall be built first; "Up-to-standard emission" and "total amount control" shall be applied to enterprises in the zone. Total amount of SO_2, NOx emission shall meet the requirement of Xiaogan Environmental Protection Bureau; 3. Air pollution prevention and control on enterprises in the zone: clean production process shall be adopted. Effective waste gas treatment measures shall be adopted by enterprises to ensure the up-to-standard emission. On-line automatic detector shall be provided at waste	Planning Bureau of Airport Area, Transportation Bureau, etc.	-	-	Local Government of Airport Area	Planning indicators	To be implemented during the implementation of airport economic zone plan.

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
		gas emission point to control the total amount of SO_2 and NO_2 emission. Raw material transmission pipeline shall be of efficient sealing. A standard operating procedure shall be prepared. In addition, automatic system shall be provided with interlock protection in order to avoid spillage and leakage caused by equipment fault or mis-operation and reduce the amount of hazardous volatile gases into atmosphere; 4. Two sides of main traffic roads and various functional areas around airport zone shall be provided with 10 to 20m wide greenbelt of dense trees, shrubs or grasses, so as to purify atmosphere. Furthermore, the greenbelt between surrounding commercial and residential estate shall be 20m wide or larger.						
Solid waste	There is an absence of ability in safe disposal and integrated use of dangerous	1. For safe disposal, dangerous waste shall be transferred to places that are qualified to treat dangerous waste;	Planning Bureau of Airport Area, etc.	-	-	Local Government of Airport Area	Planning indicators	To be implemented during the implementation of airport

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
	waste and general industrial waste.	2. Plan and arrange the solid waste of enterprises in a comprehensive way so as to integrate the use of waste; 3. Garbage shall be transferred to Xiaogan garbage disposal plant.						economic zone plan.
Ecological environment	Water and soil will be lost and the area of green land will reduce.	1. Enhance the management during construction to reduce water and soil loss; 2. Reasonably plan and use the land in an intensive way; expand the proportion of ecological land; 3. Protect waters like lakes; connect the water systems in the zone; build Fenghuanggang and Yujiazui wetlands	Planning Bureau of Airport Area, etc.	-	-	Water Supplies Bureau of Airport Area	Planning indicators	To be implemented during the implementation of airport economic zone plan.
Risks	During the production of the enterprises, environmental risks such as the leak of toxic gases and harmful gases may have impact on the enterprises in the zone and the surrounding villages as well as urban safety.	1. Follow the urbanization process to consolidate villages into towns; guide people to centralize towards the upwind direction of prevailing wind and secondary wind; 2. Arrange the enterprises based on similar projects; enterprises in the airport zone shall develop into demonstration sites according to their industry categories; 3. A Class-III precaution	Planning Bureau of Airport Area, etc.	-	-	Environmental Protection Bureau of Airport Area	Planning indicators	To be implemented during the implementation of airport economic zone plan

Project Type	Potential Impact	Mitigation Measures	Implementing Unit	Estimated cost (10 thousand Yuan)	Financial source	Supervision Unit	Supervision Indicators	Frequency
		plan shall be implemented in airport zone. At first level, enterprise in airport zone shall be required to set up cofferdam around plant area; at Class II, emergency water tanks shall be provided at each plant area to collect polluted rainwater and serve for fire water; at Class III, emergency tanks shall be provided at wastewater treatment plant of airport zone.						
Society	Relocation of villages: the native residents will lose land and will be transformed from farmers to urban residents, which will pose pressure on employment.	Population to be resettled shall be removed during the construction of airport economic zone; Reemployment issue of land-lost farms shall be addressed in various ways.	House Demolition and Relocation Office of Airport Area	-	-	Local Government of Airport Area	Demolition and relocation plan indicators	To be implemented during the implementation of airport economic zone plan

3.2 Communication and continuous public participation

During construction, communicating and consulting with the public is a continuous process that will be done through the following measures：

