The World Bank Financed

Duchang Water Environment Management Project

Environmental Assessment Report

CERI eco Technology Co., Ltd.

August, 2016 Nanchang

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1 Overview

1.1 Project Introduction

Project name	The World Bank-financed Duchang Water Environment Management Project				
Construction agency	Leading Group Office of The World Bank-financed Duchang Water Environment Management Project				
Legal representative	/		Contact	Huang Yi	
Telephone	13576906989	Fax	/	Postcode	330600
Construction site	Urban areas of Duchang County and three suburban townships (Beishan Township, Dashu Township and Wangdun Township), Jiujiang City				
Approval department	/		Registered Number of Approval	/	
Type of construction	New ■ Improvement or expansion □ Technological renovation □		Industrial category and code	E4852 Pipeline Engineering, N7721 Water Pollution Treatment, N7820 Sanitation Management	
Occupied area (m^2)	/		Green area (m^2)	/	
Total investment (10,000 yuan)	17,407.36	Environmental Protection Investment among the Total (10,000 yuan)	298.32	Ratio of the Environmental Protection Investment to the Total Investment	1.7%
Assessment expenditure (10,000 yuan)	/	Expected commissioning date	December, 2022		

1.2 Project Background

1. Project background

In order to protect favorable ecological environment of Jiangxi Province and guard the “green mountains and clear waters”, Jiangxi Provincial Government, on the one hand advances social and economic development, on the other hand enhances

ecological civilization construction, strengthening ecological advantages and effectively improving ecological environment. Jiangxi Province applies for World Bank loan to carry out Jiangxi Poyang Lake Town Water Environment Management Project, which was nationally approved in October, 2014, and listed as one of proposed projects in the World Bank's lending pipeline for FY2015-2017. Duchang Water Management Project is one of the subprojects. Situated in the north of Jiangxi Province, with Wushan Mountain in the north, and Poyang Lake in the south, Duchang County is located in the core area of Poyang Lake. 22 out of a total of 24 townships (towns) in the county are close to Poyang Lake. Moreover, its county seat is one of the largest ones along the Poyang lake. Therefore, Duchang County ecological environment will directly influence Poyang Lake, and environmental pollution treatment in urban areas of Duchang can also benefit the improvement of Poyang Lake ecological safety.

2. Project Selection

Data of total pollutant emissions in recent years provided by Duchang County Environmental Protection Agency are shown in Table 1-1.

Table 1-1 Duchang County Total Pollutant Emissions in Recent Years

Index name	Unit	Total emission	Industrial source	Agricultural source	Urban domestic source	Centralized treatment facility
2012						
Sewage	10,000 t	1,567.95	329.63	-	1,237.71	0.62
COD	t	6,923.40	869.33	1,186.27	4,829.00	38.8
NH_3-N	t	884.11	1.03	348.08	532.00	3.00
TN	t	1,148.48	-	1,148.48	-	-
TP	t	148.07	-	147.98	-	0.09
2013						
Sewage	10,000 t	1,634.52	360.17	-	1,273.70	0.64
COD	t	7,031.49	879.72	1,131.97	4,981.00	38.80
NH_3-N	t	895.30	1.43	340.87	550.00	3.00
TN	t	1,149.37	-	1,149.37	-	-
TP	t	148.25	-	148.16	-	0.09
2014						

Sewage	10,000 t	1,678.87	372.18	-	1,306.05	0.64
COD	t	6,349.89	352.64	1,071.97	4,886.48	38.80
NH_3-N	t	839.50	1.47	334.05	500.96	3.00
TN	t	876.44	-	876.44	-	-
TP	t	100.10	-	100.01	-	0.09
2015						
Sewage	10,000 t	1,759.33	452.90	-	1,305.82	0.60
COD	t	6,547.13	460.38	1,014.38	5,033.57	38.80
NH_3-N	t	855.51	10.55	327.47	514.49	3.00
TN	t	1,117.93	-	1,117.93	-	-
TP	t	141.57	-	141.48	-	0.09

The table above indicates that pollutant emissions from the urban domestic source account for 70%-77% of Duchang County total pollutant emissions, so it is the major pollution source; the second one is agricultural source, representing 15%-17% of the total; the next is industrial source, occupying 5%-12% of the total. Therefore the comprehensive treatment of pollutants from urban domestic source is included in the project after overall consideration.

Meanwhile, on the basis of water consumption, sewage treatment capacity, influent quality and other information in recent years offered by Duchang County water supply company and wastewater treatment plant, sewage production and treatment quantity over the years in the county is analyzed in Table 1-2, and total water pollutants (COD) and pollutant reduction are listed in Table 1-3.

Table 1-2 Sewage Production and Treatment Quantity over the Years in Duchang County ($10,000m^3/d$)

Item	2012	2013	2014	2015
Sewage quantity from self-sustaining wells	1.66	1.55	1.84	2.14
Average influent quantity	0.98	0.98	1.39	1.65
Uncollected sewage quantity	0.68	0.57	0.45	0.49

Table 1-3 Total Pollutant Load (COD) and Pollutant Reduction over the years in Duchang County (t)

Item	2012	2013	2014	2015
COD production	611.5	541.3	749.2	825.2
COD reduction	288.3	259.9	422.0	480.8
COD emission	323.2	281.4	327.2	344.4

From data above, it can be seen that sewage and pollutant emissions (COD) in the past few years in the county are increasing. Along with the data analysis of total pollutant emissions in the urban area, sewage and pollutant emissions in the urban area are the main part and centralized. In the meantime, pollutant emissions from the industrial source mostly originates from Furong Mountain Industrial Park to the north of the county. Thus, the project mainly solves sewage collection and treatment problems in the county. Duchang County covers a large area (total land area is 2,669.5 km^2), with large population (total population is about 810,500). Pollutant emissions from the agricultural source are decentralized with few in the urban area. Formulated fertilization by testing soil and organic fertilizer are popularized through the whole county, so the treatment of pollutant emissions from the agricultural source is not included in the project.

Recently, City Management Bureau of Duchang County obtains special state funds for urban sanitation construction. At the end of 2015, waste transfer stations in the north district started construction, sanitation facilities in other districts have been gradually implemented according to special sanitation plans, and waste collection and transportation system has been improved step by step. However, there are still phenomena existing in Beishan Township, Dashu Township and Wangdun Township all of which are situated in outskirts. For instance, a great deal of domestic waste is randomly dumped and piled up, or burned directly in waste tanks, or dumped and embedded beside the lakes, or buried in simple holes in a wasteland, all of which will pollute ecological environment at Poyang Lake banks. Meanwhile, since the overall development of the county expands to the west, the natural water body, water system of Zoujiazui Lake to the west side of the urban area and its ecological environment face great threats.

