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The World Bank Financed Duchang Water Environment Management Project

Environmental Management Plan

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Table of Contents

1 Overview

1.1 Introduction

Based on “World Bank Financed Duchang Water Environment Management Project－Environmental Assessment Report”, this environmental management plan (EMP) is an independent document that includes all environmental protection actions during the project design, construction and operation periods, and which acts as an action principle and working framework for implementation of mitigation measures, environmental management and environmental monitoring. The main contents of the plan include:

*project introduction
*potential environmental impacts
*agencies and responsibilities
*Environmental Management Plan
*Environmental monitoring plan
* Environmental Supervision

1.2 EMP Objectives

The objectives of EMP preparation are to 1) improve project screening, site selection, planning, design, implementation and other activities through practicable and feasible prevention and mitigation measures or measures to offset adverse environmental impacts and enhance positive environmental impacts, i.e. to take measures during project implementation to mitigate and manage adverse environmental impacts; 2) assess the actual effectiveness of mitigation measures through implementing environmental monitoring plan, propose, based on monitoring results, recommendations for further improving mitigation measures and meet relevant environmental requirements of the state, Jiangxi Province and the World Bank.

2 Project Description

2.1 Project Background

To reduce pollutants entering Poyang Lake from key water areas, and to improve water quality management, the Duchang leading group office of Comprehensive Pollution Control and Ecological Safety Improvement Project plans to use the World Bank's loan to implement Duchang Water Environment Management Project. This project aims at building a relatively sound municipal drainage system, ensuring the biological safety of the county's water environment, promoting the rainwater-sewage diversion system, improving wastewater collection and treatment rate, mitigating pollution to the Poyang Lake at the source, enhancing the water environmental management level and achieving urbanization of sustainable development.

2.2 Project Components

See Table 2-1 for project components.

Project name	Sub-project	Content	Nature	Site	Service range
Reconstruction of drainage network	sewage pipeline network	build a DN400～DN1200 sewage pipeline of 20.10km and supplementary facilities (including the 4.0-km pollution source control project of Zoujiazui Water System)	Reconstruction	built area in the town	Built area of the town, covering 14.28km^2, serving about 153,000 people.
	rainwater pipeline network	build a d800 ～ d1500 rainwater pipeline of 8.7 km and supplementary facilities (including parts of the Zoujiazui water system low impact development (LID) project－the1.7-km rainwater pipeline and supplementary facilities in Furongshan Avenue, E.)	Reconstruction	built area in the town	
Ecological Restoration and Protection Project of Zoujiazui Water System	pollution source control project	Build a DN600～DN800 sewage pipeline of 4.0 km and supplementary facilities	New	Villages along the Zoujiazui Lake and Furongshan Industrial Park	about 10,000 people in villages along the Zoujiazui Lake and Furongshan Industrial Park
	internal source control project	dredging quantity of nearly 8000m^3 with a dredging depth of nearly 0.3 m covering a lake body of nearly 25,610m^2	New	Parts of the lake body at the eastern side of Zoujiazui Lake Chengxi Avenue.	
	LID facilities	① improve the Furongshan Avenue on trial for building the sponge City, build a d1000～d1800	Reconstruction	Furongshan Industrial Park	

		rainwater pipeline of 1.7 km ; ② concave green space of 5000m2; ③ porous pavement of nearly 10000m2; ④ Reconstruct pervious public parking lot of 2000 m2 in Furongshan Industrial Park with porous function			
	overflow facilities of outlet sluice of Zoujiazui Lake	overflow facilities in the outlet sluice of Zoujiazui Lake and reconstruction of automatic sluice gate	improvement	the outlet sluice of Zoujiazui Lake	
	ecological restoration	Restore nearly 0.8km-long water system by combining parapet and ecological slope protection; restore and protect 3.0km-long water system with a total area of 26.82ha, covering water area of 13.27ha, footpath of 1.14ha, floor space of 0.05ha, pavement of 0.86ha and green land of 11.50ha		Zoujiazui Lake	
Domestic garbage collection and transportation project in three suburb towns	garbage collection, transportation and treatment system	3 newly built garbage collection and transportation stations and a garbage collection, transportation and treatment system: a 22.7 t/d station in Beishan Township, a 29.0 t/d one in Wangdun Township and a 25 t/d one in Dashu Township	new	Beishan Township, Wangdun Township and Dashu Township	Beishan Township, Wangdun Township and Dashu Township
others	water environment monitoring system premises	a building of nearly 1250m^2, including a lab, a control room, a data analysis room and rooms for information release and interaction.	new	Huanhu Road near the Nanshan Avenue	Duchang County
	automatic Water environment monitoring station for river cross sections	An Automatic water environment monitoring station in Cross Section I with a total construction area of 153.5m^2 and a buoy-based water environment monitoring station in Cross Section II.	new	Cross Section I is near the border btween Caocun Village of Shishan Township and Tieluxia Village of Sanchagang Town; Cross Section II is set up near Xiaojishan Port near Wangjia, Zhongba Village.	Duchang County

	automatic Water environment measurement sites	7 sites	new	7 sites which are located respectively in the west of Jinchang Road (in Furongshan Industrial Park), the west of Furongshan Avenue (in Furongshan Industrial Park), the middle reach of Zoujiazui water system (in the west of Wanli Avenue), the Zoujiazui sluice, the east of Zoujiazui Lake (the overflow of intercepting wells) and the East Lake	Duchang County
cost	About RMB 174,073,600 in total, including USD 20 million (RMB 132 million) loan of World Bank and RMB 42,073,600 of counterpart funding from superior support and the local government's self-raised fund.				

Table 2-1 Project Components

3 Environmental Protection Targets and Standards

3.1 Environmental Protection Targets

The environmental protection targets of this project are shown as follows from Table 3-1 to 3-4.

Table 3-1 List of Acoustic and Ambient Air Environment Protection Targets

Project content	Impact period	Impact factor	Name of sensitive spots	Location	Distance from the project (m)	Number of household /people
1）general environmentally sensitive spots						
Improvement of drainage network	Construction period	dust and noise from construction machinery during the construction period	Zhanghe Village	In the upper reach of Zujiazui Lake and at the western side of sewage pipeline network	10	20 household
			Chengbei Chuntian Community	In the middle reach of Zujiazui Lake and on the southeast side of sewage pipeline network	70	200 household
			Dawan Lv Village	In the middle reach of Zujiazui Lake and at the northern side of Wanli Avenue	10	180 household
			Xuzongshi Village	In the middle reach of Zujiazui Lake and on the southern and northern sides of sewage pipeline network	10	180 household
			Zhaoshengmian Village	In the lower reach of Zujiazui Lake and at the western side of sewage pipeline network	10	30 household
			Yangjia Port	In the lower reach of Zujiazui Lake and at the western side of sewage pipeline network	10	50 household
			Zoujiazui	In the lower reach of Zujiazui Lake and at the western side of sewage pipeline network	10	220 household
			Xiawan Lvjia	on the southern and northern sides of Wanli Avenue	20	200 household
			Ruanlonggao Village	at the northern side of Wanli Avenue	15	200 household
			Changling Zhou Village	at the southern side of Wanli Avenue	20	100
			Huimin Commnity	at the southern side of Wanli Avenue	15	200 household
			Tongshu Village	on the southern and northern sides of Wanli Avenue	15	220 household

Project content	Impact period	Impact factor	Name of sensitive spots	Location	Distance from the project (m)	Number of household /people
			Caojia Village	at the northern side of Wanli Avenue	15	50 household
			Yangguang Community	at the southern side of Yingbin Avenue	20	200 household
			Xinghuo Village	at the western side of the sewer in Donghu Avenue, N.E.	15	150 household
			Shaoqiao Shao Village	at the western side of the sewer in Donghu Avenue, N.E.	15	100 household
			Shiji Huating	at the northern side of the sewer in Donghu Avenue, N.E.	20	200 household
			Yingzuiban Chen Village	at the eastern side of the sewer in Donghu Avenue, N.E.	80	100 household
			Shenjia	at the northern side of the sewer in Donghu Avenue, N.E.	15	50 household
			Defujiayuan	at the northern side of the sewers in Donghu Avenue, N.W.	40	180 household
			Xiangyang NO.3 Village	at the eastern side of the sewers in Donghu Avenue, N.W.	15	80 household
			Zhoujiazui	In Donghu Avenue, N.	15	30 household
			Zhaojiazui	In Donghu Avenue, S.	40	20 household
			Tupu Chen Village	In Donghu Avenue, S.	20	15 household
			Dayan Huang Village	In Donghu Avenue, S.	15	100 household
			Chenjialong Village	In Donghu Avenue, S.	15	50 household
			Huapu International Mansion	In Donghu Avenue, S.	20	200 household
			Luojialing Village	In Donghu Avenue, N.	15	120 household
			Liufang Village	In Donghu Avenue, S.	40	80 household
Water system ecological restoration and	Construction period	dust and noise from construction machinery during the constructi	Zhaoshengmian Village	at the western side of Zoujiazui water system	30	30 household
			Yangjia Port	at the western side of Zoujiazui water system	30	50 household
			Zoujiazui	at the western side of Zoujiazui water system	15	220 household
			Shaojiatuo	at the eastern side of	180	50

Project content	Impact period	Impact factor	Name of sensitive spots	Location	Distance from the project (m)	Number of household /people
protection project		on period		Zoujiazui water system		household
			Shaocun Village	at the eastern side of Zoujiazui water system	100	120 household
			Bajiazui	On the northeast side of Zoujiazui water system	30	120 household
			Sigua Weir	at the eastern side of Zoujiazui water system	20	120 household
2）Key environmentally sensitive spots						
Improvement of drainage network	Construction period	dust and noise from construction machinery during the construction period	Duchang Central Kindergarten	In the lower reach of Zujiazui Lake	10	under construction
			Duchang Experimental Elemetary School	In the lower reach of Zujiazui Lake and at the southern side of sewage pipeline network	80	5500 people
			Duchang NO.3 Elementary School	In Wanli Avenue. N.	15	4000 people
			Duchang Maternity and Child Health Care Hospital	In Wanli Avenue. N.	15	262 people
			Qingjiafan Elementary School	In Wanli Avenue. S.	40	1500 people
			Xiehe Hospital	In Donghu Avenue, S.	15	300 people
Domestic garbage collection and transportation project	Operation period	Odor during operation period	Pachuan Pond	at the eastern side of Beishan Township Garbage Transfer Station	200	10 household
			Yanggang Village	at the northern side of Wangdun Township Garbage Transfer Station	70	3 household
			Matang Village	at the southern side of Dashu Township Garbage Transfer Station	20	10 household

Table 3-2 List of Water Environment Protection Targets

No.	Protection target	Environmental planning target	Project target	Water body function
1	Zoujiazui Lake	Category Ⅲ	Category Ⅴ	water for general scenic purposes
2	Poyang Lake	Category Ⅲ	/	water for scenic and recreational purposes

Table 3-3 The list of Ecological Environment Protection Targets

Environment factor	Protection target	Overview of protection target
ecological environment	terrestrial plant	damaged plants due to permanent and temporary land occupation of the project
	aquatic life	aquatic life in Zoujiazui Lake
	wild animals	wild animals within the area affected by the project

Table 3-4 The list of Social Environment Protection Targets

No.	Impact factor	Protection target
1	infrastructure	existing roads and buildings
2	traffic block	the travel and safety of residents, schools and hospitals, and shops along the existing roads during project construction
3	public facilities	water and electricity supply and other public facilities

3.2 Environmental Protection Standards

3.2.1 Environmental Quality Standards

（1）Ambient air

According to EHS, ambient air quality should follow standards in national laws and regulations. The ambient air involved in the project is classified as Category II, therefore, shall follow the Category II standard in *Ambient Air Quality Standards* (GB3095-2012) while ammonia gas and hydrogen sulfide shall follow the allowed maximum concentration of harmful substance in the ambient air in residential places in *Hygienic Standards for the Design of Industrial Enterprises (*TJ36-79). See Table 3-5 for details.

Table 3-5 Ambient Air Quality Standards

Item	1-hour Average	24-hour Average	Standard
SO_2	500	150	Category II standard in *Ambient Air Quality Standards* (GB3095-2012)
NO_2	200	80	
TSP	-	300	
PM_{10}	-	150	
NH3	200 (one-time monitoring)	-	*Hygienic Standards for the Design of Industrial Enterprises (*TJ36-79)

（2）Water environment

The water bodies involved in this project is Zoujiazui Lake which is subject to Category III standard in *Surface Water Environment Quality Standards (*GB3838-2002). Zoujiazui Lake is scenic and recreational water body, and its water quality in some parts is worse than Category V. It is proposed to improve its quality to Category V. See Table 3-6 for details.

Table 3-6 Surface Water Environment Quality Standards (mg/L, excluding pH)

Assessment factor	*Surface Water Environment Quality Standards (*GB3838-2002)	
	Category Ⅲstandard	Category V standard
pH	6-9	6-9
DO	≥5	≥2
permanganate index	≤6	≤15
COD	≤20	≤40
BOD_5	≤4	≤10
TN	≤1.0	≤2.0
NH_3-N	≤1.0	≤2.0
TP	≤0.2 (for lakes and reservoirs, 0.05)	≤0.4 (for lakes and reservoirs, 0.2)
petroleum	≤0.05	≤1.0
sulfide	≤0.2	≤1.0
fecal coliform	≤10000	≤40000

（3）Acoustic environment

The acoustic environment quality related standards of China and noise standard in EHS are shown in Table 3-7.

Table 3-7 Acoustic Environment Quality Standards (dB(A))

Acoustic Environment Quality Standard (GB3096-2008)				Noise guideline value in EHS		
Implementation area	Category of functional zone	Daytime 6:00~22:00	Nighttime 22:00~6:00	Receptor	Daytime 7:00~22:00	Nighttime 22:00~7:00
Residential, commercial and industrial combined areas	Category 2	60	50	residential, office and cultural& educational area	55	45
Areas along both sides of transport corridors	Category 4a	70	55	Industrial and commercial facilities	70	70

This project is located in the urban area of Duchang County, Beishan Village, Dashu Village and Wandun Town. The urban area belongs to residential, commercial and industrial combined areas while the rest three areas are residential areas. After comparison, *Acoustic Environment Quality Standard* (GB3096-2008) is applied in this project. See Table below for the acoustic environment quality standard of this project.

Table 3-8 Acoustic Environment Quality Standards (dB (A))

Item	Category	Implementation area	*Acoustic Environment Quality Standards* (GB3096-2008)	
			daytime	nighttime

acoustic environment	Category I	Beishan Township, Wangdun Township and Dashu Township	55	45
	Category II	urban area in the county seat	60	50

（4）Soil

As shown in Table 3-9, the dredging of bottom sludge in Zoujiazui Lake shall follow the Category II standard in *Soil Environment Quality Standards* (GB15618-1995) and *Standards for Control of Pollutants in Agricultural Sludge* (GB4284-84).