1) All construction sites shall be equipped with conspicuous signage which states a brief project description, the period and activities of construction, the names and phone numbers of the project manager and chief engineer; the public will be welcome to select their own administrators to manage areas with which they are concerned.
2) The Contractors shall hold public meeting at all villages on the construction site at least once a year. At such meetings, the site administrators should explain the construction activities, gain an understanding of villagers' concerns, and respond to these concerns.
3) The project office should arrange for a full-time security officer to take charge of people's complaints about construction and operation. The names and contact information of members of the project office shall be made public to the local people through brochures and public meetings.
4) The Contractor and members of the project office may visit schools, residential areas, and other sensitive locations from time to time, so as to learn what concerns the people at these locations and how these people feel about the impact of construction and operation.
5) When preparing for construction activities that are special or have far-reaching effects, e.g. nighttime construction, the Contractor shall visit the potentially-affected communities to explain the construction activities and their impacts (e.g. safety risks, noises), listen to what the concerns are of people in the area, and adopt proper and responsible measures to solve the problems that concern the local people.

4.Environmental supervision and Management

4.1 Law and contract requirements

The Contractor shall develop a thorough plan for environmental protection for the different sites in the bidding documents. The plan and the construction contract's environmental protection provisions shall comply with national environmental protection laws and regulations.

The contractor shall submit his construction plan to the CSE for approval and the CSE will determine whether the plan contains sufficient environmental protection and pollution control measures. The Contractor shall submit to the CSE his progress report, updated plans for the projects and other relevant documents, so as to clear obstacles for CSE inspection. On-site logs shall be recorded in accordance with CSE requirements, and will be submitted to the CSE for inspection.

If the examined documents include any content that violates the provisions for environmental protection and pollution control of the contract or related laws, the CSE will offer advice to the Contractor on rectification of the issue. The Contractor shall take prompt measures to rectify the content, otherwise the CSE will not issue construction permits.

4.2 Environmental supervision and management during the initial stage of construction

With regard to the project, environmental management during the initial stage of construction concerns itself with design along with contracting and subletting work for the next stage of construction. At the design stage, Xiaogan authorities will directly supervise construction units' and designing institutions' implementation of the measures for environmental protection that have been proposed in *the Report of the Environmental and Social Impacts* and approved by the Hubei Environmental Protection Bureau. These measures will be incorperated into investment budgets and will be fully reflected in the construction design, so as to meet the requirement of "simultaneous design", out of three "simultaneous" requirements of environmental protection projects.

In construction subletting, construction units should attach the same importance to

environmental protection projects as they do to primary projects. They should require the construction firms to incorporate environmental protection into construction plans in accordance with *the Report of the Environmental and Social Impacts*. They should give priority selection to the construction firms that have strong awareness of environmental protection with good performance and competency in environmental protection projects, so as to lay a solid foundation for high-quality "simultaneous construction" with measures taken to protect the environment during construction. Before going to the site, construction workers need to receive training in order to increase their knowledge of the laws and regulations on environmental protection and raise their awareness of ecological protection and pollution prevention.

4.3 Environmental supervision and management during construction

1. Environmental protection objectives

Environmental supervision and construction have similarities and differences. The objectives of environmental protection are as follows:

(1) Ensure full implementation of environmental protection projects in construction in accordance with *the Report of the Environmental and Social Impacts*;

(2) Ensure that environmental protection projects meet the standards of construction quality, scheduling, ecological restoration, and pollution control, and that environmental protection projects meet the requirements of laws and regulations on environmental protection;

(3) Provide instant feedback to the construction units and the construction firms when construction fails to meet environmental requirements or when the construction quality fails to meet construction requirements, provide advice on measures that address problems, approve, rectify, and change the construction, according to supervisors' responsibilities, their authority, and the contract's management procedures for environmental supervision and management;

(4) Help local environmental protection authorities conduct inspections according to law, and provide a scientific and thorough basis for settling disputes over environmental protection;

(5) Perform acceptance inspections on quantities and qualities of the environmental protection projects, and take part in the acceptance inspection upon completion of a project.

2. Monitoring sources of noise pollution

In order to prevent noise pollution, relevant units should control or eliminate sources of heavy noise pollution according to design requirements, and noises on the construction site and the areas that are affected by construction are required to be kept under a stipulated level. Supervising environmental engineers should be familiar with the site where construction machinery operates, construction schedules, and various sources of noise pollution, including traffic noise and domestic noises from workers. These engineers should also monitor and examine whether noise pollution caused by mechanical equipment during construction is controlled according to relevant laws and regulations so that residential areas and sensitive spots will not be disturbed by noise.