In order to reduce pollutants in key waters which will flow into Poyang Lake, and promote water quality management of Duchang County, Construction Leading Group Office of Duchang County on Pollution Comprehensive Treatment and Ecological Safety Improvement Project intends to apply for World Bank loan to solve these problems above by carrying out Duchang Water Environment Management

Project. This project contains Urban Sewage Pipe Network Improvement Subproject, Zoujiazui Lake Water System Ecological Restoration and Protection Subproject, Domestic Waste Collection and Transportation of the Three Suburban Townships Subproject and other non-engineering measures. The implementation of this project will improve the urban sewer system and ensure eco-security of urban water environment. It will promote the reconstruction of urban rain and sewage diversion system, enhance the efficiency of collecting and disposing sewage, effectively and properly solve the problem of domestic garbage daily produced by residents, reduce the pollution to the water in Poyang Lake from the source, and improve the management of water environment and solid waste so as to realize the sustainable urbanization.

According to rules in *Environmental Impact Assessment Law of the People' s Republic of China, Regulations on the Administration of Construction Project Environmental Protection*, and *Notice on Strengthening Environmental Impact Assessment Management of Construction projects* financed by International Financial organizations, and requirements under World Bank's safeguard policies, World Bank Financing Duchang Water Environment Management Project calls for environmental impact assessment, therefore the construction agency commissions CERI eco Technology Co., Ltd. to draw up the Environmental Assessment Report of the project. After accepting the commission, our company immediately organized technical teams to carry out on-site surveys and collect relevant information, then prepared the Environmental Assessment Report in accordance with relevant technical guidelines and regulations. It will be submitted to the construction agency and presented to World Bank for approval. It can also be taken as the basis of pollution prevention efforts.

1.3 EIA Objectives

Environmental Impact Assessment will evaluate the positive environmental impacts of the project implementation; identify, screen and predictively analyze the possible negative environmental impacts; put forward specific and effective

environmental impact mitigation measures and Environmental Management Plan for the main inevitable adverse effects. The report can provide the basis for World Bank to make independent assessment on the project, and also provide a basis of decision-making and management for Government Comprehensive Management Department and Environmental Management Department.

1.4 Basis for EIA Preparation

1.4.1 National Laws and regulations and rules on environmental protection

(1) *Environmental Protection Law of the People's Republic of China* (2014.4);

(2) *Environmental Impact Assessment Law of the People's Republic of China* (revision) (2016.7);

(3) *Law of the People's Republic of China on Water Pollution Prevention and Control* (2008.6);

(4) *Law of the People's Republic of China on Atmospheric Pollution Prevention and Control* (2015.8);

(5) *Law of the People's Republic of China on Prevention and Control of Ambient Noise Pollution* (1997.3);

(6) *Law of the People's Republic of China on the Prevention and Control of Environment Pollution Caused by Solid Wastes* (2013.6);

(7) *Law of the People's Republic of China on Land Administration* (2004.8);

(8) *Law of the People's Republic of China on the Protection of Wildlife* (2004.8);

(9) *Law of the People's Republic of China on the Protection of Cultural Relics* (revision) (2015.6);

(10) *Water Law of the People's Republic of China* (2002.8);

(11) *Law of the People's Republic of China on Flood Control* (amendment) (2015.4);

(12) *Law of the People's Republic of China on Soil and Water Conservation* (2010.12);

(13) *Urban and Rural Planning Law of the People's Republic of China* (2007.10);

(14) *Regulation on the Implementation of the Water and Soil Conservation Law of*

the People's Republic of China (1993.8);

(15)*Regulations of the People's Republic of China on Nature Reserves* (October, 9, 1994);

(16)*Regulations on Scenic and Historic Areas* (State Council Decree No. 474, September 19, 2006);

(17)*Measures for the Administration of National Wetland Park* (trial implementation) (Lin Shi Fa No. 1 [2010], Feburary 2, 2010);

(18)*Provisions on Administration of Wetland Protection* (State Forestry Administration Decree No. 32, March 28, 2013);

(19)*Regulations on Basic Farmland Protection* (State Council Decree No.257, 1998);

(20)*Regulations of the People's Republic of China on River Channel Administration* (State Council Decree No. 3, March, 1988);

(21)*National Ecological Environment Protection Program* (Guo Fa [2000] No. 38, November, 2000);

(22)*Regulations on Administration of Environmental Protection in Construction Projects* (State Council Decree No. 253, November 29, 1998);

(23)*Administration of Environmental Impact Assessment of Construction Projects by Means of Classification Catalogue* (2015.4);

(24)*Interim Procedures of Public Participation in Environmental Impact Assessment* (State Environmental Protection Administration Huan Fa [2006] No. 28, March 18, 2006);

(25)*Decision of State Council on Implementing Scientific Outlook on Development and Strengthening Environmental Protection* (Guo Fa [2005] No. 39);

(26)*Opinions on Enhancing Supervisions of Resource Development and Ecological Environmental Protection* (State Environmental Protection Administration Huan Fa [2004] No. 24);

(27)*Provisions on Environmental Pollution Prevention and Control Administration of Drinking Water Source Protection Area* (revision) (October, 2010);

(28)*Catalogue for Guiding Industry Restructuring* (2011 Version) (2013

Amendment);

(29)*Notice on Strengthening Environmental Impact Assessment Management of Construction projects financed by International Financial organizations* (1993. 6).

1.4.2 Local Regulations on Environmental Protection

(1) *Regulations of Jiangxi Province on Environmental Protection in Development Projects* (amendment) (September 17, 2010);

(2) *Regulations of Jiangxi Province on Environmental Pollution Prevention and Control* (January 1, 2009);

(3) *Methods of Jiangxi Province for Prevention and Control of Pollution to Domestic Drinking Water Sources* (August 1, 2006);

(4) *Surface Water (Environment) Functional Divisions in Jiangxi Province* (reply vision) (People's Government of Jiangxi Province Gan Fu Zi [2007] No.35, June 29, 2007);

(5) *Regulations of Poyang Lake on Environmental Protection in Eco-economic Zone* (May 1, 2012);

(6) *Methods of Jiangxi Province for Land Acquisition Administration* (December 22, 2001)

1.4.3 Technical Guidelines and Regulations of Environmental Impact Assessment

(1) *Technical Guidelines on EIA: General Principles* (HJ2.1-2011);

(2) *Technical Guidelines on EIA: Atmospheric Environment* (HJ2.2-2008);

(3) *Technical Guidelines on EIA : Surface Water Environment* (HJ/T2.3-93);

(4) *Technical Guidelines on EIA : Groundwater Environment* (HJ610-2016);

(5) *Technical Guidelines on EIA: Acoustic Environment* (HJ2.4-2009);

(6) *Technical Guidelines on EIA: Ecological Impacts* (HJ19-2011);

(7) *Technical Guidelines on Assessment of Environmental Risks of Development Projects* (HJ/T 169-2004);

(8) *Technical Specifications for Ecological environmental Assessment* (HJ/T 192-2006);

(9) *Technical Specifications for Acoustic Environment Functional Divisions* (GB/T15190-2014).