Table 3-9 Soil Environment Quality Standards (mg/kg)

Standard / Item	*Soil Environment Quality Standards* (GB15618-1995)			*Standards for Control of Pollutants in Agricultural Sludge* (GB4284-84)	
	Category II standard value			pH＜6.5	pH≥6.5
pH	＜6.5	6.5~7.5	＞7.5	＜6.5	≥6.5
Cd	0.3	0.3	0.6	5	20
Cu	50	100	100	250	500
Pb	250	300	350	300	1000
Cr	150	200	250	600	1000
Zn	200	250	300	500	1000
Ni	40	50	60	100	200

3.2.2 Pollutants Discharge standards

（1）Atmospheric pollutants

Monitored concentration limits for fugitive discharge in *Comprehensive Atmospheric Pollutant Emission Standards* (GB16297-1996) are applied for dust from construction. See Table 3-10 for details.

Odor generated from the garbage transfer stations during the operation period follows Category II Standard of fugitive emission in *Odorous Pollutant Emission Standards (GB14554-93)*. See Table 3-11.

Table 3-10 Comprehensive Atmospheric Pollutant Emission Standards (excerpt) (unit: mg/m^3)

Pollutant	Monitored concentration limits for fugitive discharge	
particulate matter	Monitoring point	Concentration
	maximum concentration point outside boundary	1.0

Table 3-11 Odor Discharge Standards (excerpt) (unit: mg/m3)

Pollutant	Monitored concentration limits for fugitive discharge (new construction, reconstruction and expansion)
NH_3	1.5
H_2S	0.06

（2）Water pollutants

The sewage collected through the pipeline network, and domestic sewage discharged

from public toilets and water environment monitoring premises of the Zoujiazui Lake Wetland Protection System Project shall drain into Duchang wastewater treatment plant. They are subject to Category B standard of *Water Quality Standard for Sewage Discharged to Urban Sewer* (GJ343-2010) as shown in Table 3-12. Then the effluent that meets the Category I B standard in *Pollutant Discharge Standards for Urban Wastewater Treatment Plants* (GB18918-2002) shall be discharged into Poyang Lake. See Table 3-13.

Table 3-12 Water Quality Standard for Sewage Discharged into Urban Sewers (unit: mg/L)

No.	Item	Category B	No.	Item	Category B
1	COD	500	9	Total lead	1
2	BOD_5	350	10	total chromium	1.5
3	SS	400	11	Total Nickel	1
4	NH_3-N	45	12	Total zinc	5
5	pH	6.5~9.5	13	Total copper	2
6	TN	70	14	total manganese	5
7	TP	8	15	Total iron	10
8	Total cadmium	0.1	16	Total arsenic	0.5

Table 3-13 Wastewater Discharge Standards (unit: mg/L, excluding pH)

Source of standards / Pollutant	Category I B standard
pH	6~9
SS	20
BOD_5	20
COD	60
NH_3-N	8（15）
petroleum	3
animal and plant oil	3

Note: number outside brackets is control indicators when the water temperature is above 12℃, and the number in brackets is used when the water temperature is below or equal to 12℃.

（3）Noise

Standards for Ambient Noise Emission at Construction Site Boundary (GB12523-2011) applies for all construction noises while noise produced by machinery is subject to Category II standard in *Emission Standards for Industrial Enterprises Noise at Boundary* (GB12348-2008). See Table 3-14 for specific standard values.

Table 3-14 Standards for Ambient Noise Emission (unit: dB(A))

Item	*Emission Standards for Industrial Enterprises Noise at Boundary*	*Standards for Ambient Noise Emission at Construction Site Boundary*

	(GB12348-2008)	(GB12523-2011)
	Category II	noise emission standards at construction site
daytime	60	70
nighttime	50	55

（4）Solid waste

Standard for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes (GB18599-2001) is applied. Hazardous waste in the monitoring lab shall follow *Standards for Pollution Control at Hazardous Waste Storage Site* (GB18597-2001) and relevant safety policy requirements of EHS and the World Bank.

4 Environmental Management Plan

4.1 Environmental Management Agencies and Responsibilities

Setup of the project's environmental management agencies is provided in Figure 4-1 and Table 4-1. Roles and responsibilities and staff establishment of agencies under the project are summarized in Table 4-2.

Table 4-1 Agencies under Environmental Management System

type	Name		Roles and Responsibilities
Management	PPMO		Designates an environmental manager to be exclusively responsible for environmental protection activities during planning, design and implementation, make sure work procedures meet domestic and World Bank requirements for environmental assessment and environmental management, and coordinate and supervise EMP implementation.
	County PMO		Designates staff to be exclusively responsible for routine environmental supervision and management during project implementation and operation, environmental acceptance and routine monitoring after project completion to reduce adverse environmental impacts of the project to the lowest possible or acceptable levels and maximize environmental benefits of the project; provide funding needed for carrying out environmental protection activities and take charge of sorting out and archiving relevant documentation.
supervision	World Bank Supervision Mission		Sends an environmental specialist to supervise and review ECOP implementation.
	Various-level Environmental Protection Administrations		Supervise and inspect to ensure work procedures meet Government of China (GOC) requirements for environmental management and pollution control measures during project implementation meet GOC requirements for environmental protection.
implementation	Project owner	Office of River Head	Designates staff to be exclusively responsible for the Poyang Lake Basin management during the project operation period.
		Duchang County Construction Bureau	Designates staff to be exclusively responsible for the restoration of Zoujiazui Lake, urban sewage collection pipeline network, and the implementation of the EMP during the operation period of the collection and transfer project of garbage in three townships or towns.
	Civil Works Contractor		Appoints a site environmental engineer to implement environmental protection and soil and water conservation measures specified in contract clauses and the bidding document, prepare and submit monthly environmental reports during construction, following requirements of the World Bank and local environmental protection administrations for environmental protection.
Consulting service	EIA Institute		Prepares project environmental report.
	Design Institute		Prepares feasibility study and construction design.
	Environmental Supervision Agency		Supervises route construction activities of the contractor.
monitoring	Environmental Monitoring Agency		Qualified environmental monitoring agency takes charge of environmental monitoring during project construction and operation.

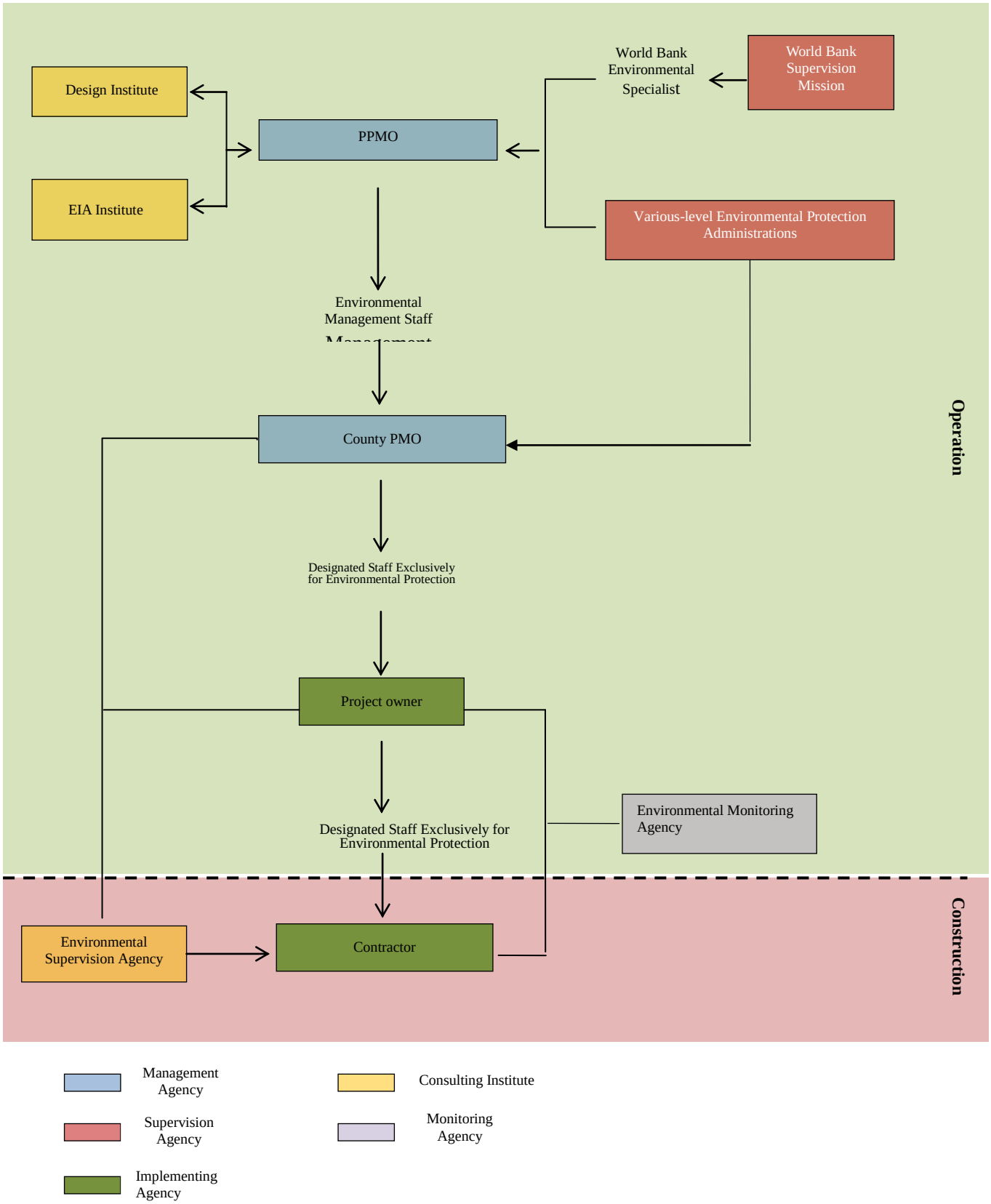


Figure 4-1 Organizational Framework of Environmental Management

Table 4-2 Roles and Responsibilities and Staff Establishment of Agencies under Environmental Management System

Agency	Type	Staff Establishment (No. of People)	Roles and Responsibilities
Various-level Environmental Protection Administrations	Supervision	A few	1. Undertakes whole-process environmental monitoring and management in accordance with law, including approval of Project EIA (or subproject EIAs), environmental monitoring and management during project implementation and operation.
World Bank	Supervision	1	1. Sends supervision missions every year to supervise project implementation; 2. Reviews implementation of the project's Loan Agreement and EMP.
PPMO	Management	1	1. Supervises EMP implementation; 2. Supervises and coordinates enforcement of domestic and World Bank requirements for environmental management; 3. Submits relevant reports to the World Bank every six months; 4. Inspects environmental protection activities of project counties (cities); 5. Coordinates with other relevant authorities to address significant environmental issues; 6. Engages panel of external environmental specialists to review environmental protection activities.
County PMO	Management	1	1. Supervises implementation of sub-project environmental management rules and institutions; 2. Incorporates environmental protection measures in the EMP into construction contracts; 3. Employs supervision engineer and supervises and coordinates its work (including qualification, responsibilities and management); 4. Organizes EMP implementation; 5. Organizes special-subject study or relevant investigations; 6. Properly documents and compiles complaints during construction and operation, clarifies to the public result of addressing complaints and addresses public complaints; 7. Reviews environmental supervision and environmental consulting reports; 8. Submits quarterly reports (statements) to PPMO; 9. Signs off on site checklists submitted by the contractor and supervision engineer, verifies environmentally sensitive issues and archives the checklists; 10. Receives environmental supervision mission (including World Bank supervision mission).
project Owner	implementation	many	1. Supervises implementation of sub-project environmental management rules and institutions; 2. Supervises and coordinates work of supervision engineer (including qualification, responsibilities and management); 3. Organizes special-subject study or relevant

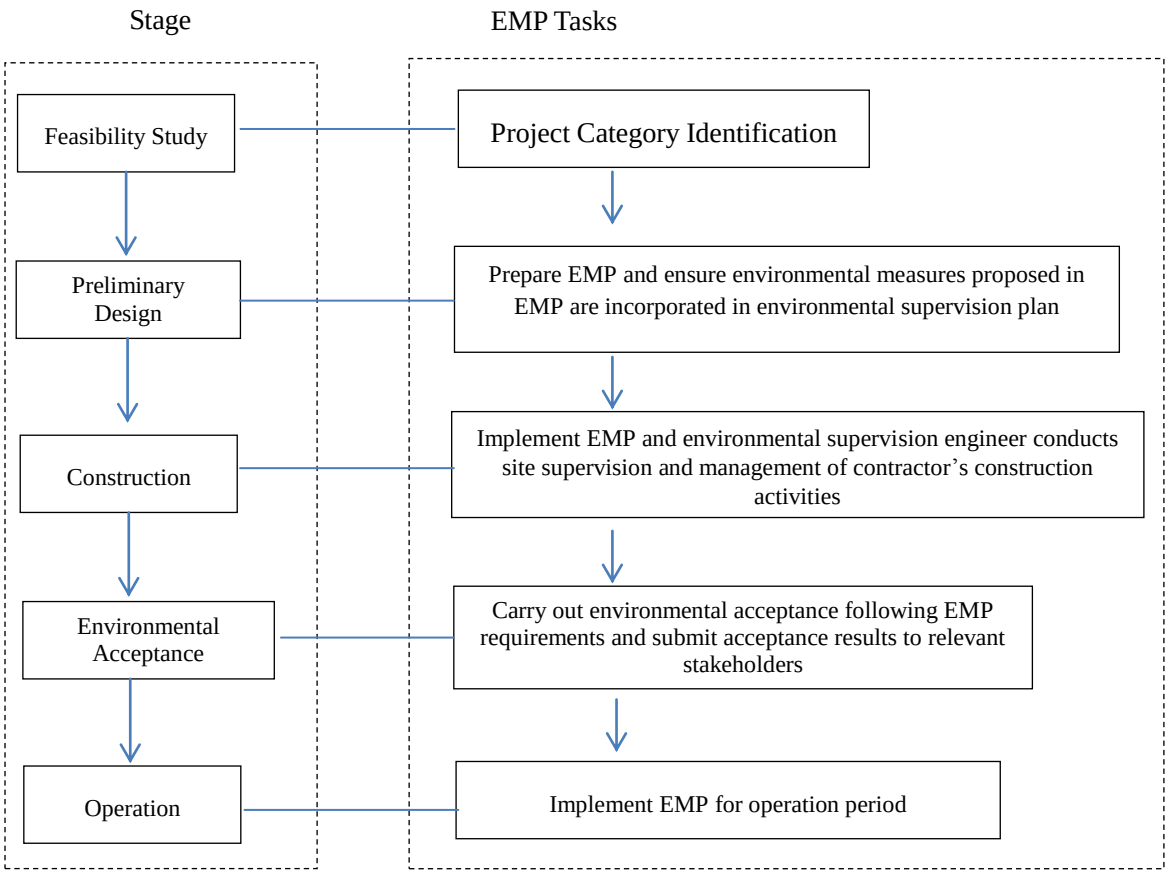
Agency	Type	Staff Establishment (No. of People)	Roles and Responsibilities
			investigations; 4. Properly documents and compiles complaints during construction and operation, clarifies to the public result of addressing complaints and addresses public complaints; 5. Reviews environmental supervision and environmental consulting reports; 6. Submits quarterly reports (statements) to PPMO and county PMO; 7. Signs off on site checklists submitted by the contractor and supervision engineer, verifies environmentally sensitive issues and archives the checklists; 8. Receives environmental supervision mission (including World Bank supervision mission).
EIA Institute	IEA	A few	1. Visits project sites and conducts EIA; 2. Prepares EMP.
Supervision Engineer (also undertakes environmental supervision)	Consulting	1-2	1. Supervision engineer is employed separately by PPMO or county PMO; 2. Supervises and inspects domestic sewage treatment, production wastewater treatment, implementation of soil erosion, waste gas, dust and noise control measures, disposal of production and domestic garbage and epidemic control; 3. Fills out on a regular basis all checklists in the annexes of ECOP; 4. Proposes and follows up on solutions to rectify environmental issues/ problems encountered by the contractor during construction, including issuing rectification notices and checklists and archiving relevant documentation; 5. Submits to county PMO weekly implementation progress reports.
Contractor	Implementation	Many	1. Develops environmental protection measures to be implemented during construction; 2. Accepts supervision and inspection of all aspects of environmental protection by supervision engineer, World Bank and various-level environmental protection administrations; 3. Sets up a feedback mechanism and completes rectification within 3 working days after receiving rectification notice (or within 10 working days when addressing of issues/problems needs coordination by management agencies); 4. Prepares, together with supervision engineer, prior to construction commencement and submits to county PMO a construction site checklist; 5. Submits to county PMO weekly implementation progress reports.
Environmental Monitoring Agency	Monitoring	A few	1. Undertakes environmental monitoring during implementation and operation following environmental monitoring plan, archives and submits to county PMO monitoring reports.