3. Monitoring sources of air pollution

Air pollution around the construction site is primarily caused by exhaust gas and dust from construction and production. Emissions of exhaust gas and dust should be kept under stipulated levels. Environmental quality on the construction site and the areas that are affected by construction should meet environmental quality standards. The construction site should be kept clean and regularly watered depending on weather. Results from air quality monitoring over sensitive spots within 200m of the construction site should be assessed, if the results fail to meet standards, supervising environmental engineers should notify the Contractor and ask him to take preventive measures to ensure that air quality standards are met.

4. Monitoring sources of water pollution

Supervising environmental engineers should focus on monitoring and managing water quality. They should monitor and manage sources of sewage, both domestic and from production, along with sewage discharge, water quality levels, and treatment facilities' construction processes and their effects, and should examine whether sewage discharge meets approved standards. They should monitor and examine whether roads are clear on the construction site, whether sewerage systems function normally, and whether there is waterlog gin on the construction site.

Vehicles should be flushed on the construction site with the flushing water then being deoiled and precipitated and then recycled. Construction wastewater is prohibited from being discharged into Tongjia Lake. After construction, the pond where the flushing water is deoiled should be removed and the area where the flushing water is precipitated should be cleaned.

5. Monitoring solid wastes

The disposal of construction waste should be monitored for adherence to rules. Disposal of solid wastes include both household garbage and construction waste so as to keep the construction site clean.

6. Transport vehicle management

Construction firms should double their efforts in managing vehicles and try to arrange for construction vehicles to be used during the daytime. With regard to nighttime construction, construction vehicles shall be driven slowly and without honking so as to reduce noises. If a construction firm receives 4 complaints concerning the same source of noise within one week, they shall examine the way they work and all the machines they use, and take effective measures to reduce the noise.

Vehicles should not be loaded to capacity so as to control spillover. The construction firms should organize to clean the construction site's entrance and exit areas, clean makeshift roads, water the roads and entrance and exit areas so as to inhibit dust and prevent it from impacting the surrounding environment.

4.4 Environmental supervision and management during the later stages of construction

Construction units should monitor and manage the implementation of the ecological restoration plan and the operation of treatment facilities. The units should examine the implementation of ecological measures and measures for pollution prevention and control. The units should take part in acceptance inspections for environmental projects, help construction unites organize personnel for environmental protection training, and plan and summarize the project's environmental supervision and management work.

4.5 Punishment system

As per the contract, if CSE finds operations against environmental regulations during on-site supervision, the Contractor shall rectify those within specified time limit (e.g. 2 weeks). If the Contractor completes those rectifications as required, there will be no punishment. If not, the Contractor shall at its own cost hire a third party to complete those rectifications.

4.6 Environmental complaints

CSE shall initiate complaint investigations if receiving environmental complaints during construction. Complaint investigation procedures are as follows:

1) Record the received complaints and the dates into complaint database, and inform the Contractor;

2) Investigate the complaints to determine their validity and evaluate that whether the issues complained are caused by construction activities;

3) If complaints are valid and caused by construction activities, CSE shall lay down mitigation measures and provide them to the Contractor;

4) If complaints are forwarded by environmental protection bureau, CSE shall submit interim report of complaint investigation to environmental protection bureau and take further actions within time limits specified by environmental protection bureau;

5) Investigate to verify the situation and take measures to prevent same complaints.

6) Report investigation results and actions taken as required by the person who launches the complaint. (if complaints are from environmental protection bureau, results shall be reported within the time limits required by it);

7) Record complaint, investigation and follow-up actions, and monthly results of EMP.

The Contractor and CSE shall work together to investigate complaints. The Contractor shall provide all the necessary information for investigation. If mitigation measures have been determined during investigation, the Contractor shall immediately carry out those measures. CSE shall ensure that the Contractor has carried out those measures.

5 External Monitoring Consultant of Environmental Management Plan

5.1 Overview

During the implementation stage, project owner will commission monitoring unit to periodically collect data from environmentally sensitive spots (including water, air, sound, etc.). These indicator data will be provided to the owner as basis for compliances of environment regulations. Formulation of a viable monitoring plan will be helpful for evaluating the overall performance of the project and the short-term effects of the construction activities.