1.4.4 World Bank Safeguard Policies

Table 1-4 World Bank Safeguard Policies

World Bank Operational Policy and Procedures	Whether Involved	Reasons for Involvement
OP/BP4.01 Environmental Assessment	√	The project is covered by the policy. The project is a water environment management project. It can reduce pollutants which flows into surface water, promote local environment quality, bring positive environmental efficiency and produce some adverse impacts: for example (1) common impacts of construction; (2) equipment noise and waste gas from transfer stations during the operation period.
OP/BP4.04 Natural Habitats	×	The project is not covered by the policy. Construction sites are situated in the urban area and townships, not in natural habitats.
OP/BP 4.36 Forestry	×	The project is not covered by the policy. The project will not influence health and quality of forests. It will not affect the benefits of people who own the forests and independent relations between people and forests.
OP/BP 4.09 Pest Management	×	The project is not covered by the policy. The project does not involve purchasing of pesticides, so it won't increase the usage of pesticides.
OP/BP 4.11 Cultural Property	×	The project is not covered by the policy. According to on-site surveys, the project do not involve cultural property.
OP/BP 4.10 Indigenous People	×	The project is not covered by the policy. The project areas do not include aborigines or minority areas.
OP/BP 4.12 Involuntary Resettlement	√	The project is covered by the policy. Construction activities will temporarily and permanently occupy some lands.
OP/BP 4.37 Safety on Dams	×	The project is not covered by the policy. Construction contents do not cover any dam works, and the construction will not rely on any existing dams or any dams under construction.
OP/BP 7.50 Projects on International Waterways	×	The proposed construction site is Duchang County, Jiujiang City, Jiangxi Province, China, and it doesn't involve international waterways.
OP/BP 7.60 Projects in Disputed Areas	×	Construction sites are all located within Jiangxi Province, and there are no disputed areas.
BP17.50 Information Disclosure	√	EA documents have carried out public consultation and information disclosure.
IFC *Environmental, Health and Safety General Guidelines*	√	IFC *Environmental, Health and Safety General Guidelines* can apply to the project.
IFC *Water and Sanitation, Health and Safety General Guidelines*	√	IFC *Water and Sanitation, Health and Safety General Guidelines* can apply to the project.
IFC *Waste Management Facility Environment,*	√	IFC *Waste Management Facility Environment, Health and Safety General Guidelines* can apply to the project.

Health and Safety General Guidelines		

1.4.5 Relevant Project Documents

(1) Project Feasibility Study Reports;

(2) Project Resettlement Plan;

(3) Project Social Impact Assessment.

1.5 EIA Contents and Key Points

Pursuant to domestic EIA technical guidelines and World Bank requirements, Environmental Assessment Report of this project focuses on answering the following questions:

(1) The project characteristics and main possible environmental problems;

(2) The rationality of the location selected in the project and main environmental protection targets (sensitive spots);

(3) Possible environmental benefits and negative environmental impacts during the project implementation;

(4) Mitigation measures for the possible adverse impacts of the project;

(5) Alternative analysis;

(6) EMP.

1.6 EIA Standards

IFC *Environmental, Health and Safety General Guidelines* (EHS) contains standards and requirements for atmospheric emissions, noise and acoustic environment quality, wastewater and waste management, occupational health and safety.

EIA Standards which can apply to the project are finally determined after the comparative analysis between domestic standards and that in World Bank EHS. Specific comparative analysis and results are shown as follows.

1.6.1 Environmental Quality Standards

1.6.1.1 Atmospheric Environment

According to EHS, domestically legislative standards shall be applied to ambient

air quality. If there is no domestically legislative standards, then latest *The World Health Organization Air Quality Guidelines* or other internationally recognized references shall be applied. See Table 1-5. China has issued *Ambient Air Quality Standards* (GB3095-2012). The project is classified into Category II in ambient air functional divisions, and subject to Category II Standard in *Ambient Air Quality Standards* (GB3095-2012). See Table 1-3. And standards of NH3 and H2S in *Hygienic Standards for the Design of Industrial Enterprises* (TJ36-79) shall be applied in subprojects involving in waste transfer stations. Specific standard values are provided in Table 1-6.

Table 1-5 Ambient Air Quality Standards in EH (μg/m3)

Item	Average period	Guidance Value	Standard
SO_2	24 h	125 (the target value at the first stage) 50 (the target value at the second stage)	*Global Air Quality Guidelines* of The World Health Organization
	10 min	20 (guidance) 500 (guidance)	
NO_2	1 a 1 h	40 (guidance) 200 (guidance)	
PM_{10}	1 a	70 (the target value at the first stage) 50 (the target value at the second stage) 30 (the target value at the third stage) 20 (guidance)	
	24 h	150 (the target value at the first stage) 100 (the target value at the second stage) 75 (the target value at the third stage) 50 (guidance)	
$PM_{2.5}$	1 a	35 (the target value at the first stage) 25 (the target value at the second stage) 15 (the target value at the third stage)	

	24 h	10 (guidance) 75 (the target value at the first stage) 50 (the target value at the second stage) 37.5 (the target value at the third stage) 25 (guidance)	

Table 1-6 Ambient Air Quality Standards Unit: μg/m3

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	
NH_3	200 (value at a time)	-	*Hygienic Standards for the Design of Industrial Enterprises* (TJ36-79)
H_2S	10 (value at a time)	-	

As comparison shows, if the item is NO2, the hourly average and the annual average value of Chinese national standards are in accordance with guideline value of EHS. If the item is PM10, the hourly average and the annual average value of Chinese national standards are in accordance with the target value in Stage I of EHS. If the item is PM2.5, the hourly average and the annual average value of Chinese national standards are in accordance with the target value in Stage I of EHS. If the item is SO2 the hourly average and the annual average value of Chinese national standards are lower than the target value in Stage I of EHS.

According to EHS, the specified standard of national legislation should be applied to ambient air quality. Therefore, relevant standards in Table 1-6 are applied.

1.6.1.2 Water Environment

The project involves Zoujiaju Lake, and Category III Standard in *Surface Water Environment Quality Standards* (GB3838-2002) is applied. Zoujiaju Lake is the water region for landscape and amusement, and now its water quality is classified into Category inferior V. See details in Table 1-6.

Table 1-7 Surface Water Environment Quality Standards (Excluding mg/l, pH)

EIA factors	*Surface Water Environment Quality Standards* (GB3838-2002)	
	Category III Standard	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 (lake, reservoir 0.05)	≤0.4 (lake, reservoir 0.2)
Petroleum	≤0.05	≤1.0
Sulfide	≤0.2	≤1.0
Fecal coliform	≤10000	≤40000

1.6.1.3 Acoustic Environment

Standard limited values of water environment in Chinese National Standards (CNS) and noise guidelines in EHS are presented in Table 1-8.

Table 1-8 Comparison of Acoustic Environment Quality Standards (dB(A))

Acoustic Environment Quality Standards (GB3096-2008)				Noise Guidelines in EHS		
Applied Region	Category of Functional Area	Daytime 6:00-22:00	Nighttime 22:00-6:00	Receptor	Daytime 7:00-22:00	Nighttime 22:00-7:00
Dwelling, health care, cultural education, research design and working	Category I	55	45	Dwelling; working; cultural education	55	45
Dwelling, business, and industry mixed zones	Category II	60	50	Industry; business facilities	70	70
Both sides of traffic artery	Category IV A	70	55			

The project is in the urban area of Duchang County and Beishan Township, Dashu Township and Wangdun Township. In particular, the urban area belongs to Dwelling and Business Mixing Zones; the three townships belong to rural area, and the residential district is the main district. After comparative analysis, the project decides that *Acoustic Environment Quality Standards* (GB3096-2008) is applied. See the following table for specific values of applied acoustic environment quality

standards.