4.2 Environmental Management Tasks at Different Project Stages

As shown in Figure 4-2, environmental management tasks differ in different stages of project implementation.

The most important task in the EMP is to ensure all environmental protection measures proposed are truly effectively implemented, including 1) incorporation of EMP environmental protection measures into design and construction contracts; 2) supervision through environmental engineer over implementation by the contractor of environmental protection measures during construction and review of effectiveness and implementation of environmental protection measures; 3) inspection, reporting and archiving mechanisms in the EMP. Inspection of routine activities is carried out to reflect the timeliness and effectiveness of these activities.

Figure 4-2 Tasks of Environmental Management at Different Project Stages



4.3 Environmental Supervision

4.3.1 Purposes of Supervision

During project implementation, environmental supervision engineer shall follow requirements in environmental protection design, conduct environmental supervision during construction, carry out all-round supervision and inspection of implementation of environmental protection measures by construction units and effectiveness of these

measures, and address and resolve in a timely manner environmental pollution incidents.

4.3.2 Roles and Responsibilities of Environmental Supervision Engineer

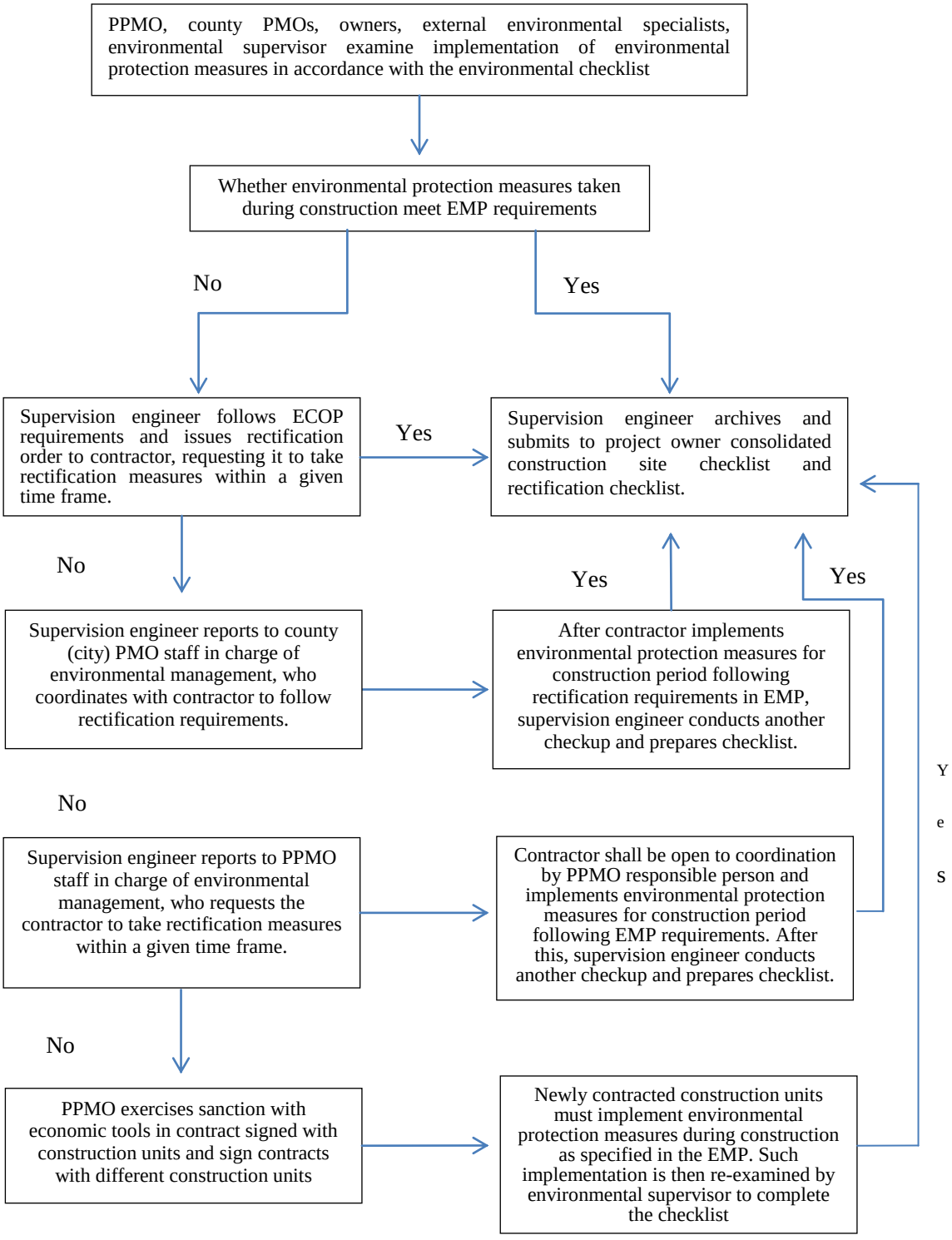
The environmental supervision engineer shall follow national and local governments' guidelines, policies, decrees, laws and regulations on environmental protection and supervise contractors to implement environmental protection-related articles in their contracts. Main roles and responsibilities are to:

(1) prepare environmental supervision plan and develop subjects and items of environmental supervision;
(2) take charge of reviewing environmental protection articles in tendering and bidding documents;
(3) conduct supervision over contractors to prevent and mitigate construction-induced environmental pollution and destruction to farmland and wild flora and fauna, as well as prevent fire;
(4) carry out all-round supervision and inspection of implementation of environmental protection measures by construction units and effectiveness of these measures, building on survey and monitoring data; and address and resolve in a timely manner environmental pollution incidents;
(5) conduct all-round inspection of cleaning and restoration of dump sites and construction "footprints" by construction units, including side slope stability, restoration of construction footprints, afforestation and afforestation rate;
(6) be responsible for implementing environmental supervision, reviewing relevant environmental reporting, and working out requirements for construction management corresponding to results of air quality, ambient air and noise monitoring to minimize adverse environmental impacts of construction; and
(7) Maintain good supervision documentation during daily work, prepare supervision report and participate in completion acceptance.

4.3.3 Procedures for Implementing EMP during Construction by Environmental Supervision Engineer

Environmental supervision is an important component of environmental management and is relatively independent. Therefore, an independent and qualified environmental supervision agency shall be established. In compliance with contract articles and national environmental protection law, regulations and policies, the agency shall supervise, review and evaluate implementation of environmental protection measures by construction units, and timely identify and rectify construction activities in violation of contract articles and national environmental protection requirements. The environmental supervision engineer shall inspect construction site at least once a week, fill out and archive environmental protection checklist, propose plans for addressing relevant environmental issues/problems of construction units with their construction activities and monitor implementation of these plans, and report every six months to environmental chiefs of PMOs and environmental specialist of the World Bank. Procedures for environmental supervision during construction are provided in Figure 4-3.

Figure 4-3 Environmental Supervision during Construction



4.4 Environmental Management Plan and Environmental Impact Mitigation Measures

Details of EMP and mitigation measures are indicated in table 4-3 and the EMP of associated projects are shown in Table 4-4.

Table 4-3 Environmental Management Plan and Environmental Impact Mitigation Measures

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
preliminary preparation							
Tendering and bidding	——	1. Incorporate EMP into tendering and bidding documents; 2. Incorporate EMP into contracts with contractors, environmental supervision engineers and environmental protection contracts so as to ensure the effective implementation of all environmental protection measures.	——	—	—	PPMO, County PMO	——
Before Construction	Social environment	1. Establish special office of land acquisition and formulate land acquisition and resettlement plan. According to relevant national and local policies for land acquisition and demolition, strictly carry out compensation plan for land acquisition; 2. Timely inform the public of information about construction plan, environmental impacts, construction road, interim public traffic lines, etc; 3. If municipal services (including water, electric power, telephone line and bus line, etc.) need to be interrupted due to the construction, notice shall be posted at construction site, public traffic stops, as well as affected areas at least five days in advance. 4. Design optimization: efforts will be made in reducing acquired land area involved in the project in designing stage. Advanced environmental protection measures should be taken to avoid the secondary pollution.	——	—	——	PPMO, County PMO County project owner, design institute, the working group of resettlement plan and social impacts assessment team	PPMO, County Bureau of Land and Resources and Price Bureau

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		5. On the basis of consultation with the affected mass, migrants' living conditions will not decline due to the project construction as provided by relevant policies. 6. Preferential payment policies will be formulated and implemented for the poverty group. 7. Construction period of laying pipelines should be shortened as much as possible to minimize impacts on neighboring shops and households. Compensation may be made if possible. 8. Sewage of all the communities and households in the project area should be connected at the very source. 9. Taking the well-developed water system and abundant water volume in the project area into consideration, drainage project should adapt to local conditions to ensure quality and service life of the project. 10. It is proposed that consultation should be conducted with residents occupying the wetland to facilitate restoring farmland to lakes and improving ecological system in the wetland. 11. The Code of Economic Conduct in the Lake Area will be issued. 12. Scientific forces will be integrated to promote the parallel development of ecological protection and economic development in the Lake Area. 13. Participatory activities					

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		will be carried out. 14. Environmental knowledge and public health education training shall be conducted. 15. Institutional capacity building: it is proposed that we should enhance relevant social and security safeguard training of World Bank projects for project administrators and constructors. 16. A follow-up management mechanism will be set up for the project. 17. It is proposed that residents' inclination of "NIMBY" should be taken into consideration. The sites of waste collection, transfer, and treatment facilities shall not be either too near or too far from residential areas to avoid high cost of waste transportation. The core principle is to conduct more consultation and communication with residents to ensure their recognition of waste treatment project. 18. Due to adopted tax distribution system, financial budget of village and town (township) is very tight. Thus, the project funds should prefer the rural regions to support waste transfer system construction there. Meanwhile, the local government should not be responsible for too much project expenditure. 19. Technology plays a crucial role in improving the efficiency of waste treatment. Scientific					

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		treatment of waste should be conducted in terms of technology either in simple garbage landfill sites or in new garbage treatment plants, to prevent leakage and pollution.					
Land Occupation	Land Acquisition and Resettlement	1. In the planning stage, when optimized selection for schemes was conducted, much consideration was put into the impact of project construction on the local socioeconomic, which was set as a key factor in the optimized selection for schemes; 2. Design was optimized. To reduce the demolition immigrants, existing national and local roads were used to connect planned construction area. The design was optimized to occupy wasteland and state-owned land and reduce the occupancy of arable land.	— —	—	Included in resettlement cost	Design institute and County Project Management Office	PPMO and County Bureau of Land and Resources
Waste collection and transportation design	Site Selection	1. They shall comply with urban and rural environmental sanitation planning; 2. Garbage transfer stations shall get close to main roads for the purpose of easy entry and exit of waste transporters; 3. Garbage transfer stations shall be set in places where there are complete water and power facilities and sewage discharge pipe networks; 4. Garbage transfer stations shall not be set in places that may pose a threat traffic safety or easily cause traffic congestion.	— —	— —	——	design institutes	PPMO, County PMO, County Sanitation authority, County EPB

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
	structure	1. The site selection of garbage transfer stations shall comply with the principles of high efficiency, energy conservation, environmental protection, safety and sanitation; 2. After entry into garbage transfer stations, waste shall be directly dumped into waste containers lest waste should be dumped on the ground; 3. The appearance and color of Garbage transfer stations shall be matched with their surroundings; 4. The architecture of Garbage Collection Stations shall ensure the effective control of the waste collection operation over pollutants; 5. The wastewater collection system shall meet such requirements as corrosion resistance and leakage prevention;	— —	— —	—		
Ecological Restoration of Zoujiazui Water System	Invasion of foreign species	In plants design, local species shall be selected and introduction of foreign species is prohibited.	— —	— —	—	design institutes	PPMO, County PMO, County EPB, County Forestry Bureau
Construction period							

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
Land occupation by project	Resettlement of inhabitant	1. Establish special office of land acquisition and formulate land acquisition and resettlement plan. According to relevant national and local policies for land acquisition and demolition, strictly carry out compensation plan for land acquisition; 2. Monetary indemnity shall be acquired according to compensation standard and the amount of lost land. Land compensation fees and resettlement subsidies shall be offered to the impacted people. The compensated can continue to pursue their former occupation after they get compensation fees, or use the money to develop individual operation; 3. During the construction period, give priority to arranging work for the emigrant, which will bring the impacted people the cash earnings; 4. If there is labor-exporting project within the impacted county, work will firstly be arranged to the impacted people; 5. Go through the approval procedures of excavating urban roads if the construction temporarily occupies the national road. Pay the excavation and restoration fee (which is included into the project cost). After the construction, project institute shall recover the road according to the former standard and scale; 6. Pay the compensation fee for green crops when the construction temporarily occupies farmland. During the construction, excavate in sections, which has a short construction period. It helps to timely clean	— —	—	Listed in construction cost	County PMO	PPMO, County Land Department, land-acquisition - involved villagers' committee