(1) As an important component of the EMP, the environment monitoring plan consists of the following:

(2) Confirmation of disadvantageous impacts forecasted in EIA;

(3) Determining actual scopes of impacts;

(4) Assessing the effects of mitigation measures at project site;

Identifying and adjusting additional mitigation measures for incidental impacts which may be necessary during project construction or operation.

5.2 Impact monitoring

In order to monitor the impacts during the construction stage, the monitoring unit commissioned by the project owner will conduct periodical environmental supervision.

Sensitive spots with potential for prominent pollution will be designated as the monitoring sites, based on forecast results from the project's environmental impact report. The monitoring of pollution during the construction and operation stages will focus on aspects with strong impacts: noise, air, and surface water environment. The factors to be monitored will be determined based on the project's characteristic pollution factors.

For analysis methods, the relevant methods defined in *Technical Specification for Environmental supervision* issued by the former Administration of Environmental Protection (now the Ministry of EP). The evaluation standards nominated in the environmental impact report will be used. According to the engineering characteristics of the World Bank-funded Ancient Jingzhou City Restoration and Protection Project, a monitoring plan for the construction and operation stages have been designed, as in Table

5.2-1.

Table 5.2-1 Environmental supervision plan

Stage		Location	Parameter	Frequency		Term	Performed by
Construction	Air and environment	Concrete mixing station; lime mixing stationand; Lvwan, Pengxing Village;AnjingmiaoVillage;Chengjiayuanzi;Yangjiatian;Tangjiawan; Minji;Yupantaowan;Gaomiao Village; Yiwan, Gaomiao Village; Wangtuhuwan; Chengjiayuanzi; Yangxingyuan Village; Yaoxiwan and other communities	TSP, PM_{10}	Once per quarter (More during peak construction)		3-4 times per quarter	The monitoring unit commissioned by the project owner
	Noise	Lvwan, Pengxing Village;AnjingmiaoVillage;Chengjiayuanzi;Yangjiatian;Tangjiawan; Minji;Yupantaowan;Gaomiao Village; Yiwan, Gaomiao Village; Wangtuhuwan; Chengjiayuanzi; Yangxingyuan Village; Yaoxiwan and other communities	LAeq	Once per quarter	Two days	Once at day, once at night	
Operation	Air	Minji community	TSP, NO_x	Once per year	One day	18(12)-hour continuous monitoring	
	Noise	Minji community	LAeq	Once per year	Two days	Once at day, once at night	
	wastewater	Main outlet of sewage from information building	pH ,NH_3 –N,COD ,BOD_5 ,Oil, etc	Once per year			

In addition, the contractor and supervision engineers will also perform environmental supervision as stipulated in the contract, including: monitoring noise levels at sensitive spots using portable devices; during periods of heavy construction activities, such as digging, piling, power generation, material transportation and night constructions; monitoring the noise levels at sensitive spots surrounding construction areas.

The results will be compiled into formal written reports, submitted to PMO for review

once per month. In case of any incidents, the construction firms will report to PMO immediately.

5.3 Monitoring devices and records

The monitoring devices and methods used by construction firms and supervisors should comply with relevant regulations and quality standards. The devices should be periodically calibrated before on-site measurements.

During the on-site monitoring and inspection, data recording should be conducted at possible locations. Table 5.3-1 has provided the records to be kept at each site's EMC office.

Table 5.3-1 Typical records to be kept on-site

Type	Record
General	1). Environmental training record (e.g. attendance record for environmental awareness training meetings); 2). On-site log and inspection record; 3). Environmental work log, complaint work log, and environmental quality non-compliance notification form; 4). Construction process and schedule; 5). Equipment maintenance and repair record; 6). Contacts of related parties and other parties; 7). Meeting records.
Noise control	1). Updated list of current on-site mechanical and electrical equipment; 2). If any sensitive spot is affected, perform periodical checks and provide detailed results
Water pollution control	1). Water drainage plan for construction sites; 2). Treatment of toilet wastewater (not connected into current main wastewater pipe); 3). Final quality of outgoing wastewater and recording of waste collection.
Management of solid wastes	1). Backup of valid certificates from waste delivery vehicles and waste collectors in the EMP; 2). Amounts of recycled wastes; 3). Amounts of inert wastes converted into active substances on-site (if any); 4). Waste treatment record.
Air	1). On-site water drainage plan; 2). Material transportation route plan; 3). Mitigation measures for air impacts, such as sprinkling water; 4). Monitoring results of air quality.
Ecological resources	Locations of sensitive ecological resources and related protection records
Storage of chemicals	1) Drawings of chemical storage facilities; 2) Material safety data sheet for used and stored chemicals; 3) Inventory list and consumption record of chemicals.