Table 1-9 Acoustic Environment Quality Standards (dB(A))

Item	Category	Applied Region	*Acoustic Environment Quality Standards* (GB3096-2008)	
			Daytime	Nighttime
Acoustic Environment	Category I	Beishan Township, Dashu Township and Wangdun Township	55	45
	Category II	Urban Areas of the County	60	50

1.6.1.4 Soil

Category II standard in *Soil Environment Quality Standards* (GB15618-1995) and *Standards for Control of Pollutants in Agricultural Sludge* (GB4284-84) are applied in Zoujiazui Lake desilting subproject. Specific standard limited values are shown in Table 1-9.

Table 1-10 Soil Environment Quality Standards

Item \ Applied Standard	*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

1.6.2 Pollutant Emission Standards

1.6.2.1 Atmospheric Pollutant

Monitoring limited values of fugitive emission in *Comprehensive Atmospheric Pollutant Emission Standards* (GB16297-1996) are applied to construction dust and dust generated during the operation period in waste transfer station. See Table 1-10.

Fugitive emission Category II Standard of *Odorous Pollutant Discharge Standards* (GB14554-93) is applied for odor produced during the operation period of waste transfer station. See Table 1-11 for standard limits.

Table 1-11 Comprehensive Atmospheric Pollutant Emission Standards (Excerpt)

Pollutant	Fugitive Emission Monitoring Limited Values

Particulate Matter	Monitoring Site	Concentration (mg/m^3)
	Concentration peak outside the boundary	1.0

Table 1-12 Odorous Pollutant Discharge Standards (Excerpt) Unit: mg/m^3

Pollutant	Fugitive Emission Monitoring Limited Values (New and Improvement or Expansion)
NH_3	1.5
H_2S	0.06

1.6.2.2 Water Pollutants

Sewage collected by pipe network of the project, sewage in public toilets of Zoujiazui Lake Wetland Protection System Engineering and domestic sewage produced during the operation period of Water Quality Monitoring Center are discharged in to Duchang wastewater treatment plant through sewage pipe network. Category B Standard in *Water Quality Standards of Sewage Discharged into Urban Sewers* (GJ343-2010) is applied. See table 1-13 for details. When the effluent reaches Category IB Standard in *Pollutant Discharge Standards for Urban Wastewater Treatment Plants* (GB18918-2002), it can be eventually discharged into Poyang Lake. See Table 1-14 for details.

Table 1-13 Water Quality Standards of Sewage Discharged into Urban Sewers (unit: mg/L)

No.	Item	Category B	No.	Item	Category B
1	COD	500	9	Total Pb	1
2	BOD_5	350	10	Total Cr	1.5
3	SS	400	11	Total Ni	1
4	NH_3-N	45	12	Total Zn	5
5	pH	6.5-9.5	13	Total Cu	2
6	TN	70	14	Total Mn	5
7	TP	8	15	Total Fe	10
8	Total Cd	0.1	16	Total As	0.5

Table 1-14 Pollutant Discharge Standards for Urban Wastewater Treatment Plants (unit: mg/L)

No.	Item	Category IB Standard
1	COD	60
2	BOD_5	20
3	SS	20

4	NH_3-N	8 (15)
5	pH	6-9
6	TN	20
7	TP	1

Notes: Values outside brackets are controlling index when the water temperature is above 12℃, and values inside brackets are controlling index when the water temperature is below or equal to 12℃.

1.6.2.3 Noise

Standards for Ambient Noise Emission at Construction Site Boundary (GB12523-2011) is applied for construction noise of the project. Category I Standard in *Emission Standards for Industrial Enterprises Noise at Boundary* (GB12348-2008) is applied for equipment noise produced during the operation period of the waste transfer station. See Table 1-15 for specific standard limits.

Table 1-15 Standard Applied for Noise Emission (dB(A))

Item	*Emission Standards for Industrial Enterprises Noise at Boundary* (GB12348-2008)	*Standards for Ambient Noise Emission at Construction Site Boundary* (GB12523-2011)
	Category I	Standards for Noise Emission at Construction Site
Daytime	55	70
Nighttime	45	55

1.6.2.4 Solid Waste

Pollutant Control Standards for Storage and Disposal Sites of General Industrial Solid Waste (GB18592-2001) is applied for the storage and disposal of domestic waste under the project; hazardous waste produced from monitoring laboratory under the project shall be subjected to *Standard for Pollution Control on Hazardous Waste Storage* (GB18597-2001), and at the same time to the requirements of EHD and relevant World Bank Safeguard Policies.

1.7 Environmental Impact Factors and Assessment Factors

The assessment first adopts the matrix method to identify the major environmental problems under the project. See the following table.

Table 1-16 Matrix Table of Environmental Impact Identification

Environmental	Pollution factors	Construction period	Operation period

medium		Pipe network engineering	Water system restoration	Waste collection and transportation engineering	Water environment monitoring system	Pipe network engineering	Water system restoration	Waste collection and transportation engineering	Water environment monitoring system
Atmosphere	Particulate matter	△	—	△	△	—	—	△	—
	Odor	—	—	—	—	—	—	△	—
Water	COD	—	—	—	—	●	●	●	—
	BOD_5	—	—	—	—	●	●	●	—
	SS	—	—	—	—	●	●	●	—
	NH_3-N	—	—	—	—	●	●	●	—
	TP	—	—	—	—	●	●	●	—
Noise	Noise	△	—	△	△	—	—	—	—
Solid waste	Solid waste	△	△	△	△	—	—	●	△
Social impact	Impacts on business, traffic and municipal facilities	▲	—	—	—	●	●	●	—

Instruction: ▲ represents significantly negative impacts, and △ represents common negative impacts; ● represents significantly positive impacts, and ○ represents common positive impacts; — represents no impacts.

From the table above, it can be seen that the major problems of the project are:

(1) Construction period: common impacts such as construction dust, waste water, noise and solid waste during the construction period; social influence that construction of the pipe network engineering suspends business, traffic and municipal facilities; influence caused by desilting;

(2) Operation period: mainly positive impacts on environment; negative impacts like odor and leachate of waste collection and transportation engineering, and impacts of experimental waste in laboratory of water quality monitoring center on environment.

According to environmental impact identification, the assessment factors involved in the assessment are shown in table 1-17.

Table 1-17 List of Assessment Factors

Medium	Status quo assessment factors	Impact prediction and assessment factor
Atmosphere	SO_2, NO_2, PM_{10}, TSP	NH_3, H_2S
Surface water	pH, COD, BOD_5, NH_3-N, TN, TP	COD, BOD_5, NH_3, NH_3-N, TN, TP
Noise	Equivalent sound level Leq(A)	Equivalent sound level Leq(A)
Ecological	Animal and plant resources	—

environment		
Solid waste	—	Amount of silt, earthwork and waste collected and transported

1.8 Environmental Protection Targets

1.8.1 Acoustic Environment and Atmospheric Environment Protection Targets

Pursuant to the field investigation of project teams, acoustic environment and atmospheric environment protection targets involved in each subproject are provided in Table 1-18.