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
Pipeline sub-project	Common impacts caused by construction	Adopt measures in *General Environmental Management Regulations on Construction Activities*(see annex 1)	TSP, Noise	See details in monitoring plan	50	contractor	Environmental supervision agency, PPMO, County PMO, County EPB, Office of River head, Duchang County Construction Bureau
	Service interruption (including water, electricity, etc.)	1. Inform the public of service interruption (including of water, electricity, fuel gas, and public traffic lines) at least five days ahead by putting up a notification at project site, public traffic stops, as well as affected residents and enterprises; 2. On the basis of proper construction organization, ensure construction progress, shorten construction period as much as possible, guarantee safe construction and complete the construction as quickly as possible so as to restore municipal services.	——	——	2	contractor	Environmental supervision agency, PPMO, County PMO, County EPB, Office of River head, Duchang County Construction Bureau
	Obstruction to traffic and traffic safety, and Impacts on business of stores along the	1. Before construction, contractors shall communicate with traffic department and road administration department to make a traffic management plan, provide the information on construction and engineering schedule, traffic detours and interim public traffic lines, and relocation, etc. on construction nameplate;	——	——	28	contractor	Environmental supervision agency, PPMO, County PMO, County EPB, Office of River head, Duchang County

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
	road	2. Warning board shall be placed at the entrance of each construction section, each crossroad, each road turn, each change of traffic lane, and each entrance of traffic aisle to inform people of entrance into construction area, and of traffic restrictions such as speed limit, height limit, etc. 3. In principle, construction is banned between 22:00 and 06:00. Construction activities that must be carried out at night shall be approved by relevant local environmental protection department and negotiation in advance with local residents should be achieved. In addition, noise reduction measures shall be implemented (such as installing sound barriers) to minimize the impact of construction noise on local residents; 4. In order to reduce traffic congestion, except in special circumstances, vehicles transporting earthwork shall avoid urban rush hour and run at night. Operation time of other construction vehicles shall be arranged properly in accordance with elements affecting traffic flow such as season, weather, holiday and emergency, etc; 5. For engineering with construction period of more than 30 days, the boundary of construction site shall be enclosed and have color plate enclosure, measures shall be adopted according to local					Construction Bureau

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		conditions; the enclosure shall be at equal to or more than 2.5m/ 3m at construction site of common areas/ key areas respectively; 6. The enclosure shall be set up straight, orderly, clean, beautiful, and damage-free, with the appearance harmonious with surrounding environment; 7. The enclosure constructed on road shall be within 5m range of visibility at crossroad; straight and rigid enclosure of metal mesh panel shall be set up without blocking the visual line of drivers and pedestrian, and in the precondition of guaranteeing traffic safety; no article shall be allowed to stack within 5m range of visibility; 8. In case the enclosure is equal to or less than 5m from residence, or the construction point is equal to or less than 15m from sensitive buildings like residence, hospital and school, etc., proper measures shall be taken to lower the noise, such as raising the enclosure, etc., the enclosure in sensitive areas shall be up to 3m high; and the scope of 5m outside the enclosure shall be kept clean; 9. It is forbidden to stack materials, tools, and earthwork, etc. within the scope of 1m inside the enclosure; 10. It is forbidden to use the enclosure as retaining wall or the support of other					

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		facilities and equipment; 11. When construction site is neighboring to access to residential areas, try to minimize impacts on travel of vehicles and nearby residents. One-way construction shall be adopted, and completed as quickly as possible, and the construction site shall be covered timely by earth. If the work cannot be completed on the very day, steel plates shall be used to cover ditches so as to guarantee the safe passing of pedestrian and vehicles; 12. Employ full-time "traffic director", and establish working team to ensure traffic safety and civilized construction, guarantee the implementation of traffic support measures, manage and maintain the measures during construction period, direct the traffic on the construction section, and assist in solving the traffic problems during construction period; 13. During construction period, vehicle and personnel in and out of the construction site shall observe traffic rules strictly and obey the directions of traffic administrations, accept inspection and examination of traffic administrations and construction bureau. Once problems affecting traffic are found, rectification shall be conducted immediately; 14. During construction period, safe and civilized construction shall be					

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		guaranteed, and measures to prevent disturbing residents, in particular, dust pollution control, noise pollution control, mud and earthwork management measures shall be implemented effectively. The construction unit shall communicate in advance with enterprises, institutions and residential areas along the construction site and try to win their understanding and support, so as to guarantee the smooth progress of construction; 15. Incorporate supporting traffic measures into construction organization design. Prior to construction, take the initiative to contact traffic administrations, introduce and report the project profiles, construction scheme, total plane layout and materials used, and earthwork transportation plan. Ask traffic administrations to give support and guidance to improve the transportation plan and formulate detailed rules for the implementation; 16. In case hidden well cover is opened or raised for construction on urban road maintained open to traffic, folding construction curb fender shall be adopted at the boundary of construction area; 17. It is forbidden to use red and white flag, safety isolation rope, or other materials to replace the construction curb fender; 18. The setting of					

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		construction curb fender surely makes the long-side section of channel steel on the foundation face towards construction area; in case construction passageway is set up between construction curb fender and construction area, the passageway shall be equal to or more than 0.6m wide; 19. In case the external surface of buildings (structures) is painted, refurbished, or cleaned, construction curb fender shall be used as fully-closed enclosure at the boundary of construction area, and various mechanical equipment, tools, and materials shall be placed within the scope of enclosure; 20. Never remove construction curb fender before the road construction takes interim passing measures or the engineering is completed; 21. In key areas, road pipeline shall be constructed by means of "excavating a section, paving a section, and renovating a section", and the whole pipeline shall never be excavated simultaneously; 22. For construction occupying urban road, the construction unit shall observe relevant regulations of public security, traffic department, and road administration department, handle relevant examination and approval formalities, and					

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		set up interim road according to specifications; 23. The construction unit shall observe the license regulations on construction period strictly, and never execute construction by occupying road or exceeding the licensed construction period; 24. Interim road shall be set up according to regulations for construction occupying urban road and impacting the travel of vehicles and pedestrian; In particular, interim road shall be set up near hospitals to facilitate the safe entry and exit of ambulance; if interim road is set up in the construction section neighboring kindergarten or school, the construction site shall be closed, and infants and children are forbidden to enter the construction area; 25. For construction occupying footway, the construction unit shall build up solid, flat and continuous pedestrian shortcut with safety edge enclosure at the access side neighboring to business stores,, enterprises, schools, office buildings, hospitals, nursing homes, kindergartens and residence, etc., in order to guarantee the safe passing of the pedestrian; 26. The construction unit shall adopt sheet flattening method for construction in case the ditch or pipeline slot is excavated on urban road which is used as traffic road, and the work cannot be completed on the					

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		very day; 27. The supporting and consolidation scheme shall pass safety argumentation, and shall be reported to construction bureau for approval; the steel plate covering road shall be at least equal to or more than 0.03m thick; the edge of the steel plate and metal slope rack adopted shall be burnished to remove sharp edges and burrs, in order to ensure the safety of personnel and vehicles; 28. Metal shape shall be adopted for supporting and consolidating the lower end of covering steel plate in case the excavation width of ditch (pit) is equal to or more than 0.8m.					
Waste collection and transportation subproject	Common impacts caused by construction	Adopt measures in *General Environmental Management Regulations on Construction Activities*(see annex 1)	TSP noise	See details in monitoring plan	30	contractor	Environmental supervision agency, PPMO, County PMO, County EPB, Office of River head, Duchang County Construction Bureau
Water system restoration	Common impacts caused by construction	Adopt measures in *General Environmental Management Regulations on Construction Activities*(see annex 1)	TSP noise	See details in monitoring plan	20	contractor	Environmental supervision agency, PPMO, County PMO, County Water Bureau, County EPB,
	Impacts on water environ	1. Channel dredging shall be carried out in dry seasons and construction	—	—	20		

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
	ment and ecology, and sludge	time shall be shortened as much as possible to reduce disturbance to water bodies; 2. During dry season, lakes shall be dried, cofferdam set up, digger used for dredging. Bottom silt shall be air-dried and dug by long-arm excavator block by block; 3. In using the autochthonous lake as the storage yard, the cofferdam made of soil in woven bags or grind debris can be built in the enclosed swale formed during dry season. The section form of the cofferdam is usually sloping and the inner side of the cofferdam shall be laid with impermeable materials. 4. Far from the mud outlets, water outlets should be built in the corner of the storage yard to make full use of the space to store mud with a comprehensive consideration of the mud-bearing capacity, area, geometric shape and drainage channels of the storage yard to meet the residual water monitoring requirements and requirements of emergency treatment for residual water that fails to meet the emission standards.. 5. Emergency treatment facilities of residual water include accidental water storage pool, agent-feeding facilities for emergencies, etc. If possible, an emergent accidental water storage pool of different volumes should be built					County Forestry Bureau, Office of River head, Duchang County Construction Bureau

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		based on the specific conditions of the construction site to store residual of 2 to 4 hours. The pool should have some impermeable measures to store and treat accidental or emergent residual water that fails to meet the emission standards. 7. The storage yard should be covered with tarpaulin to avoid rain wash. 8. Deodorants should be sprayed at regular intervals to dry sludge to avoid the impacts of ambient air. 9. Cleared garbage and silt shall be removed in a timely manner so as to shorten temporary land occupation period as much as possible; 10. Bottom sludge is directly transported to wasteland of Guling mountain, Wangdun village by closed trunks, and used on the wasteland surface. Fences and warning signs should be set up to prevent the public from entering into the area. 11. For the sake of reducing water and soil erosion, fences should be set up around the dumping area on the wasteland of Guling mountain, Wangdun village. See details in the water conservation measures. 12. After the natural drying in the dumping area on the wasteland of Guling mountain, Wangdun village, the silt should be afforested. 13. Pollutants from the sludge-dredged water body should be collected in					

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		waste collection boxes and cleared and transported by the environment and sanitation department to Yugan waste landfill for further treatment.					
	Invasion of foreign species	Following strictly the design, temporarily occupied land shall be reclaimed or vegetation restored. Local species shall be selected and introduction of foreign species is prohibited.	—	—	—		
Monitoring premises	Common impacts caused by construction	Adopt measures in *General Environmental Management Regulations on Construction Activities*(see annex 1)	TSP noise	See details in monitoring plan	15	contractor	Environmental supervision agency, PPMO, County PMO, County EPB, Office of River head, Duchang County Construction Bureau

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
Land Occupation	Land Acquisition and Resettlement	1. Through basic data collection, in-depth analysis is carried out of current situation and future development of local society and economy so as to formulate a pragmatic and feasible migrant action plan in accordance with local conditions and to ensure no loss caused by the project construction for those affected by the project. 2. Public participation is encouraged. The project accepts public supervision. 3. Internal and external monitoring is strengthened by establishing effective and open mechanism and channels of feedback to shorten information processing period and to ensure that various problems can be addressed in time during project construction. 4. The project site is arranged in a scientific way by occupying as less land as possible. When construction is completed, temporarily occupied area will be recovered as provided by its original land use type. 5. Temporary storage area of earthwork is properly arranged so that it is far from environmentally sensitive points such as residential quarters, schools and the like.				County PMO, project owner and construction institutes	PPMO and County Bureau of Land and Resources

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
Project construction	Social Environment	1. The project will provide job opportunities for migrants, urban and rural poverty households and women, enabling them to participate in the project construction. 2. Security and facility maintenance during construction: it is proposed that the project owner and construction institutes arrange the construction procedures after fully considering the objective demands and practices of local residents' life and work during construction.	/	/	/	County PMO, project owner and construction institutes	PPMO and County Bureau of Land and Resources
Operation period							
pipeline construction	Pipeline leakage causes water pollution	1. Pipeline shall be dredged timely and damaged pipeline shall be replaced to prevent the running, spilling, leakage of wastewater from polluting nearby water body and underground water.	— —	— —	Listed in construction cost	Duchang County Construction Bureau	PPMO, County PMO, County Water Bureau, County EPB
	Industrial park wastewater accident release causes damages to the normal operation of wastewater treatment plants	1. The water quality in the drainage outlets of industrial parks shall be sampled and monitored at regular intervals; 2. In case of water quality abnormality, the causes shall be found from the main pollutants in the water catchment system. Relevant enterprises shall take emergency responses to control the release of microorganism and toxic matters.	pH, suspended matter, COD, BOD_5, NH_3-N, petroleum, etc.	This project has set water environment monitoring and reporting sites. r	———-	Duchang County EPB	PPMO, County PMO, County Water Bureau,

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
	Risks prevention	1. Before pulling out the inspection shaft, a warning sign shall be set up in advance, barriers shall be removed to guarantee smooth traffic; and non-operation personnel shall be evacuated before opening the cover; 2. The cover of the inspection shaft shall not be pried by steel chisel and anvil in order to avoid spark and cause burns and explosion; 3. Using electric machine to pump and drain sewerage, and check whether electric machine, power supply, line and knife switch have leakage or not to avoid electric shock; 4. Operating personnel should use natural ventilation to remove harmful gases such as carbon monoxide, carbon dioxide, hydrogen sulfide, methane before dredging, and use instrument to detect, and conduct pit operation after confirming harmless and safe. Operators under pit shall wear anti-static clothing, and shall not wear hard metal objects such as a key; 5. Operators above the pit shall hold seat belts in hands and contact with under-pit staff at any time; 6. After finishing clearing work, ditch cover shall be recovered and repaired in a timely manner; and warning signs or protection shall be set up in case of failing to finish the very day.	— —	— —	Listed in construction cost	Duchang County Construction Bureau	PPMO, County PMO, County Water Bureau, County EPB

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
	Maintenance and management	1. The inspection shaft shall be cleared and treated at regular intervals, checked frequently and repaired timely to ensure that wastewater interception pipe and inspection shaft are kept in good condition; 2. Garbage, sewage and sundries shall not be poured into inspection shaft, and debris shall not be piled on the inspection shaft, and blow-off line shall not be rebuilt without permission; 3. The cover plate of inspection shaft shall be closely covered to prevent the occurrence of stink and accident; 4. Fire use shall be prohibited nearby the inspection shaft; 5. Sludge taken out of the inspection shaft shall be transported to the professional treatment plant designated by municipal sanitation competent department, and documented properly to avoid cross contamination.	— —	— —	——		
Waste collection and transportation subproject	Associated project	Domestic waste comprehensive treatment plant of Duchang County shall supply environmental acceptance reply and monitoring report.	— —	— —	——	Owner of Domestic waste comprehensive treatment plant of Duchang County	PPMO, County PMO, County EPB
	Leachate, flushing wastewater, domestic sewage	1. Garbage trucks shall all be closed type; 2. Waste transfer station shall set up impermeable collection pool. Domestic waste water, flushing wastewater, and leachate	SS, COD, BOD_5, NH_3-N	2 rounds/ year	30	Duchang County Construction Bureau	