6 Checking and Accepting Completed Installations of Environmental Protection of Construction Projects

The project should be designed to prevent and control waste water, exhaust gas, and noise, based on the project's features, so as to ensure that emissions of exhaust gas, discharge of waste water, and noise are all kept under stipulated levels after the project is complete and begins operation; according to *Management Regulations for Checking and Accepting Completed Installations of Environmental Protection of Construction Projects*, construction units should apply to the EPB (Environmental Protection Bureau) for checking and accepting completed installations of environmental protection, develop plans to monitor the checking and accepting process, and monitor the checking and accepting of completed installations of environmental protection after the application is approved.

Before checking and accepting completed installations, construction units should prepare the following materials：Environmental Impact Report, Monitoring Report of Environmental Protection for Check and Accept of Completed Construction Project, and Implementation Report of Environmental Protection Project

The acceptance checklist of a completed environmental protection project is shown in Table 6.1-1.

Table 6.1-1 Acceptance checklist of completed environmental protection project

<table>
<tr><th>No.</th><th colspan="2">Subitem</th><th>Content</th><th>Notes</th></tr>
<tr><td>1</td><td colspan="2">setting up organization</td><td>Setting up organizations for the EIA according to EIA requirements</td><td rowspan="4">Provided by the project owner when submitting the application for check and acceptance</td></tr>
<tr><td>2</td><td colspan="2">Bidding documents</td><td>Including environmental protection provisions in engineering, construction, and procurement contracts</td></tr>
<tr><td>3</td><td colspan="2">Dynamic monitoring data</td><td>Monitoring and managing environment during construction according to EIA requirements</td></tr>
<tr><td>4</td><td colspan="2">Monitoring the effects of environmental protection facilities</td><td>Survey report on the effects of environmental protection facilities during trial operation</td></tr>
<tr><td>5</td><td colspan="2">Environmental protection measures</td><td></td><td></td></tr>
<tr><td>Time period</td><td colspan="2">Items treated</td><td>Pollution control measures</td><td></td></tr>
<tr><td rowspan="5">construction</td><td colspan="2">Wastewater</td><td colspan="2">Treating household wastewater in temporary septic tanks at construction camps for fertilizing soil; recycling construction wastewater after sedimentation with oil removal. Discharging wastewater into Tongjia Lake and other water bodies is forbidden.</td></tr>
<tr><td>Exhaust gas</td><td>Dust</td><td colspan="2">Small sprinklers for sprinkling at roads and sites, effectively reduce dust</td></tr>
<tr><td>Noise</td><td>Construction noise</td><td colspan="2">Using low-noise equipment and machines, strengthening the control over noise pollution from equipment, installing temporary sound boarding near communities，providing construction workers with protection equipment.</td></tr>
<tr><td>Solid</td><td>Household</td><td colspan="2">Placing dustbins at construction camps，removing wastes promptly to waste landfill</td></tr>
</table>

No.	Subitem		Content	Notes
	wastes	wastes		
		Construction wastes	Prompt removal to Wuzhongdagou construction waste landfill, unmanaged piling is forbidden	
	Eco-protection	Conservation of water and soil	Conservation of water and soil, ecological restoration (covering temporarily discarded stockpiles, slope protection, etc.) , effectively preventing soil erosion	
	Society	Population	Publicized announcements; notification signs	
Operation	Wastewater	Road drainage	Rain-sewage diversion, road wastewater collected through the wastewater pipeline network going to the 4th wastewater treatment plant. Rainwater collected through the rainwater pipeline network built by the project	
		Water pollution control in the information building	Discharging household wastewater into urban wastewater pipeline network after the wastewater is pretreated in septic tanks and meets relevant standards	
	Noise	Reduction	Strengthening road maintenance and traffic management, installing speed limit signs and no honking signs near sensitive spots, enabling sensitive spots in acoustic environment to meet GB3096-2008 requirements. Having made a plan for tracking noise sources to ensure that noise is kept under stipulated levels during operation	
	Solid wastes	Household wastes	Placing classified dustbins on different roads and in the information building, prompt removal to ensure sanitation	
	Ecology	Landscaping	landscaping the middle and the two sides of roads, landscaping the information building, Green areas meet the design requirements	