Table 1-18 List of Acoustic Environment and Atmospheric Environment Protection Targets

Engineering content	Influential stage	Influential factor	Name of sensitive spots	Location	Distance (m)	Number of household/people
1) General sensitive spots						
Sewage Pipe Network Improvement Subproject	Construction period	Construction dust, machinery noises	Zhanghe Village	Upper reaches of Zoujiazui Lake, west of sewage pipe network	10	20 households
			Chengbei Spring	Middle reaches of Zoujiazui Lake, southeast of sewage pipe network	70	200 households
			Dawanlv Village	Middle reaches of Zoujiazui Lake, southeast of sewage pipe network, north of Wanli Avenue	10	180 households
			Xuzongshi Village	Middle reaches of Zoujiazui Lake, south and north of sewage pipe network	10	180 households
			Zhaoshengmian Village	Lower reaches of Zoujiazui Lake, west of sewage pipe network	10	30 households
			Yangjiagang	Lower reaches of Zoujiazui Lake, west of sewage pipe network	10	50 households
			Zoujiazui	Lower reaches of Zoujiazui Lake, west of sewage pipe network	10	220 households
			Xiawanlv Village	South and north of Wanli Avenue	20	200 households
			Ruanlonggao	North of Wanli Avenue	15	200

Engineering content	Influential stage	Influential factor	Name of sensitive spots	Location	Distance (m)	Number of household/people
			Village			households
			Changlingzhou Village	South of Wanli Avenue	20	100
			Huimin Community	South of Wanli Avenue	15	200 households
			Tongshu Village	South and north of Wanli Avenue	15	220 households
			Caojia Village	North of Wanli Avenue	15	50 households
			Sunshine Community	South of Yingbin Avenue	20	200 households
			Xinghuo Village	Northeast of Donghu Avenue, west of sewage pipe network	15	150 households
			Shiqiaoshao Village	Northeast of Donghu Avenue, west of sewage pipe network	15	100 households
			Shijihuating	Northeast of Donghu Avenue, north of sewage pipe network	20	200 households
			Yingzuibanchen Village	Northeast of Donghu Avenue, east of sewage pipe network	80	100 households
			Shenjia	Northeast of Donghu Avenue, north of sewage pipe network	15	50 households
			Defujiayuan	Northwest of Donghu Avenue, north of sewage pipe network	40	180 households
			Xiangyangsan Village	Northwest of Donghu Avenue, east of sewage pipe network	15	80 households
			Zhoujiazui	North of Donghu Avenue	15	30

Engineering content	Influential stage	Influential factor	Name of sensitive spots	Location	Distance (m)	Number of household/people
						households
			Zhaojiazui	South of Donghu Avenue	40	20 households
			Tubuchen Village	South of Donghu Avenue	20	15 households
			Dayanhuang Village	South of Donghu Avenue	15	100 households
			Chenjialong Village	South of Donghu Avenue	15	50 households
			Huapu International Residence	South of Donghu Avenue	20	200 households
			Luojialing Village	North of Donghu Avenue	15	120 households
			Liufang Village	South of Donghu Avenue	40	80 households
Water System Ecological Restoration and Protection Subproject	Construction period	Construction dust, machinery noises	Zhaoshengmian	West of Zoujiazui water system	30	30 households
			Yangjiagang	West of Zoujiazui water system	30	50 households
			Zoujiazui	West of Zoujiazui water system	15	220 households
			Shaojiazhe	East of Zoujiazui water system	180	50 households
			Shao Village	East of Zoujiazui water system	100	120 households

Engineering content	Influential stage	Influential factor	Name of sensitive spots	Location	Distance (m)	Number of household/people
			Bajiazui	Northeast of Zoujiazui water system	30	120 households
			Siguayan	East of Zoujiazui water system	20	120 households
2) Key sensitive spots						
Sewage Pipe Network Improvement Subproject	Construction period	Construction dust, equipment noises	Duchang County Central Kindergarten	Lower reaches of Zoujiazui Lake	10	Under construction
			Duchang Experimental Primary School	Lower reaches of Zoujiazui Lake, south of sewage pipe network	80	5,500 People
			The Third Primary School in Duchang	North of Wanli Avenue	15	4,000 People
			County Maternal and Child Care Service Center	North of Wanli Avenue	15	262 People
			Qinjiafan Primary School	South of Wanli Avenue	40	1,500 People
			Concord Hospital	South of Donghu Avenue	15	300 People
Domestic Waste Collection and Transportation	Operation period	Odors during the operation period	Bachuantang	East of Beishan Township waste transfer station	200	10 households
			Yanggang Village	South of Wangdun Township waste transfer station	70	3 households
			Yanggang Village	South of Dashu Township waste transfer station	20	10 households

Engineering content	Influential stage	Influential factor	Name of sensitive spots	Location	Distance (m)	Number of household/people
Subproject						

1.8.2 Water Environment Protection Targets

Water Environment Protection Targets under the project are shown in Table 1-19.

Table 1-19 List of Water Environment Protection Targets

No.	Name of Protection Target	Water Function
1	Zoujiazui Lake	Common landscape water

1.8.3 Ecological Environment Protection Targets

Ecological Environment Protection Targets under the project are presented in Table 1-20.

Table 1-20 List of Ecological Environment Protection Targets

Environmental medium	Protection target	Protection target
Ecological environment	Terrestrial plants	Plants damaged by permanently and temporarily occupied lands in the project
	Aquatic organisms	Aquatic organisms living in Zoujizui Lake
	Wild animals	Wild animals in the affected area of the project

1.8.4 Social Environmental Protection Targets

Social Environment Protection Targets in the project are listed in Table 1-21.

Table 1-21 List of Social Environment Protection Targets

No.	Protection target	Overview of protection target
1	Infrastructure	Existing roads and buildings
2	Traffic blockage	The traffic and safety of residents, schools, hospitals, business along streets during project construction
3	Municipal facilities	Municipal service facilities like water supply and power supply

2 Project Description

2.1 Project Overview

2.1.1 Project Components

(1) Project name: World Bank-financed Duchang County Water Environment Management Project

(2) Construction agency: Leading Group Office of The World Bank-financed Duchang Water Environment Management Project

(3) Construction sites: Urban Areas of Duchang County and three suburban townships (Beishan Township, Dashu Township and Wangdun Township), Jiujiang City, Jiangxi Province. Project Location sees Figure 1.

(6) Project designs:

Details of project designs and construction contents are indicated in Table 2-1.