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		generated in waste collection station shall be collected in the pool and after precipitation sucked by suction-type sewer scavenger and transported to domestic sewage treatment plant of Duchang county.					
	Odor	1. Waste transfer stations employ BENTAX high-energy reactive oxygen ion to dispel odor and use spray to dispose waste gases; 2.Regularly clean the facilities and floor of the garbage transfer stations to reduce odor; 3. Vehicles and containers capable of minimizing air emission during the process of waste reception, unloading, treatment and storage shall be selected; 4. Garbage collection stations and nearby roads shall be frequently cleaned, and sprinkled with water to control dust when necessary; 5. All of biological waste shall be rapidly cleaned and disposed on a daily basis; 6. Deodorant and bactericidal plants shall be raised nearby; 7. Garbage truck shall be sealed to prevent garbage from leaking or spilling; 8. Make and improve the transporting route of garbage truck so as to prevent vehicle exhaust from affecting sensitive sites on both sides of the road, such as residential area, school, and hospital.	TSP, NH_3, H_2S	2 rounds /year	50		
	Acoustic Environ	1. Enhance the management and	Leq dB	2 rou	2		

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
	ment	maintenance of garbage trucks so as to lessen vehicle accident rate; 2. Workers who are responsible for waste transportation should receive occupational training and hold related certificates; 3. Make and improve the transporting route of garbage truck so as to prevent traffic noise from affecting sensitive sites on both sides of the road, such as residential area, school, and hospital; 4. Select proper location, employ low-noise equipment, strengthen maintenance of equipment and adopt measures like vibration reduction and building sound insulation.	（A）	nds/year			
	Domestic waste	Collected domestic waste shall be sent directly into compression room and then transported to waste treatment plant.	——	——	—		
	Social environment	1. Garbage collection stations shall make safe operation procedures for operation and maintenance, and operate according to the operation procedures; 2. Garbage collection stations shall keep a clean look, regularly clean collection containers; adopt biological methods, such as spraying biological bacteria, and light and liquid disinfection system to eliminate bacteria and mosquitoes in a systematic way; Sweep and wash equipment and station floor regularly for disinfection and sterilization, ensure that the surface is clean, without dirt and leachate.	——	——	3		

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		Waste transfer stations shall spray insecticide in and out to kill mosquitoes; 3. Administrative staff and operators of garbage collection stations shall receive the pre-job training to grasp technical process and technical requirements of Garbage Collection Stations as well as major technical indicators and operation and management requirements of relevant facilities and equipment; 4. Garbage Collection Stations shall be opened in strict accordance with the schedule time; 5. Operators shall randomly inspect waste content, and any hazardous waste and forbidden object are prohibited from entering the stations; 6. Collected materials and organic waste are classified for the purpose of easy collection and compost; 7.Messes are strictly prohibited from being piled up in Garbage collection stations;					
	Impacts on occupational health	1. Any operator shall wear corresponding protection supplies such as protective clothing, gloves, respiratory masks and mouth shads before the work as required. All waste transport workers shall be provided with anti-skid shoes, and all workers shall be provided with hard ground safety shoes. Safe production management staff shall inspect the employment of labor protection supplies at any time. Any person who fails to wear labor protection	— —	— —	3		

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
		supplies shall not start work; 2. Meal, smoking and drinking are prohibited from nearby areas of garbage collection stations; 3. Workers shall be provided with immunization and health monitoring (such as hepatitis B and tetanus); 4. Garbage collection stations shall be kept clean; 5. Medical treatment is required for any incised and scratch wound. The wound shall be wrapped up to avoid contacting waste; 6. Garbage collection stations shall be completely enclosed to avoid livestock or wildlife from contacting waste. Otherwise, zoonosis may spread between livestock and human and affect wildlife.					
Water system restoration	invasion of foreign species	1. Quantity and composition of organism species in the subproject areas shall be surveyed and monitored on a regular basis. Upon finding out evident increases in the quantity of a species, identification shall be conducted in a timely manner to judge whether it is a foreign species. If this species has potential invasion risks or has invaded, clearing, curbing or control measures shall be taken as soon as possible to reduce its negative impacts.	— —	— —	2	Duchang County Construction Bureau	PPMO, County PMO, County EPB
Monitoring premises	Waste acid (HW34), waste alkali（HW35	1. Hazardous waste shall be stored separately in impermeable and leakage proof sealed containers with clear color signs; 2. Hazardous waste	— —	— —	9	Duchang County EPB	PPMO, County PMO, County EPB

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
	), and waste organic solvent（HW42）	containers shall be stored in an impermeable and leakage proof temporary storage room; 3. Hazardous waste shall be collected, transported and treated by organizations with permit for operation of hazardous wastes and the treatment fee shall be paid; 4. Permit for hazardous waste transfer and duplicate forms for transfer of hazardous waste shall be implemented; 5. Abandoning and littering hazardous waste shall be prohibited during transportation; Dumping and piling hazardous waste or mixing hazardous waste into domestic sewage or domestic garbage shall be prohibited; No one shall collect, store, transport or treat hazardous waste without an operation permit or in violation of the rules on permit for operation of hazardous wastes.					
	Domestic waste	Collected domestic waste shall be sent directly into compression room and then transported to waste treatment plant.	——	——	1		

Sub-project/ activities	Potential impact	Mitigation Measures	Monitoring Item	Monitoring Frequency	Cost (10,000 yuan)	Implementing Agency	Supervision Agency
Other non-engineering measures	Positive impacts	1. River and lake water environment patrol monitoring; 2. Strengthen water environment policy and planning research; 3. Improve water environment system; 4. Strengthen the maintenance management and regular refits of facilities, ensure the normal operation of the system; 5. Encourage public to participate in the supervision of environment protection; 6. Publicize water environment information through internet and outdoor LED display.	— —	— —	———	Duchang County EPB	PPMO, County PMO

The EMP of units to be expanded or to be environmentally checked and accepted in the associated projects is shown in the table below.

Table 4-4 EMP of associated projects

Project name	**Construction situation**	**Construction overview**	**EMP**	**Estimated cost (10,000 yuan)**	**Implementation agency**	**Supervision agency**
Duchang County Sewage Treatment Plant	To be expanded	The treatment capacity is 20,000t/d now. It is proposed to be expanded to 40,000t/d in the 2nd phrase and 80,000t/d in the long	Investigate and report its progress every half year	——	Duchang County PMO and project ower	PPMO

Project name	Construction situation	Construction overview	EMP	Estimated cost (10,000 yuan)	Implementation agency	Supervision agency
		term.				
Duchang County Comprehensive Garbage Treatment Plant	To be checked and accepted	It is still on trial production and will be checked and accepted in September 2016.	After being checked and accepted, it needs to provide a Environmental Acceptance Monitoring Report	——		
Jiujiang Municipal No.2 Garbage Treatment Plant	To be expanded	It is proposed to carry out the 2nd phrase of the project and will start working in 2016 and put into use in 2017.	Investigate and report its progress every half year			

5 Environmental Monitoring Plan

5.1 Objectives of Monitoring

Environmental monitoring is conducted during the construction period and the operation period; the objectives are to 1) have an all-round and timely understanding of the pollution of the proposed project, 2) know the degree and scope of impacts of the project on local environment and the dynamic environmental quality, 3) report information timely to EPB and provide scientific basis for environment management of the project.

5.2 Implementation of Monitoring

Based on the environmental impact evaluation results, sensitive spots with possible obvious pollution are chosen as monitoring spots. Considering the pollution in the construction and operation period, surface water environment, ambient air, acoustic environment which are heavily influenced by the environment are selected as

medium for monitoring. Monitoring items are thus decided by pollution features in engineering analysis. Monitoring analysis methods in *Technical Specifications for Environmental Monitoring* of the Ministry of Environmental Protection are used and evaluation standards follow the relevant standards in EIA. Environmental monitoring agencies, county PMO and project owners respectively take charge of monitoring, construction, and operation. And various-level environmental protection administrations are the supervisors.

5.3 Environmental Monitoring Plan

The environmental monitoring plan of Duchang sub-project is shown in Table 5-1.

Table 5-1 Environmental Monitoring Plan of Duchang Sub-project

Monitoring Period	Medium	Location and Number of Monitoring Points	Item	Frequency	Unit Cost (10,000 yuan/round)	Annual Cost (10,000 yuan/year)	Stage Cost (10,000 yuan/year)	Monitoring Agency	Responsible Agency	Supervision Agency
Construction period (5 years)	Ambient air	① Two monitoring points: Duchang No.3 Elementary School, Duchang Maternity and Child Health Care Hospital	TSP	2 rounds/year, 1 day/round, once/day	0.25	1	5	Qualified agency	Duchang County Construction Bureau, Office of River Head	Duchang County EPB
		② Two odor monitoring points: Bajiazui Village and Siguayan Village	NH_3、H_2S	2 rounds/year, 1 day/round, once/day	0.25	1	0.5 (1 year)			
	noise	Four monitoring points: Duchang Experimental Elementary School, Duchang No.3 Elementary School, Duchang Maternity and Child Health Care Hospital, Qinjiafan Elementary School	LeqdB（A）	2 rounds/year, 1 day/round, twice/day (once at daytime and nighttime, respectively)	0.04	0.32	1.6			
	Surface water	① One monitoring point at Zoujiazui Lake	Water temperature, pH, DO, COD, BOD, permanganate index, NH3-N, total phosphorus, total nitrogen	2 rounds/year, 1 day/round, once/day	0.25	0.5	2.5			

Monitoring Period	Medium	Location and Number of Monitoring Points	Item	Frequency	Unit Cost (10,000 yuan/ round)	Annual Cost (10,000 yuan/ year)	Stage Cost (10,000 yuan / year)	Monitoring Agency	Responsible Agency	Supervision Agency
		② One residual water outlet	Water volume, suspended matter, turbidity, permanganate index , total phosphorus, total nitrogen, heavy metal, etc.	2 rounds/year, 1 day/round, once/day	0.25	0.5	0.5 (1 year)			
	Bottom sludge	Two sites	Water content, organic matter, heavy metal, etc.	1 round/year, 1 day/round, once/day	0.5	1	1 (1 year)			
	Subtotal (10,000 yuan)						11.1			
Operation period (3 years)	Ambient air	3 monitoring points: one at Bachuanwu of Beishan Town, one at Yanggang Villiage of Wangdun Township, the last one in the residential area nearest to Garbage Transfer Station of Matang Villiage in Dashu Township	TSP, H2S, NH3	2 rounds/year, 1 day/round, once/day	0.5	3	9		Duchang County Construction Bureau	Duchang County EPB
	water quality	3 monitoring points: one at Bachuanwu of Beishan Town, one at Yanggang Villiage of Wangdun Township, the last one in the sewage collecting pool of Garbage Transfer Station in Matang Villiage of Dashu Township	COD, BOD_5, SS, NH_3-N	2 rounds/year, 1 day/round, once/day	0.5	3	9			

Monitoring Period	Medium	Location and Number of Monitoring Points	Item	Frequency	Unit Cost (10,000 yuan/ round)	Annual Cost (10,000 yuan/ year)	Stage Cost (10,000 yuan/ year)	Monitoring Agency	Responsible Agency	Supervision Agency
		9 monitoring points: 2 at Automatic Water environment monitoring points for river cross sections , 7 at Automatic monitoring and reporting sites	Water temperature, pH, DO, COD, BOD_5, permanganate index, NH_3-N, total phosphorus, total nitrogen, chlorophyll a, etc.	Online monitoring	—	—	—			
	noise	3 monitoring points: Beishan Township, Wandun Township and boundary of waste transportation station, Dashu Township	LeqdB（A）	2 rounds/year, 1 day/round, twice/day (once at daytime and nighttime, respectively)	0.04	0.24	0.72			
	Subtotal (10,000 yuan)						14.22			
Total (10,000 yuan)							25.32			

The environmental monitoring plan of associated project is shown in Table 5-2.

Table 5-2 Environmental Monitoring Plan of Associated Project

Name of associated project	medium	Location and Number of Monitoring Points	Item	frequency	Unit Cost (10,000 /round)	Annual Cost (10,000 yuan/ year)	3-year Cost (10,000 yuan/ year)	Monitoring Agency	Responsible Agency	Supervision Agency
Duchang Town Wastewater Treatment Plant	Water quality	2 monitoring points: 1 at the inlet, 1 at the outlet	pH, suspended matter, COD, BOD_5, NH_3-N, petroleum, total	2 rounds/ year, 1 day/round, once/day	—	—	—	Qualified agency	Owner of associated project	EPB of Duchang county

			nitrogen, total phosphorus, permanganate index							
	odor	5 monitoring points at four boundaries of the plant and the nearest residential area	NH_3, H_2S	2 rounds/ year, 1 day/round, once/day	—	—	—			
	sludge	Transported sludge	Heavy metals (As, Hg, Pb, Cr, Cu) and water content	2 rounds/ year, 1 day/round, once/day	—	—	—			
Duchang County domestic waste comprehensive treatment plant	odor	5 monitoring points at four boundaries of the plant and the nearest residential area	NH_3, H_2S	2 rounds/ year, 1 day/round, once/day	—	—	—			
	underground water quality	2 monitoring points at upstream and downstream of the plant	pH, suspended matter, COD, BOD_5, NH_3-N, petroleum, total nitrogen, total phosphorus, permanganate index	2 rounds/ year, 1 day/round, once/day	—	—	—			
	Water quality	2 monitoring points at inlet and outlet of wastewater treatment station	pH, suspended matter, COD, BOD_5, NH_3-N, petroleum, total nitrogen, total phosphorus, permanganate index	2 rounds/ year, 1 day/round, once/day	—	—	—			

	odor	5 monitoring points at four boundaries of the plant and the nearest residential area	NH_3, H_2S	2 rounds/ year, 1 day/round, once/day						
Jiujiang Municipal No.2 Garbage Landfill Plant	underground water quality	2 monitoring points at upstream and downstream of the plant	pH, suspended matter, COD, BOD_5, NH_3-N, petroleum, total nitrogen, total phosphorus, permanganate index	2 rounds/ year, 1 day/round, once/day						
	Water quality	2 monitoring points at inlet and outlet of wastewater treatment station	pH, suspended matter, COD, BOD_5, NH_3-N, petroleum, total nitrogen, total phosphorus, permanganate index	2 rounds/ year, 1 day/round, once/day						

Note: The monitoring cost of associated project is covered by associated project owners, therefore, is not included in the monitoring cost of this project.

6 Personnel Training

6.1 Objectives of Training

Objectives of environmental management training are to ensure smooth and effective implementation of environmental management activities, enable relevant staff to familiarize themselves with contents and procedures of environmental management, enhance capacity of environmental management staff, and ensure effective implementation of environmental protection measures. Environmental capacity building is mainly targeted at environmental managers and environmental supervision engineers and training for them is part of the project's technical support. During project implementation, training is also provided to contractors and construction workers. Before construction is initiated, all construction units, operation units and construction supervision engineers are required to participate in compulsory training on environment, health and safety.

6.2 Training and Training Participants

The training is organized by PPMO for PMO environmental managers, project environmental management coordinators and supervision engineers before and during the construction of the project. The courses are taught by environmental technical experts who are invited environmental protection specialists from universities and scientific research institutes, environmental protection designer of design institute and experts from EIA institute and supervision agencies.