7Training

The proper functioning of the management activities in this EMP relies on the knowledge and experience of environmental management workers and extensive training will equip relevant management workers with knowledge of and experience in project management at the World Bank. Trainings will be led by experts from universities, research institutes and professional consultation organizations.

Based on the experience from previous projects, improving the environmental awareness of construction firms and supervisors is important, as well as reinforcing the monitoring on managing authorities. Training is necessary to achieve this purpose.

Training includes subjects of environment-related regulations, standards, responsibilities and management methods. The details are shown in Table 7.1-1.

Table 7.1-1 Staff training information table

Type	Area	Trainee	Content	No. of Trainee	Term	Date (Year)	Cost (CNY 10,000)
overseas	Environ. management	Management at relevant departments of project coordination office	Experience and best practices for environ. management during construction	5	10 days	2015	12.5
		Project management office, professionals at owner	Technical methods for environ. management during construction	20	10 days	2016	45.0
Domestic	Environ. protection	Environmental protection personnel at construction firm	Fundamentals of environ. and monitoring methods; monitoring records; occupational training once per year：EMP, environ. monitoring and reporting, emergency plans	10～20	3 times per day	2015-2017	9.0
	Supervision	Environ. protection supervision engineer; construction firm environ. management personnel	Legislations, construction planning, environ. monitoring principles and planning, air and noise monitoring and control technologies	5～10	5 times per day	2015 -2017	7.5
Total							**74.0**

8. Reporting

8.1 Submitting contractor project documents

By the provision of the bid invitation document, the contractor should compile an Environmental Management Implementation Plan prior to the start of construction. The Plan should be provided to the construction supervision engineer (CSE) for review to ensure compliance with legislations and the already approved Environmental Impact Report and EMP. All changes to submitted files will be reviewed and approved by CSE representative. The supervision engineer-approved Environmental Impact Implementation will also be submitted to EMC for review. Any additional suggestions by EMC will be passed to the contractor via supervision engineer. The relevant documents will be periodically updated.

8.2 Environmental management plan report

All inspection results and suggestions of environmental management plan report will be recorded in the seasonal (semiannual; annual) environmental management report prepared by the EMC. If necessary, the EMC will also prepare a simple monthly report, particularly when violation of contracts occurs. The environmental management implementation report will be submitted within two weeks after each report date. The Phase I progress report will be submitted in the first month after construction starts.

The seasonal (semiannual; annual) environmental management report should include at least the following:

(a) Implementation overview (one or two pages)

1) Non-compliances of regulations:
2) Complaint records;
3) Report of changes;
4) Key issues in the future.

(b) Basic project information

1) Project organization, including names and telephone numbers of key personnel;

2) Construction process;

3) Management structure;

4) Tasks to be done this season.

(c) Environmental status

1) Illustrated explanation of tasks of the season (e.g. work locations and activities);

2) Illustration of locations of project area, sensitive spots and monitoring stations

(d) Summary as required by EMP

1) All monitored parameters;

2) Suitability of the environment;

3) Environment evaluation report, and implementation status of mitigation measures recommended by the EMP;

4) Requirements of the environment provided by the contract.

(e) Implementation status

Protection and pollution prevention; suggestions of mitigation measures as recommended by evaluation report and EMP are provided in the summary.

(f) Monitoring results

Results and the following information

1) Methods;

2) Laboratory name, devices and calibration details;

3) Monitored parameters;

4) Monitored location (and depth) ;

5) Date, time, frequency and terms;

6) Weather condition during monitoring;

7) Other factors that may influence the results;

8) Quality assurance, quality control results, and limitations.

(g) Reporting violations, complaints, notifications, etc.