Table 2-1 List of Project Designs and Construction Contents

Project name	Item	Construction content	Type of construction	Construction sites	Service scope
Urban Sewage Pipe Network Improvement Subproject	Sewage pipeline	Sewage pipeline with a total length of 20.10 km and the pipe diameter being DN400-DN1200	Reconstruction	Urban built-up area	Urban built-up area with an area of 14.28 km^2, and service population of around 1.53 million
	Rainwater pipeline	Rainwater pipeline with a total length of 8.7 km and the pipe diameter being d800-d1500	Reconstruction	Urban built-up area	
Zoujiazui Lake Water System Ecological Restoration and	Sewage interception	The new interception sewer with a total length of 4.0 km and the pipe diameter being DN600-DN800	New	Villages along Zoujiazui Lake water system and Furongshan Industrial Park	Villages along Zoujiazui Lake water system covering an area of 10,000 people and
	Control of Inner Source	Dredging amount being about 8,000 m3, dredging depth being about 0.3 m, and the lake area being about 25,610 m2	New	Zoujiazui Lake to the east side of Chengxi Avenue	

Project name	Item	Construction content	Type of construction	Construction sites	Service scope
Protection Subproject	Low impact development (LID) facilities	①Sponge city pilot in Furongshan Avenue will newly build rainwater pipelines with a length being 1.7km and the pipeline diameter being d1000-d1800; ②Low elevation greenbelt covering a area of 5,000 m2; ③Sidewalk porous pavement covering an area of about 10,000 m2. ④Public parking space in Furongshan Industrial Park will be rebuilt with porous pavement covering an area of about 2,000 m2.	Improvement	Furongshan Industrial Park	Furongshan Industrial Park
	Ecological restoration	The combination of retaining walls and ecological slope protection is used to restore water system with a length being about 0.8 km. Ecological restoration and protection is about 3.0 km long covering a total area of 26.82 ha. In particular, the waters area is 13.27 ha, the footpath land area is 1.14 ha, the construction land area is 0.05 ha, the pavement land area is 0.86 ha , and the greenbelt land area is 11.50 ha		Zoujiazui Lake	
Domestic Waste Collection and Transportation of the Three Suburban	Waste collection and transportation system	Three new waste transfer stations: Beishan Township with collection capacity being 22 t/d, Wangdun Township with collection capacity being 29 t/d, Dashu Township with collection capacity being 25 t/d. Building waste collection and transportation system	New	Beishan Township, Wangdun Township, and Dashu Township	Beishan Township, Wangdun Township, and Dashu Township

Project name	Item	Construction content	Type of construction	Construction sites	Service scope
Townships Subproject					
Other works	Rooms for county water environment monitoring system	Total construction covering an area of about 1250m^2, including laboratory, control room, data analysis room, information distribution, interactivity and other functional rooms	New	Nanshan Avenue near Huanhu Avenue	Duchang County
	Water environment automatic monitoring station at monitoring cross sections of the boundary	An automatic monitoring station of water environment with a total area of 153.5 m^2 shall be placed in the first cross section; an monitoring station of buoy-based water quality shall be set up in the second cross section	New	The first cross section is set at the intersection of Laowucao Village, Shishan Township and Tieluxia Village and, Sanchagang Town; the second cross section is set in Xiaojishangang near Zhongbawangjia	Duchang County
	Automatic water environment measurement sites	7	New	West of Jinchang Road (Furongshan Industrial Park), west of Furongshan Avenue (Furongshan Industrial Park), middle reaches of Zoujiazui Lake water system (west of Wanli Avenue), Zoujiazui sluice, east of Zoujiazui Lake (sewage intercepting well and overflow well), and Donghu Lake (a total 7 sites)	Duchang County
Project investment	Total estimated cost of the project is RMB 174,073,600 yuan, which includes a proposed loan of U$20 million (RMB 132 million yuan) from the World Bank and RMB 42,073,600 yuan of counterpart funds from the superior support and local governments' self-funding.				

2.1.2 Project Scale

2.1.2.1 Sewage Quantity Prediction

When the project is completed in 2030, there will be a population of 1.95 million and the area of industrial lands will be 2.0 km^2. In a long term of 2030, there will be a population of 2.47 million and the area of industrial lands will be 4.6 km^2. Water consumption index and sewage emission factors above are adopted to predict sewage quantity. See Table 2-2.

Table 2-2 Prediction Table of Duchang Urban Sewage Quantity

Type	The project completion (2023)		A long term (2030)	
	Population (10,000 people)	Industrial lands (km^2)	Population (10,000 people)	Industrial lands (km^2)
Amount	19.0	2.0	24.7	4.6
The average of water consumption	180 L/(person·d)	2,000 m^3/（km^2·d）	220L/(person·d)	2,500 m^3/(km^2·d)
The average of sewage quantity (10,000 m^3/d)	2.74	0.3	4.35	0.8
Total sewage quantity (10,000 m^3/d)	3		5.2	

In the project completion of 2022, the average of newly increased sewage produced by Furongshan Industrial Park will be 3,000 m^3/d, and the quantity of newly increased urban sewage will be about 5,000 m^3/d, then a sewage treatment scale of 30,000 m^3/d will be formed; in 2030, the average quantity of newly increased sewage produced by Furongshan Industrial Park will be 8,000 m^3/d, and the quantity of newly increased urban sewage will be 6,000 m^3/d, the a sewage treatment scale of 52,000 m^3/d will be formed.

2.1.2.2 Waste Quantity Prediction

In accordance with information provided by each township, the population and predicted production of waste in townships are presented in the following table. According to the actual measurement and relevant regulations, domestic waste production per capita is 0.7kg/person·d. The proportion of recyclable waste and unrecyclable waste is 2:8.

Table 2-3 Population and Waste Predictions of the Three Townships

Townships	Permanent population (people)	Total quantity of waste (t/d)	Quantity of unrecyclable waste (t/d)	Quantity of unrecyclable waste (t/d)
Beishan Township	18,424	12.9	2.6	10.3
Wangdun Township	24,696	17.3	3.5	13.8
Dashu Township	21,448	15.0	3.0	12.0

Calculation formula of domestic waste collection quantity in service districts:

$$Qc=nq/1000$$

In which, Qc—daily transfer quantity of domestic waste in transfer station (t/d);

n—resident population in service districts, here using rural permanent population for calculation;

q—per capita daily production of domestic waste in service districts (kg/person·d), here q is 0.7 kg/person·d;

Table 2-4 Waste Production Prediction in Three Suburban Townships of Duchang County

No.	Township	Average treatment quantity Qc	Treatment quantity of waste transfer station Q_D
1	Beishan Township	10.3	22
2	Wangdun Township	13.8	29
3	Dashu Township	12.0	25
4	Total	31.6	76

The waste transfer station of the subproject will compress and then transfer the unrecyclable components (85%) of domestic waste in the three suburban townships. Calculation formula of design scale of transfer station:

$$Q_D=Ka\cdot Ks\cdot Qc$$

In which, Qc—daily transfer quantity unrecyclable domestic waste in transfer station (t/d);

Ka—population variation factors in service districts, during festivals, migrant

workers come back and the service population is 1.4 times as many as that at normal period. So Ka is 1.4.

Ks—seasonal fluctuation factors of waste discharge, here Ks is 1.5;

Treatment quantity calculated of waste transfer station in the three townships is provided in the following table.

Table 2-5 Treatment Quantity of Waste Transfer Station in the Three Townships (t/d)

No.	Township	Daily production quantity of unrecyclable waste Qc	Treatment quantity of waste transfer station Q_D
1	Beishan Township	10.8	22.7
2	Wangdun Township	17.6	37.0
3	Dashu Township	13.7	28.8
4	Total	42.1	88.5

2.1.2.3 Engineering Quantity

1. Modification works of drainage network

As for pipes with diameters being DN600 and less, the pipe uses HDPE winding reinforcing pipes; as for pipe with diameters being DN600 and more, the pipe uses continuous winding FRP (fiberglass reinforced plastics) pipes; the pipe-jacking uses continuous winding FRPM (fiberglass reinforced plastic mortar) pipes. The main engineering quantity is:

(1) Sewage pipeline of DN400-DN1200 with a total length of about 1411.36 km;

(2) Rainwater pipeline of DN800-DN1500 with a total length of about 8.7 km;

(3) Transforming Zoujiazui Lake drainage culvert, with a length of about 15 m, the size of 5.0×2.5m, and the low elevation of 2.7 m.