The participants are all staff from provincial, municipal and county PMOs, all staff of the owner and environmental supervision staff, representatives from environmental monitoring agencies, and representatives from key contractors

6.3 Training Contents

1) World Bank environmental safeguard policy, domestic environmental protection laws and regulations, and knowledge about and application of environmental standards;
2) Environmental management models and environmental articles in the Loan Agreement for the project;
3) EMP for the project;
4) Environmental management regulations for the project;
5) Roles and responsibilities of and relationships among environmental management staff, environmental supervision staff and contractors;
6) Preparation of environmental management report, environmental supervision report, environmental monitoring report and contractor's monthly report.

6.4 Training Program

Funding for training during JPESTP implementation would be incorporated into the project budget and funding for training during operation would be included in the O&M cost. Capacity building and training program is summarized in Table 6-1.

Table 6-1 Capacity Building and Training Program

Subject	Participant	Contents	Times	Day/ Time	No. of Participants/Times	Budget (10,000 yuan)
Construction Period						
Environmental protection laws, regulations and policies	County (City) PMOs, project owners, construction units	I. Environmental protection laws and regulations	1	1	3	2
		II. Environmental policies and plans	1	1	3	
		III. Environmental management at the World Bank	1	1	3	
EMP implementation	Construction units , project owner	I. Roles and responsibilities for environmental protection	1	0.5	4	2

Subject	Participant	Contents	Times	Day/ Time	No. of Participants/Times	Budget (10,000 yuan)
		during construction				
		II. Main tasks of environmental protection during construction	1	0.5	4	
		III. Main contents of environmental protection during construction	3	0.5	4	
		IV. EMP (including ECOP)	2	0.5	4	
		V. Improvement or amendment of EMP	1	0.5	4	
		VI. Internal monitoring methods, data collection and processing , etc.	1	0.5	4	
Subtotal during construction						**4**
Operation Period						
Environmental monitoring, inspection and reporting	Project owner	Inspection of environmental protection facilities, ecological restoration and environmental quality monitoring and report preparation	2	1	2	2
Environmental protection facilities and measures	Project owner	I. Rules and specifications for ensuring environmental safety	2	1	2	2
		II. Emergency preparedness plan	2	1	2	
Subtotal during construction						**4**
Grand Total						**8**

7 Environmental Management Plan Cost Estimation

It is estimated that the total cost of the EMP of this project is about 2.9832 million yuan.

Table 7-1 List of the Cost of Project EMP (unit: 10,000 yuan)

Cost of Environmental Management	Cost of Environmental Monitoring		Training fee	Total cost of EMP implementation
	Construction period	Operation period		
265	11.1	14.22	8	298.32

8 Information

For the purpose of carrying out environmental management, necessary

information sharing is needed among county PMOs, owners, contractors and operators and all staff within these entities, which also need to disclose relevant information to external parties (stakeholders and the general public). Internal information sharing can be carried out through meetings and internal bulletins, but a formal meeting needs to be held every month and all information sharing activities shall be recorded and archived. External information sharing is carried out biannually or annually. Information sharing activities with partners shall be recorded and archived.

9 Documentation

To ensure effective operation of environmental management system, the project owner must organize to establish a sound documentation system and maintain records on the following:

(1) Requirements of laws and regulations;
(2) Relevant review and approval documents for the project;
(3) Environmental media and relevant environmental impacts;
(4) Training;
(5) Supervision, verification and maintenance activities;
(6) Monitoring data;
(7) Issues/problems during environmental management and environmental protection;
(8) Project-related information;
(9) Exam and verification
(10) Review and evaluation

In addition, necessary control is needed for the above records, including identification, collection, categorization, archiving, storage, management, maintenance, storage period, and disposal of these records.

10 Reporting

During project implementation, PPMO, all County PMOs, owners and environmental supervision agencies of JPESTP shall record and report in a timely manner to pertinent departments project progress, EMP implementation and environment quality monitoring results. Specific tasks include:

(1) Environmental Supervision Engineer of the project documents in detail EMP implementation by month and submit in a timely manner weekly and monthly reports to the project owner and respective county PMO, which shall cover implementation of environmental protection measures, status of environmental monitoring and monitoring data;

(2) The project owner or operator documents in detail project progress and EMP implementation by quarter, submits in a timely manner quarterly report to the respective county PMO and provides a copy to the respective county environmental protection bureau (EPB);

(3) After completing monitoring activities, the monitoring agency submits in a timely manner monitoring report to the project owner (operator) and environmental supervision engineer;

(4) County PMO submits in a timely manner project progress report to PPMO

and provides a copy to the provincial EPB. Such report (e.g. monthly report, quarterly report or annual report) must cover EMP progress, such as EMP implementation progress and effectiveness and especially environmental monitoring results;

(5) In the event of incidents in serious violation of environmental protection regulations, the environmental supervision engineer and county PMO shall report such incidents to the local environmental protection administration and to higher level environmental protection administrations when necessary;

(6) The project's EMP implementation report for each year must be prepared and submitted to the World Bank by March 31 of the next year. The report mainly includes the following:

a) Implementation of training program;

b) Project progress, for instance, the construction progress of waste transfer station and lengths of pipelines already paved;

c) Implementation of environmental protection measures, status of environmental monitoring and key monitoring results;

d) Whether there are public grievances; if incurred, such grievances, their solutions and degree of public satisfaction shall be recorded;

e) EMP implementation plan for the next year.

11 Public Grievance Redress and Project Change Mechanisms

1. Public Grievance

In the EIA process of the proposed project, views and comments of the public shall be collected through convening discussion meetings and distributing questionnaires. During project construction and operation, the public could offer their views and comments or lodge their complaints through attending discussion meetings, filling out questionnaires, sending letters, faxes or emails to or phoning the project owner or EIA institute, or through local EBPs and petition offices.

Immediately after receiving complaints about environment related issues/problems or rectification notices issued by government administrations, the EIA institute, contractor or project owner shall work together with the design institute and other relevant agencies to organize site visits and investigations, disclose rectification plans and implement appropriate rectification measures to addressing environment related issues/problems.

2. Environmental Requirements in Case of Project Changes

Based on environmental monitoring reports and inspections by supervision agencies, mitigation measures in the EMP would be adjusted and environmental management activities would be further improved.

During inspection, if significant deviations from EMP contents are identified, or project changes result in significant adverse environmental impacts or significantly increase the number of people affected by these adverse impacts, PPMO shall immediately consult environmental authorities and the World Bank and set up an environmental assessment team to carry out additional environmental assessment or additional public consultation, if necessary. If the EMP is revised, the implementing

agency and contractor also need to be informed of the revisions to ensure that they follow the revised version.

Annex1 General Environmental Management Regulations on Construction Activities

1. Overview

First, the construction unit and construction personnel shall implement mitigation measures proposed in this regulation to prevent inconvenience to or influence on the lives of local residents, and to reduce the project impacts on the environment during construction and operation periods;

Second, remedial measures which cannot be effectively carried out during construction shall be implemented when the project is completed:

1) Vegetation landscape of all affected areas shall be timely rehabilitated via grass planting and afforestation, etc;

2) Rubble and silt left by waterway construction shall be cleaned up to ensure smooth water flow in drains and culverts;

3) Waste gravels shall be cleared and remaining construction materials shall be properly disposed in all construction sites;

4) The borrow area shall be restored.

2. Construction personnel's Code of Conduct and Environmental Standards

This section shall be combined with national and local laws and regulations, being a guideline for construction personnel's behavior. Before breaking ground, the construction unit shall develop project construction plans, in which detailed rules for the implementation based on the specification shall be clarified. Only after engineer-in-charge's approval of the plan shall the construction begin.

2.1 Prohibited Behaviors

The following behaviors are prohibited at the construction site or in surrounding areas:

1) Logging outside the construction site;

2) Hunting, fishing, capturing wild animals, and picking plants;

3) Using unapproved toxic materials, including lead-based paint and asbestos, etc;

4) Influencing other art buildings and architectures of historical value;

5) Triggering house fires;

6) Drunk constructing.

2.2 Traffic

Selection of routes to the construction site shall be approved by the engineer-in-charge. Appropriate vehicles shall be chosen according to local road level and load capacity shall be limited to avoid damage to local roads and bridges. For damage to local roads and bridges caused by overload, the construction unit shall be responsible for the repair under the consent of the engineer-in-charge.

Vehicles with heavy emissions or strong noises should not be used. At completed areas, noise reduction devices shall be installed under normal operation.

During the implementation of the contract, the construction unit, under engineer-in-charge's consent, may take necessary traffic control measures.

2.3 Construction Personnel and Construction Camp

Whenever possible, the construction unit shall recruit local workers and offer them appropriate training.

The construction camp shall be set at the place easy to rent local houses. Domestic sewage cannot be discharged arbitrarily but disposed via surrounding

existing sewage treatment system to avoid affecting nearby rivers.

The construction unit shall establish a set of system and methods for on-site construction materials storage and generation and disposal of solid waste.

The construction unit shall provide substitute fuel while prohibit the use of wood in the camp for cooking or heating.

The on-site layout scheme shall be approved by the engineer-in-charge.

The construction unit should ensure that the construction site, warehouses, storage yards, and manufacturing equipment are not set within 500m to the river. Pollutants running into the river, especially the leakage via land or surface water during the rainy season, shall be avoided; lubricant should be recycled; in surrounding areas channels shall be dug out, at the exit of which settling pond or oil collecting pond shall be set up.

When preparing molding construction materials, construction personnel are prohibited to use wood to heat up.

Production and living areas shall be set independently in accordance with the unit's bidding section. Living areas, based on actual construction conditions, shall be set at a high location among the bidding section. The construction camp consists of living and office welfare facilities, constructing and processing plants, construction warehouses, simple repair stations and other ancillary facilities.

2.4 Waste Management and Soil Erosion

Solid waste, sanitation and hazardous waste can be effectively controlled by implementing the following measures:

2.4.1 Waste Management

1) Reduce the generation of wastes which require treatment and disposal;

2) Identify and classify the generated wastes. Were there hazardous wastes, then storage, collection, transportation and disposal must be conducted in accordance with appropriate procedures.

3) Identify and arrange treatment zones and clearly label them with what materials and substances are allowed for storage.

4) The construction unit must not dispose any waste in any environmentally sensitive area.

5) Construction wastes (including excavated soil) shall be transported to the designated disposal sites (shall be 300m away from the rivers, creeks, lakes or wetlands). Solid waste recycle-and-classify system shall be set up at designated disposal sites to dispose wastes, scrap metal, waste engine oil and the rest construction materials generated during the construction.

5) Comprehensive classification and recycling of recyclable wastes (scrap iron, scrap steel and materials packing bags sold to scrap yards; waste bricks used as materials for road base) shall be conducted. Wastes that cannot be recycled shall be timely transported to the designated construction waste dump site. During the process, sealed transportation shall be ensured and scattering be avoided. When temporary stacking is needed, waterproof, windproof and other measures shall be conducted.

6) For recyclable wastes, the recycling shall be conducted only after on-site identification and assessment and approval of the engineer-in-charge.

During the construction, any residue or sludge stacking on the ground near the construction site should be removed immediately. The stacking area should then be restored to the level approved by the engineer-in-charge.

Throughout the construction period (including preparation, maintenance, demolition and residue clean-up periods) and under the guidance of engineer-in-charge, there shall be a schedule for transportation, and measures to

emergencies should be considered.

Inside the construction area, garbage bins for domestic wastes which have daily clearing, collection and classification shall be set, and the transportation of wastes commissioned to the Sanitation Department.

2.4.2 Soil Erosion Control:

Rationally choose the construction period and try to avoid rainy season or construction in raining days. Set up construction enclosure surrounding the work site to prevent construction materials and wastes from leaking into the surface water.

Set up earthen drainage ditch around the construction site on the basis of its terrain conditions. And set up an earthen grit chamber at the outlet of the ditch, slowing down the water and settling sand.

Combine key control with surface protection, and engineering measures with phtyto measures. Emphasize in engineering measures to realize its quick effect and guarantee function. Phtyto measures are auxiliary ones for soil and water conservation, conserving soil and water in a long term and stable manner, meanwhile afforesting and beatifying ambient environment.

Protect leaf layer and organic matters of the land surface and backfill them to the damaged areas to promote the growth of native plants.

Cover the eroded barren areas with native grasses and trees, or harden the soil surface of such areas.

Proper erosion control measures shall be conducted before the rainy season, in order to better carry out the next works. Corresponding erosion measures shall be prepared at each construction point upon the completion of their subprojects.

In all construction sites, there shall be sedimentations control facilities to slow down the water, change the flow direction and settle silts before the vegetation is restored. Such facilities include material piles, stone pathways, settling pits, straw bales, hedgerows and sludge piles, etc.

Use ditches, berms, grass fences and stone piles and other measures to prevent the water from rushing into the construction site or affect on-site work.

Maintain and continue to adopt erosion control measures till the vegetation is fully restored.

Spray water on earthen roads, excavation areas, filling areas and earthwork areas if necessary to reduce wind erosion.

2.4.3 Protection Area:

Identify and designate the equipment protection area (at least 15m away from rivers, streams, lakes and wetlands); fuel shall be stored in an appropriate location, which shall be admitted by the engineer-in-charge.

Make sure all equipment are used only within the designated protected area; never dump the used oil on the ground, or into the water, sewer or drainage system.

All spilled wastes and collected oil shall be disposed in accordance with standard environment procedures or guidance. Fuel storage and backfilling areas shall be set 300m away from the intersection of drainage buildings and important water bodies, or be set under the guidance of the engineer-in-charge.

2.5 Earthworks and Side Slope Excavation and Filling

Reasonably arrange the earthworks, especially the work during the rainy season. During the construction, the side slope shall be kept solid and firm so as not to interfere other areas outside the construction area. In particular, continuous construction shall be conducted during the rainy season to complete as soon as possible the excavation and filling of the same section. Try to avoid slope erosion caused by interruption of construction due to rainy days and other reasons.

Build intercepting ditch and drainage ditch at the top and the bottom of the slope and plant grass or other plants according to the drawings to protect the slope from erosion. The Intercepting ditch shall be located higher than the slope being excavated to reduce the runoff so as not to erode the slope.

Excavated soils and stones and other materials that cannot be utilized shall be transported to the designated location after obtaining the consent of the engineer-in-charge.

The disposal site cannot be set at the place which may cause landslides, nor should it affect other agricultural plants or private lands. In addition, prevent piling materials from rushing into the surface water through rainfalls or other media. Drainage ditch shall be set up around the stacking area under the guidance of the engineer-in-charge.

2.6 Borrow and Storage Areas

Consent of the engineer-in-charge shall be obtained when opening new borrow areas at the land surface, river or utilized lands. The borrow area shall not be located in places which may damage natural or artificial drainage facilities. River borrow areas shall not be located in places which may erode or destroy the riverbed, or tend to bring a lot of sand to the downstream.