1) All records of non-compliance in environmental quality performance;
2) All received complaints (oral or written), including location of receiving complaint, type, methods of survey or consultation, actions and followup, results and conclusion;
3) All activities in violation of local environmental protection legislations.

(h) Other

1) Explanation on reviewing future key factors from work plans and work method declarations.
2) Suggestions on management of noise, air, water and solid wastes.

8.3 Data preservation

It is not required to incorporate on-site documentation, such as monitoring records, laboratory analysis reports, videos and images in the EMP reports submitted each season. However, such files should be kept by the owner's CSE, and should be ready for submission at any time. All relevant information should be clearly and systematically recorded in the documentation.

Electronic copies are required for monitoring data. All documents will be preserved during construction period, and be available to the owner at any time within the year after project completion.

9 EMP Budget Estimate

9.1 Environmental investment estimate

The total investment is estimated to be RMB 1228 million Yuan. Environmental investment includes costs for facilities, equipment, monitoring during construction, etc. Based on the measures planned in this report, the early estimate for the one-off environmental investment is 12.0392 million Yuan, accounting for 0.98% of total investment, with 2.55 million Yuan in newly added investment.

Table 9.1-1 Environmental protection estimate

	Measures			Effect	Qnt.	Investment (CNY 10,000)	Remark
	Part I: monitoring						
	Monitoring during construction			50,000/year	4 years	20	New
	Environ. acceptance and monitoring after completion				-	50	New
	Part II: measures						
construction	Wastewater	House hold waste water	Treated in temporary septic tanks at construction camps for fertilizing soil	Discharging outside is forbidden to prevent impacting water environ.	4 facilities	6	Original project investment
		Waste water from constr uction	Recycled after sedimentation with oil removal	Discharging outside is forbidden to prevent impacting water environ.	4 facilities	6	Original project investment
	Emission	Dust	Small sprinklers for sprinkling at roads and sites	Reducing dusts	1	10	Original project investment
	Noise	Noise	Noise reduction, e.g. temporary sound boarding near communities	Meeting GB12348-90 “Standard of noise at boundary of industrial enterprises” requirements	13 sites	26	Original project investment

9 EMP budget estimate

	Measures			Effect	Qnt.	Investment (CNY 10,000)	Remark
	Solid wastes	House hold wastes	Placing classified dustbins at construction camps	Prompt removal to ensure sanitation	4 sites	4	Original project investment
	Eco-protection	Conservation of water and soil	Conservation of water and soil and ecological restoration (covering temporarily discarded stockpiles, slope protection, etc.)	Preventing soil erosion		6084.20	New 424.42，Original project investment 5656.78
	Society	population	Publicized announcements; notification signs		13 sites	6.5	Original project investment
Operation	wastewater	House hold waste water from the information building	Septic tank preparation for the 4th wastewater plant processing	Meeting GB8978-1996 “Integrated wastewater discharge standard” Class 3	1 facility	5	New
	Emission	Vehicle emission	Restrictions on emission non-compliant vehicles	Reducing air pollution		/	
	noise	Reduction	speed limit signs, no honking signs	Meeting GB3096-2008 requirements	2 sites	6	Original project investment
	Solid wastes	House hold wastes	Placing classified dustbins on different roads and in the information building.	Prompt removal to ensure sanitation		20	New
	ecology	landscaping	landscaping the middle and the two sides of roads, landscaping the information building	Green areas meet the design requirements		500.0	Original project investment
	Part III Environmental management						
	Training of environ. management personnel during construction					20	New
	EMP EMC cost					100	New
	Total Investment					1203.92	

9.2 Annual operational cost of environmental protection facilities

The operation cost of environmental protection facilities in the first 3 years in the operation phase is to be incorporated in the World Bank loan and the operation cost during the later stages will be incorporated in the cost of the operation company. The total cost for the first three years will be 630,000 million Yuan as listed in Table 9.2-1.

Table 9.2-1 Annual operational cost of environmental protection facilities

No.	**Item**	Cost (10,000 Yuan RMB)	Notes
1	Environmental supervision	6	
2	Energy cost	1	
3	Maintenance	10	Solid waste collection, etc.
4	Labor	4	
Subtotal		21	
Total in operation phase		63	3 years