Table 2-6 Engineering Quantity of Urban Sewage Pipe Network Improvement Subproject

No.	Type	Subproject name	Engineering quantity	Unit	Note	Road restoration
1	Sewage	DN1200 sewage pipeline and its appurtenance	1455	m		Bicycle lane

2		DN800 sewage pipeline and its appurtenance	470	m		covering 53,000 m^2 is restored
3		DN600 sewage pipeline and its appurtenance	2850	m	Wanli Avenue is 1720m long	
4		DN500 sewage pipeline and its appurtenance	1540	m	Wanli Avenue is 1540m long	
5		DN400 sewage pipeline and its appurtenance	5049	m	Wanli Avenue is 4264m long	
6	Rain water	D1500 rainwater pipeline and its appurtenance	1200	m	Wanli Avenue laying	
7		D1200 rainwater pipeline and its appurtenance	2232	m	Wanli Avenue laying	
8		D1000 rainwater pipeline and its appurtenance	3125	m	Wanli Avenue laying	
9		D800 rainwater pipeline and its appurtenance	2185	m	Wanli Avenue laying	
10		Transforming Zoujiazui Lake drainage culvert 5.0×2.5	15	m	Low elevation is about 2.7m	

2. List of Engineering Quantity for Ecological Restoration and Protection of Zoujiazui Lake Water System

The service scope of Zoujiazui Lake water system ecological restoration and protection subproject is within Zoujiazui Lake water system basin. The project implementation will promote lake functions, and water environment. The main engineering quantity:

(1) The total length of interception sewer in Zoujiazui Lake water system and its additional facilities of DN600-DN800 is about 4.0 km (DN600 is 2,880 m long, and DN800 is 1,100 m long).

Sponge city pilot in Furongshan Avenue: the total length of the eastern section of rainwater pipeline in Furongshan Avenue and its additional facilities of DN1000-DN1800 is about 1.7 km (DN1,000 is 850 m long, DN1500 is 430m long, and DN1800 is 420 m long);

The total area of low elevation greenbelt is about 5,000 m^2;

The total area of sidewalk porous pavement is about 10,000 m^2.

Sponge city pilot in Furongshan Industrial Park: public parking space in Furongshan Industrial Park rebuilt with porous pavement being about 2,000 m^2.

(2) Water system restoration, combined with retaining walls and ecological slope protection, is about 0.8 km long;

Lake dredging of Zoujiazui Lake to the east side of Chengxi Avenue, about 8000m^3;

Engineering quantity of wetland protection system is shown in the following table.

Table 2-6 List of Engineering Quantity of Wetland Protection System

Item		Unit of measure	Value	Proportion
Total planned land area		ha	26.82	100.00%
Water area		ha	13.27	
Footpath land		ha	1.14	
Construction land		ha	0.05	
Pavement land		ha	0.86	
Greenbelt land		ha	11.50	
Including	Hard pavement	m^2	2200	
	Wooden trestle and wooden platform	m^2	3888	
	Footpath	m^2	11400	
	Toilet	Piece	4	
	Blue flagstone road	m	432	
	Water for landscape	m^2	2191	
	Steps	m^2	500	
	Wooden square pavilion	Piece	4	
	Wooden curved flower	Piece	2	
	Greenbelt	m^2	115000	
	Wetland revetment	m	1423	
	Wooden trestle revetment	m	651	
	Natural stone revetment	m	2564	
	Hard revetment	m	1490	
	Pebble	ton	200	Landscaping
	Benches for rest	Piece	80	
	Wooden waterfront platform	m^2	2091	
	Round tree grate	Piece	20	
	Signs	Piece	30	
	Waste bins	Piece	40	
	Small lookout bridge	Piece	6	About 3 m wide and 8 m long
	Lookout bridge	Piece	1	About 5 m wide and 42 m long

3. Waste Collection and Transportation Subproject

The engineering quantity of domestic waste collection and transportation system in the three suburban townships mainly includes waste cleaning, collect, transporting, equipment and facilitiesused for compression and transfer. Every cleaner is given a set of cleaning equipment. Waste collection spots shall be arranged according to village layout.

Table 2-7 Work Quantity of Waste Collection and Transportation System in Beishan Township

Item	Size/Specification	Number	Remarks
Cleaning instrument and equipment		56 sets	Brooms, spades, carts and reflective vests
Waste tank	6 m^2	227	
Waste bin	240 L	453	
Waste recycling truck	1.4 t	2	
Waste collector	1.4 t	5	
Waste transfer station	22 t/d	1	building area of 192 m2
			2 sets of compression equipment
			1 set of video monitoring system
			1 set of deodorization system with energetic and active oxygen ions
			1 set of high pressure washer
			1 set of central control system
Waste transfer truck	8 t	1	Compatible with compressors
Intelligent cloud platform for sanitation		1 set	

Table 2-8 Engineering Quantity of Waste Collection and Transportation System in Wangdun Township

Item	Size/Specification	Number	Note
Cleaning instrument and equipment		274	Brooms, spades, carts and reflective vests
Waste tank	6 m^2	314	
Waste bin	240 L	628	
Waste recycling truck	1,400 kg	6	
Waste collector	6 m^2	314	3 available
Waste transfer station	29 t/d	1	building area of 192 m^2
			2 sets of compression equipment

			1 set of video monitoring system
			1 set of deodorization system with energetic and active oxygen ions
			1 set of high pressure washer
			1 set of central control system
Waste transfer truck	8 t	1	Compatible with compressors
Intelligent cloud platform for sanitation		1 set	

Table 2-9 Dashu Township Waste Collection and Transportation System Engineering Quantity

Item	Size/Specification	Number	Note
Cleaning instrument and equipment		165	Brooms, spades, carts and reflective vests
Waste tank	6 m^2	244	
Waste bin	240 L	487	
Waste recycling truck	1400 kg	2	
Waste collector	1400 kg	6	2 available
Waste transfer station	<50 t/d	1	building area of 192 m^2
			2 sets of compression equipment
			1 set of video monitoring system
			1 set of deodorization system with energetic and active oxygen ions
			1 set of high pressure washer
			1 set of central control system
Waste transfer truck	8 t	1	Compatible with compressors
Intelligent cloud platform for sanitation		1 set	

4. Monitoring System

Engineering Quantity of water quality monitoring system is shown in Table 2-10, and the locations of automatic monitoring cross section for water environment and automatic measurement sites are shown in following pictures.