The construction unit shall ensure that all used borrow areas have a firm and solid side slope and bear a neat and level ground. No stagnant water shall be left in the drainage ditch so as not to attract mosquitoes.

Sand and gravels excavated from the river should be transported far enough for stacking. The depth of excavation of each borrow area shall not be greater than one-tenth of the width of the river, to avoid drying up rivers or eroding or damaging the riverbed. It needs the engineer-in-charge's consent to borrow soil from which the vegetation will be destroyed. When doing this, use effective dust treatment equipment and try to avoid environmentally sensitive spots or residential spots.

Each Borrow area and spoil area shall meet the following requirements:

1) Identify and classify borrow and spoil areas, and ensure that the distance between them and sensitive areas (e.g. high and steep slopes, easy-to-erosion land, areas where waste water directly goes into the sensitive water) is larger than 15m.

2) Ensure that the soils are all excavated in admitted and designated borrow areas.

3) The topsoil of newly excavated borrow areas shall be retained and be backfilled into the hole after excavating usable soils and restore the areas into flat lands or slopes; build terraces on some steep slopes to prevent soil erosion.

4) The excess topsoil shall be compacted on which vegetation shall be planted. Topsoil or residues containing organic matters are allowable for covering the surface in suitable areas to facilitate the restoration of vegetation. Native plants are easier to grow.

5) Prevent soils from rushing into the drainage ditch if there had already been one in this construction area.

6) Once the work is completed, all the waste residues generated during the construction should be cleaned from the site.

2.7 Wastewater Control

1. Construction Wastewater

Construction wastewater: the wastewater disposed by settling pond can be used for mixing concrete and watering to reduce dust, and cannot be discharged into nearby water bodies; slurry generated during the construction shall be disposed in the settling pond via mud pump and to be solidified through drainage and evaporation, and the

slurry cannot be discharged into nearby water bodies; wastewater generated from washing machinery and equipment, after disposed by oil-separating sedimentation tank, can be used for watering the construction site to reduce dust, and cannot be discharged into nearby water bodies.

Drainage shall be taken into full account in terms of the layout of the construction site, which shall also be away as far as possible from the river. Ensure that the construction site, warehouses, storage areas of diesel oil and bitumen, and facilities for manufacturing bitumen are more than 500m away from the river. Prevent pollutants from entering the river when operating the facilities, and avoid the leakage via land or surface water during the rainy season.

During the construction, the on-site ground shall be kept clean. Prevent wastewater or pollutants from entering the ditches, thus leading to the penetration of wastewater.

If on-site oil storage is needed, then anti-seepage treatment must be conducted in the warehouse. Measures should be carried out for storage and use in order to avoid the phenomena of evaporating, emitting, dripping leaking, or polluting water bodies.

Try to construct the infrastructure in the non-flood season to reduce influence of shallow groundwater level on the construction.

2. Domestic Sewage

Domestic sewage from the construction personnel shall be disposed via surrounding existing residential sewage treatment system, and cannot be discharged arbitrarily. Anti-seepage and anti-loss measures shall be conducted in accordance with relevant requirements for temporary garbage storage room.

2.8 Noise and Dust Control

To control noise and dust, the construction unit shall meet the following requirements:

1) Adopt advanced construction techniques; use wet process for crushing gravels and concrete; be equipped with dust collection device; control vehicle speed and exhaust emission from cars and coals; spray water at the construction area when needed (4 to 5 times a day is available); construction teams shall use liquefied petroleum gas, electricity and other clean energy; enhance afforestation of the construction site and strengthen labor protection for construction personnel. All these will reduce the negative impacts on ambient air.

2) At the inner side of entrance and exit for vehicles transporting materials and spoil, a car washing platform shall be established, surrounded by barriers to prevent the leakage of wastewater from washing cars. Before leaving the site, the tires and body of vehicles must be washed in the washing platform. Any sludge is not allowed to be attached to vehicles' surface. Materials and spoil shall not exceed the upper edge of the vehicle ledge during transportation, and the vehicle hopper shall be covered with a tarpaulin or be sealed.

3) Concrete mixing station and asphalt mixing station cannot be set inside the construction site; use commodity concrete and asphalt.

4) Transporting vehicles, bulldozers, excavators and other vehicles shall slow down when passing by villages or entering the construction site. Furthermore, regular repair and maintenance should be conducted to ensure vehicles' normal function and to reduce exhaust emissions.

5) Set up dust-proof barriers around the work area, especially at places close to residential areas, hospitals and schools.

6) Try to minimize the generation of dust and particulate matter in order to avoid the impact on the surrounding residential and business practices; focus on protecting

vulnerable populations (such as children, the elderly, etc.).

7) Set up warning signs and use low-noise equipment at acoustic environment sensitive sections; control noise source, media of noise transmission, and traffic noise; offer construction personnel anti-noise earplugs; reasonably arrange construction time and other measures.

8) Reasonably arrange construction time according to *Standards for Ambient Noise Emission at Construction Site Boundary* (GB12523-2011). Simultaneous operation of a large number of high-noise equipment and construction at sensitive time shall be avoided whenever possible. Try to arrange daytime operation of high-noise equipment and reduce nighttime transportation. Construction at night (22:00 - 6:00) is prohibited. Construction activities that must be carried out at night shall be approved by relevant local environmental protection department and negotiation in advance with local residents should be achieved. In addition, noise reduction measures shall be implemented (such as installing sound barriers) to minimize the impact of construction noise on local residents.

9) The speed of all construction vehicles outside the work site must not exceed 25 km/h.

10) The speed of vehicles inside the construction site must not exceed 15 km/h.

11) Try to keep the noise lower than 90 decibels of the machinery and equipment.

12) More stringent measures shall be carried out in sensitive areas (including residential areas, hospitals, nursing homes, etc.) to prevent harsh noises.

13) Appropriate measures shall be adopted to reduce the influences of construction noise and vibration on ambient environment.

2.9 Social Impact

Scientifically arrange the construction site and minimize the occupation of land. Temporary occupied area will be restored according to its original land using type after construction is completed.

Reasonably arrange temporary stacking areas of earthworks and stones which shall be away from environment sensitive spots like residential spots and schools, etc.

Timely inform the public of the construction plans, environmental impact statement, construction access roads, temporary bus route, demolition announcement and other information.

Limit nighttime construction. When construction at night is necessary, ensure the schedule is clear and reasonable and inform affected residents in advance to let them take necessary precautions.

When public facilities (such as water pipes, electricity system, telephones, bus routes, etc) cannot work properly due to the construction, affected residents shall be informed at least five days in advance through the form of notice posting at the construction site, bus stops and the affected areas.

2.10 Construction Safety

Responsibilities of the construction unit include protecting every individual surrounding the site, namely to avoid impacts on individual’s personal safety and property caused by the construction. The construction unit has the responsibility to comply with national and local safety regulations and take all necessary measures to avoid accidents. Measures may include:

1) Setting up noticeable safety signs at construction access roads and the entrance and exit of the construction site;

2) Dispatching personnel to guide the traffic near schools in the students’ rush hour;

3) Setting up sufficient traffic warning signs (including painting, frames and markers, etc.), road signs and guardrails to ensure the safety of pedestrians during the construction period;

4) Providing safety training to all construction workers before the construction is initiated;

5) Providing construction workers with and force them to use personal protective equipment and clothes (such as goggles, gloves, masks, dust cover, and helmet, etc.);

6) Equipping each site with a safety information bulletin; warning signs shall be set up in the chemicals storage warehouse;

7) Requiring all workers to know the safety information about various materials and clarify to the construction personnel the possible risks for them and their families (especially for pregnant women or families planning a pregnancy) when using these materials, and encourage workers to share relevant information;

8) Making sure that the waste oil or other toxic materials are disposed by specially trained workers;

9) Suspending the construction when encountering heavy rains or other emergencies;

10) Ensuring that the electrical equipment and machinery shall be able to withstand a certain level of earthquake.

2.11 Disposal of Cultural Relics and Heritage Sites during Construction Period

During excavation and construction, if heritage sites, historic sites, human remains, grave yard or individual graves were found, disposal shall be conducted according to the following procedure:

1) Stop construction activities at the discovery site;

2) Draw and mark the discovery location and area;

3) Protect the site to prevent any possible damage to cultural relics. When movable cultural relics or sensitive fossil remains were found, personnel shall be set to ensure their safety until the local relevant government departments or national cultural relics management department take over the charge;

4) After cultural relics were found, the finder shall, within 24 hours, inform the patrolling supervision engineer who will be in charge of contacting local relevant government departments or national cultural relics management department;

5) Before deciding follow-up works, the local relevant government departments or national cultural relics management department will charge for the protection and conservation of the discovery site and cultural relics. Experts from the national cultural relics management department will prepare preliminary assessment on the cultural relics based on related cultural relics assessment criteria, namely from aspects of aesthetic, historical, scientific, social and economic value, to analyze the value and significance of the discovery;

6) Local relevant government departments and national cultural relics management department will decide how to handle the discovery, which includes how to modify construction plan (for example, when immovable cultural relics with cultural or archaeological sense were found), and how to save, repair and utilize the heritage sites, etc.;

7) Local relevant government departments shall deliver written materials to the project manager and inform treatment decisions on the cultural relics;

8) In order to protect the safety of cultural relics and heritage sites, the construction shall be resumed only after obtaining permission of local government or the national cultural relics management department.

2.12 Hazardous Waste

If hazardous waste or suspected hazardous waste (asbestos-containing substances generated from disposal of construction waste) might be generated in the construction site, the construction unit needs to develop a hazardous waste management plan, which, after engineer-in-charge's approval, applies to all personnel involved in disposal and transportation work. Works to clear and dispose hazardous construction waste shall be conducted by specially trained personnel in accordance with national and provincial regulations or universally accepted procedures.

2.13 Health Service and HIV/AIDS Education

The construction unit shall provide workers with basic first aid services and emergency facilities, including medical devices and mode of operation for personal use. Injured workers shall be treatable before being sent to the hospital.

The construction unit has the responsibility to develop a plan to prevent the spread of sexual diseases (especially HIV/AIDS) among workers.

The construction unit shall add health plan outline into its construction plan, offering workers advice to keep healthy during the construction. The outline shall be approved by engineer-in-charge before the construction is initiated.

3 Environmental Supervision Measures

The engineer-in-charge/construction supervisor shall ensure the implementation of above requirements. Non-compliance of the contract will lead to suspension of the construction or other sanctions until the issue has been resolved under the engineer-in-charge's satisfied manner. The construction unit shall also follow relevant national and local regulations related to environment, public health and safety.

Annex II Checklist of Construction Site before Commencement of Work

Serial No.	Environmental Problem	Check Result (Marked with "√)	Remark
1	Whether the project involves natural habitat, material culture resources, involuntary resettlement and other World Bank safeguard policies	Yes □ No □ Not Involve □	
2	Whether there are important vegetation and trees within the scope of project land occupation	Yes □ No □ Not Involve □	
3	Whether project construction road will cause significant impacts on going out of surrounding residents	Yes □ No □ Not Involve □	
4	Whether there are the public (residential community, school, hospital, office area, etc.) vulnerable to the impacts of work construction nearby the project	Yes □ No □ Not Involve □	
5	May cause the deterioration in the quality of life of nearby town	Yes □ No □ Not Involve □	
6	Whether project construction needs to interrupt municipal services (including water, electric power, telephone, bus line, etc.)	Yes □ No □ Not Involve □	
7	Whether project construction needs demolition	Yes □ No □ Not Involve □	
8	Whether rainy season will be affected by flood	Yes □ No □ Not Involve □	
9	Whether land outside project areas is temporarily occupied	Yes □ No □ Not Involve □	
10	Whether electric power, telecommunications and other municipal service lines are involved within and nearby the scope of project construction	Yes □ No □ Not Involve □	
11	Whether there is surface water body within and nearby the scope of project construction	Yes □ No □ Not Involve □	
Others		Yes □ No □ Not Involve □	

Annex 3 Checklist of Construction Site Environment

Checklist of Construction Site Environment for World Bank-financed Duchang County Water Environment Management Project						
Name of project			Name of Work Site			
Contract Number and Name			Check Result (Marked with "√")			Remark
	Inspect Item		Yes	No	Not Involve	
1. General Requirements	1.1 Whether effective measures for preventing and controlling atmospheric pollution, water and soil pollution and noise pollution as well as for improving environmental health are in place in construction organization design of the project					
	1.2 Whether environmental protection, environmental health management and inspection system for construction site are established					
	1.3 Whether environmental protection, environmental health management and inspection for construction is recorded					
	1.4 Whether operating personnel are provided with necessary protective equipment and effective occupational-disease-prevention measures are taken					
	1.5 Whether the personnel engaged in occupational-disease-inductive operation are provided with regular physical exam and training (with relevant physical exam certificate and training record)					
	1.6 Whether diet health, sunstroke prevention, cooling, cold protection, warmth keeping, gas poisoning prevention and epidemic prevention for operating personnel are in place in combination with seasonal characteristics					
	1.7 Whether education training and assessment for operating personnel at construction site contain laws and regulations relating to environmental protection and environmental health (with related records and documents)					
	Others (shall specify)					
Temporary Facilities Layout and	2.1 Whether the construction area at the construction site is clearly separated from office area and living area and whether relevant isolation measures are taken					
	2.2 Whether the construction area is neat and orderly					

Checklist of Construction Site Environment for World Bank-financed Duchang County Water Environment Management Project						
Name of project			Name of Work Site			
Contract Number and Name			Check Result (Marked with "√")			Remark
	Inspect Item		Yes	No	Not Involve	
	2.3 Whether the access of the construction site is marked with enterprise name or enterprise logo, whether the visible place of main access is set with project profile plate meeting the requirements					
	2.4 Whether the public is informed in advance when the construction needs to interrupt municipal services (including water, electric power, telephone, bus line, etc.)					
	2.5 Whether the existing building and infrastructure are utilized as temporary facilities of the construction site					
	2.6 Whether newly built temporary house is reasonable in land occupation and meets safety and fire control requirements (with related certificates)					
	2.7 Whether the construction of temporary facilities uses clay bricks					
	2.8 Whether oil, chemical solvent and other items stored at the construction site set special warehouse and warning signs					
	2.9 Whether anti-seepage treatment is made for the ground of oil and chemical warehouse, and whether such emergency treatment materials as absorption bag/sands/bits of wood are in place in the warehouse					
	2.10 Whether collective staff dormitory is set in unfinished building					
	2.11 Whether temporary facilities are demolished within one month upon completion of the construction work					
	Others (shall specify)					
3. Operating Conditions and Environmental Safety	3.1 Whether enclosed color steel fence with the height of no less than 2.5m is set at the construction site, and whether the height of sensitive section is no less than 3.m					
	3.2 Whether the construction site sets qualified bulletin board, indicating environmental protection and civilized construction system, and disposal process for emergencies, etc.					
	3.3 Whether the construction unit takes protective					

Checklist of Construction Site Environment for World Bank-financed Duchang County Water Environment Management Project						
Name of project			Name of Work Site			
Contract Number and Name			Check Result (Marked with "√")			Remark
Inspect Item			Yes	No	Not Involve	
	measures to ensure the safety of buildings, structures and underground pipelines adjacent to construction work					
	3.4 Whether tall scaffolding, tower crane and other large machinery and equipment at construction site keep a safe distance from overhead transmission conductor, and whether high voltage line adopts insulating material for safety protection					
	3.5 Whether mandatory safety protection measures are taken for sidewalks and vehicle access surrounding construction work, and whether lighting indicating device is set in the nighttime					
	3.6 Whether visible safety warning sign meeting national standard is set at dangerous section of the construction site					
	3.7 Whether the construction site adopts corresponding safety technology measures based on season change to achieve civilized and safe construction conditions					
	3.8 Whether fire extinguishing equipment is kept in good condition, and whether escape way is without obstruction					
	Others (shall specify)					
4. Dust Pollution Control	4.1 Whether construction site road reasonably utilizes the existing or proposed road in and surrounding the site					
	4.2 Whether hardening treatment is made based on its usage when constructing new road, and whether the road section producing dust controls dust by sprinkling					
	4.3 Whether materials are piled up together at construction site					
	4.4 Whether the second location selected to pile up materials is reasonable					
	4.5 Whether site material storage area, processing area and large molding storage area are flat and solid					
	4.6 Whether fine particle granular materials and the materials easy to float in the air at construction site adopt sealed storage, and whether shielding measures					

Checklist of Construction Site Environment for World Bank-financed Duchang County Water Environment Management Project						
Name of project			Name of Work Site			
Contract Number and Name			Check Result (Marked with "√")			Remark
	Inspect Item		Yes	No	Not Involve	
	are taken for their handing and transportation					
	4.7 Whether covering, solidifying or greening measures are taken for earthwork piled up together					
	4.8 Whether spoil is utilized or transported to designated disposal sites					
	4.9 Whether bare ground at office area and living area of the construction site controls dust by sprinkling and is greened and beautified based on the actual situation					
	4.10 Whether earth, waste and construction garbage are transported using closed vehicles					
	4.11 Whether the facilities washing vehicles are set at the access of the construction site, and whether the road between vehicle washing facilities and the exit of the site is paved with concrete, asphalt, straw mattress or broken brick hardcore to avoid bringing silt out of the site					
	4.12 Whether the construction site uses ready-mixed concrete and ready-mixed mortar					
	4.13 Whether dust prevention and dust removal measures are taken when conducting concrete and mortar mixing operation					
	4.14 Whether earth backfill, transportation and other construction that may produce dust pollution are prohibited in the weather with force four wind					
	Others (shall specify)					
5. Harmful Gas Emission Control	5.1 Whether all kinds of wastes are burned at construction site					
	5.2 Whether construction vehicles and mechanical equipment are kept in good condition, and whether the exhaust gas emitted meets the emission standard provided by the state					
	5.3 Whether decoration materials adopt building materials qualified through the verification of legal detection unit (with certificate of conformance)					
	5.4 Whether wood board and other wood materials used					

Checklist of Construction Site Environment for World Bank-financed Duchang County Water Environment Management Project						
Name of project			Name of Work Site			
Contract Number and Name			Check Result (Marked with "√")			Remark
Inspect Item			Yes	No	Not Involve	
	for interior decoration are prohibited from using asphalt, coal tar class anti-corrosive and moisture-proof finishing agent.					
	5.5 Whether the kitchen in living area is installed with lampblack treatment facilities as required					
	Others (shall specify)					
6. Water Pollution Control	6.1 Whether sedimentation tank is set at the place washing mixer foreground and transport vehicles at construction site					
	6.2 Whether wastewater is directly drained into municipal sewage pipe network or river					
	6.3 Whether wastewater is recycled or used for dust suppression through sprinkling after secondary precipitation					
	6.4 Whether sediment disposal is conducted when sediment in sedimentation tank reaching 1/4 depth of the tank, whether sediment in sedimentation tank is cleared and transported to designated place					
	6.5 Whether the canteen sets separation tank, and whether qualified cleaning unit is entrusted to timely clear it away					
	6.6 Whether closed waste food bin is set outside the canteen and is cleared away in a timely manner					
	6.7 Whether septic tank of temporary toilet set at construction site conducts anti-seepage treatment					
	6.8 The construction site shall set drainage ditch. Whether waste water is drained into municipal sewage pipe network or river after precipitation, and whether drainage ditch is smooth					
	Others (shall specify)					
7. Noise Pollution Control	7.1 Whether the requirements of construction time is strictly followed					
	7.2 Whether surrounding residents are informed of nighttime continuous construction, and whether related formalities for nighttime continuous construction are handled					

Checklist of Construction Site Environment for World Bank-financed Duchang County Water Environment Management Project						
Name of project			Name of Work Site			
Contract Number and Name			Check Result (Marked with "√")			Remark
Inspect Item			Yes	No	Not Involve	
	7.3 Whether shielding, closing and greening measures for noise absorption and noise insulation purposes are taken for the construction site					
	7.4 Whether low noise equipment are adopted and maintenance for the equipment is well conducted					
	7.5 Whether the equipment producing noise are set at the side far away from residential community					
	7.6 Whether noise reduction measures such as enclosing are taken to the equipment producing noise					
	7.7 Whether such measures as speed limit and no honking are taken for construction vehicles					
	7.8 Whether the equipment (air compressor, electric generator, etc.) producing noise are placed in enclosed equipment room					
8. Waste Control	8.1 Whether the construction site sets enclosed refuse storage area, and whether construction waste and domestic garbage are stored separately and cleared away and disposed according to the provisions					
	8.2 Whether corresponding container or pipe transportation are adopted for the removal of construction waste in buildings					
	8.3 Whether wastes produced from construction, demolition and site cleaning are disposed separately, recovered and recycled					
	8.4 Whether construction waste cleaning unit holds waste disposal qualification and business license approved by relevant authority					
	8.5 Whether abandoned oil and chemical solvent are stored in a centralized way, and entrusted to qualified unit for disposal					
	8.6 Whether construction equipment has obvious oil spatter					
	8.7 Whether the construction camp has set enclosed refuse storage area to collect the workers' domestic garbage, which shall be timely cleared away as required.					
	8.8 Whether septic tank is timely cleared and buried					

Checklist of Construction Site Environment for World Bank-financed Duchang County Water Environment Management Project						
Name of project		Name of Work Site				
Contract Number and Name		Check Result (Marked with "√")				Remark
Inspect Item		Yes	No	Not Involve		
	with land upon completion of the construction					
	8.9 Whether the dredging is conducted during dry season					
	8.10 Whether the sludge is desiccated and transferred to wasteland for application in sealed vehicles					
	8.11 Whether the temporary dump site and the vacant land are afforested					
	8.12 Whether the applied wasteland adopts water conservation measures like enclosure and the like as well as measures to prevent water and soil erosion					
	8.13 After the construction, whether the temporary stocking places and surface of wasteland are afforested					
	8.14 Dosage consumption during the construction should meet the water quality requirements for discharging residual water. Keep the residual water quality under strict surveillance, and decide dosage parameter and whether adopt emergency dosage measures basing on the on-site test and monitoring results					
	8.15 Dredging project doesn't allow under-excavation; Dredging area should reach the designed depth, meanwhile, strictly control the project volume of ultra-depth. When the construction units conduct the measurements after the dredging, supervising engineer should inspect the measuring equipment and supervise the measurements beside the construction units					
	8.16 Ten-day reports on dredging project, monthly progress reports, and summary of the project should be submitted to supervising engineer by construction units					
	8.17 Whether cofferdam of stocking places and residual pond adopt measures to prevent permeation					
	8.18 Whether residual water emergency response facility is set up, including measures like setting up accident reservoir and emergency chemical addition equipment					
	8.19 Whether the stocking places adopt the gradual					

Checklist of Construction Site Environment for World Bank-financed Duchang County Water Environment Management Project						
Name of project			Name of Work Site			
Contract Number and Name			Check Result (Marked with "√")			Remark
Inspect Item			Yes	No	Not Involve	
	ditching drainage method for dehydration					
	Others (shall specify)					
9. Soil Erosion and Control	9.1 Whether utilize the existing legal borrow area and the waste abandoning place determined by local sanitation department					
	9.2 Whether newly built borrow area obtains approval from relevant authority, and whether protective measures are taken to the side slope of borrow area					
	9.3 Whether surface soil is cleaned and stored to ensure that it is used for vegetation restoration upon completion of the construction					
	9.4 Whether intercepting ditch and headrace are built to lead water flow formed in rainy season away to avoid the washout of surface runoff to work					
	Others (shall specify)					
10. Preservation of Cultural Relics	10.1 In case cultural relics or suspected cultural relics is found during construction period, the construction shall be immediately stopped and the site shall be well protected, while at the same time reporting to local administrative department of cultural relics for disposal, the construction can be resumed only after disposal of relevant department					
	Others (shall specify)					
11. Vegetation Protection	11.1 Whether such behavior as cutting down trees outside construction site exists					
	11.2 Whether the layout of construction site is reasonable (judging from the point of the damage caused by work implementation to vegetation)					
	11.3 Whether effective measures are taken for the vegetation damaged and bare soil caused due to the construction to avoid soil erosion and loss (adopting such measures as covering with gravels, planting fast-growing grass, etc.)					
	11.4 Whether original vegetation area destroyed is restored or reasonably greened upon completion of the construction					

Checklist of Construction Site Environment for World Bank-financed Duchang County Water Environment Management Project						
Name of project			Name of Work Site			
Contract Number and Name			Check Result (Marked with "√")			Remark
	Inspect Item		Yes	No	Not Involve	
	11.5 Whether alien species are introduced when conducting ecological restoration and greening for vegetation					
	Others (shall specify)					
12. Risk Prevent	12.1 Whether accident prevention plan is formulated					
	Others (shall specify)					
13. Occupational Health	13.1 Whether warning signs or warning instructions are set at operating post, equipment and place vulnerable to occupational hazards					
	13.2 Whether operating personnel wear ear plugs for hearing protection when conducting high noise construction work					
	13.3 Whether anti-corrosive and waterproof operation in basement where good natural ventilation cannot be guaranteed are equipped with mandatory ventilation facilities. Whether the operating personnel wear respirator or protective mask in the workplace with toxic or harmful gases					
	13.4 Whether the operating personnel wear dust mask in the workplace with dust					
	13.5 Whether the operating personnel wear protective mask, goggles, gloves and other personal protective equipment when conducting welding operation					
	13.6 Whether the construction site is equipped with sunstroke prevention and cooling supplies when conducting high temperature operation, and the work-and-rest timetable shall be reasonably arranged					
	Others (shall specify)					
14. Hygiene and Disease Control	14.1 Whether staff meals, drinking water and rest area at construction site are in compliance with health standards (with health certificate)					
	14.2 Whether dormitory, canteen, bathroom and toilet are equipped with ventilation and lighting facilities, and maintained by special personnel					

Checklist of Construction Site Environment for World Bank-financed Duchang County Water Environment Management Project						
Name of project			Name of Work Site			
Contract Number and Name			Check Result (Marked with "√")			Remark
	Inspect Item		Yes	No	Not Involve	
	14.3 Whether construction site dormitory meets the requirement of setting open type window; the beds in the dormitory shall not exceed two layers, a wide bed for a number of people is strictly prohibited					
	14.4 Whether the canteen obtains effective sanitary license issued by relevant authority, whether canteen workers hold effective health certificate					
	14.5 Whether the canteen is located far away from toilet, refuse storage area, toxic and harmful pollution sources					
	14.6 Whether the canteen sets independent food preparation room and storage room, whether the lower part of door leaf sets rat guard no less than 0.2m					
	14.7 Whether toilet, sanitation facilities, drainage ditch and damp area are regularly disinfected (with related records)					
	14.8 Whether the living area sets closed container with regular fly killing and timely clearing					
	14.9 Whether the construction site sets health center, equipped with health kit, commonly used drugs and bandage, tourniquet, neck collar, stretcher and other emergency equipment					
	14.10 When construction personnel develop infectious diseases, food poisoning and acute occupational poisoning, whether it is timely reported to the epidemic prevention department and competent department in charge of construction of the locality, and disposed according to relevant regulations stipulated by the epidemic prevention department					
	Others (shall specify)					
15. Traffic Safety	15.1 Whether safe driving is emphasized on drivers and safety education & training is carried out regularly					
	15.2 Whether driving time is limited, and drivers take turns in driving; whether driving on dangerous road and in dangerous time is avoided					
	15.3 Whether the parts used for vehicle maintenance are					

Checklist of Construction Site Environment for World Bank-financed Duchang County Water Environment Management Project						
Name of project			Name of Work Site			
Contract Number and Name			Check Result (Marked with "√")			Remark
Inspect Item			Yes	No	Not Involve	
	approved by the manufacturer, and whether vehicle parts are purchased timely for maintenance purpose					
	15.4 Whether separation of people and vehicles are achieved					
	15.5 Whether cooperate with local community and competent authority to improve road signs and strengthen the visibility of road signs					
	15.6 Whether traffic safety and pedestrian safety education are carried out in the communities surrounding project construction and the communities nearby school					
	15.7 Whether materials are purchased locally as far as possible					
	15.8 Whether drivers operating the vehicles hold driving license					
	Others (shall specify)					
Others (shall specify)						
The construction stage when inspecting:_____Date of inspection: _____ Time of inspection: _____ Weather record: _____ Signed by on-site inspector: _____ Signed by environmental supervisor: _____ Description: ①The problem observed, unqualified situation described, corrective and preventive actions and suggestions put forward can be filled in remark. ②If it is found through on-site inspection that measures are unqualified and need to be improved, environmental supervisor shall immediately issue "Environmental Rectification Notice" to the contractor and record the serial number of "Environmental Rectification Notice" in Remark. The detailed corrective actions carried out by the contractor shall be recorded separately. ③As for the specific subproject and environmental problems, local environmental situation and construction content can be combined to make appropriate adjustment to this form and to adopt appropriate environmental protection measures.						

Annex 4 Environmental Rectification Notice

Environmental Rectification Notice

No.: _____

Contract No. and name:

_____

Name of subproject:

_____

Name of Work Site:

_____

Current construction stage:

_____

The problems existing in on-site inspection:

Checked by: _____ Date: _____

The contractor analyzes the reasons and formulates rectification plan:

Contractor in charge: _____ Date: _____

Opinion of environmental supervisor:

Responsible person on environmental supervisor side: _____Date:_____

Opinion of competent department of environmental protection (when necessary):

Contact person: _____ Date: _____

Modification deadline:

Completed as of _____

Contractor in charge: _____ Date: _____

Responsible person on environmental supervisor side: _____Date:_____

Conclusion after review:

Rechecked by: _____ Date: _____

Map 1 Emergency Handling Flow Chart in case of Discovering Cultural Relics