Table 2-10 List of Engineering Quantity of Water Quality Monitoring System

Component	Item	Number	Unit	Note
Room for water environment monitoring system	Number	1	Piece	At Nanshan Avenue close to Huanhu Road
	Number of floor	3	Floor	The main building consists of laboratory, control room, data analysis room, information distribution, interactive and other functional rooms. The main building is responsible for remote control, data collection and transmission, data statistics and application of water environment automatic monitoring station. Inside are set monitoring platform, TV wall with large screen and normal laboratory equipment.
	Height of floor	The first floor is 3.9 m high, the second and the third floors are both 3.6 m high	m	
	Building area	1250	m^2	
Water environment automatic monitoring station at monitoring cross sections of the boundary	Number	1	Piece	The first monitoring station is located at the intersection of Laowucao Village, Shishan Township and Tieluxia Village, Sanchagang Town, Poyang Lake, and an automobile monitoring station shall be set up in the first station site; the second monitoring station is located in Xiaojishangang near Zhongbawangjia, Poyang Lake and a buoy-based water quality monitoring station shall be set in the second station sit.
	Number of floor (single station)	2	Floor	Water quality automatic monitoring station is mainly used in the main building which restores system instruments and equipment, and external guarantee conditions. The main building consists of rooms for instruments and quality control.
	Height of floor (single station)	The first floor is 3m high, the second floor is 3.3m high	m	
	building area (single station)	153.5	m^2	
Automatic water environment measurement sites	Number	7	Piece	Set to the west of Jinchang Road (Furongshan Industrial Park), west of Furongshan Avenue (Furongshan Industrial Park), middle reaches of Zoujiazui Lake water system (west of Wanli Avenue), Zoujiazui sluice, east of Zoujiazui Lake (sewage intercepting well and overflow well), and Donghu Lake (total 7 sites)

No.1
monitoring
cross section

No.2
monitoring
cross section

Figure 2-1 Location of Cross-boundary Water Quality Monitoring Cross Section in Duchang County

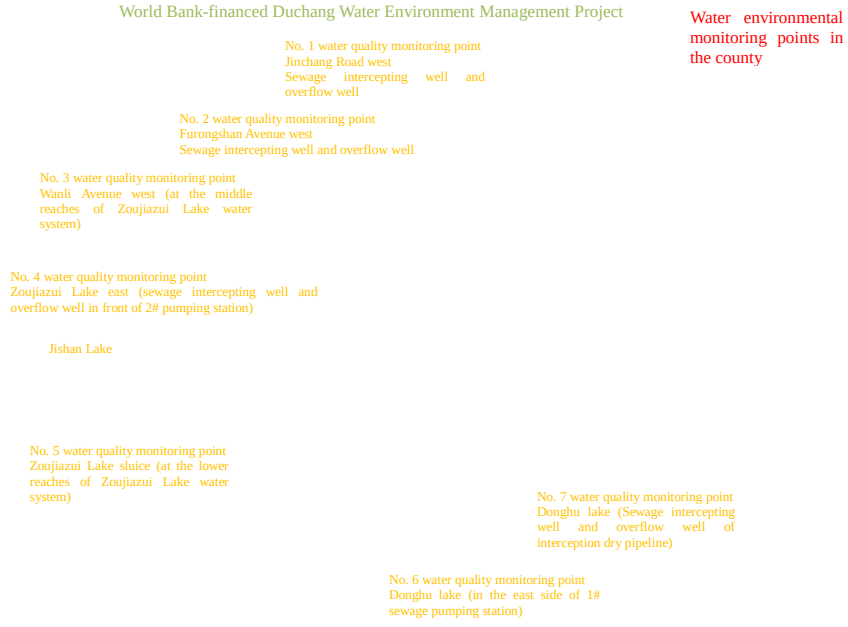


Figure 2-2 Location of Automatic Water Environment Measurement Sites

2.1.3 Construction Methods

2.1.3.1 Pipeline Construction Methods

Construction methods shall be determined on the basis of specific conditions like local soil quality, pipe diameters and placing depth.

①As for poor soil quality, difficulty and heavy excavation or construction under the built-up roads, the construction method of steel sheet pile supporting in excavation can be adopted. Shore shall be used in accordance with specific conditions to secure safety during the construction period. Meanwhile, section construction shall be considered: as soon as the completion and acceptance check of certain section are finished, foundation ditches shall be backfilled and earthed before excavation of next section.

②As for sections whose pipe placing depth is greater than or equal to 4.0 m, where the soil is soft, top unloading and steel sheet piles shall be used. Shore shall be used in accordance with specific conditions to secure safety during the construction period. Meanwhile, section construction shall be considered in case that large-scale excavation causes adverse consequences like foundation ditch collapse in the rainwater.

③When pipelines are laid under good-quality pavement, the excavating area is small, construction sites are closed to buildings, traffic volume of roads is large, roads are difficult to interrupt, or pipelines are laid cross rivers, pipe jacking and other non-excavation construction methods are usually adopted.

2.1.3.2 Management and Maintenance of Sewer

Management and maintenance of sewer shall be subjected to *Technical Specification for Safety of Urban Sewer maintenance* (CJJ6-2009).

1) Management and maintenance of sewer system

①Checking and accepting the sewer;

②Supervising the implementation of sewer using rules

③Often checking, flushing and clearing the sewer to maintain its smoothness;

④Repairing the sewer and its structures, and dealing with accidents.

The common troubles in the sewer: pollutants clogging the pipe; heavy external loads, inhomogeneous settlement of ground or erosion effects of sewage which will damage, crack and corrupt the pipeline.

2) Ways of clearing the sewer

Lack of water, small slope, too many solid impurities and bad quality

construction will produce sedimentation. Too much sedimentation will influence discharge capacity and even clog the sewer. Therefore, pipelines must be cleared at regular intervals. There is the hydraulic method and mechanical method.

①Hydraulic clearing method

Hydraulic clearing method is to flush the sewer using water. Sewage in pipes, tap water and river water can be used. As for using sewage in pipes, the pipe itself must have certain flow, at the same time, silt in the pipe should not be too much (20% or so). As for using tap water, water is commonly employed from fire hydrant or centralized hydrant in the street, or transported to the washing site by water trucks. Sewage branches in resident districts will use water of 2000-3000kg every time.

Hydraulic clearing method is easy and simple to carry out with high effectiveness, and the method is convenient for operators. According to some city experience, hydraulic clearing method can clean silt within not only 250 m of downstream pipeline, but also 150m of upstream pipeline to a great extent.

②Mechanical method

When the pipeline is clogged by silt seriously, that is to say, silt has been adhesive greatly and hydraulic clearing method cannot manage it. In thsi case, mechanical method shall be employed. The power of mechanical method can come from manual operation and motors. Pipe cleaning trucks and pipe clearing robots are advanced cleaning machines. They work well and can meet requirements of municipal works.

2.1.3.3 Dredging Sludge Construction Method

In view of small area of the lake, small dredging amount and components of bottom silt, dry cleaning and digging method is used to dredge sludge. That is to cofferdam the lake and drain the water in dry seasons, then after drying, the long-arm diggers are used to excavate it in blocks. Bottom silt will be directly transported to mountain ridges and wastelands of Wangdun Township for piling up. After being dried in the open air, bottom silt will be used as surface soil for afforestation.

2.1.4 Construction Schedule

The project intends to start in January, 2008, and complete all the subprojects

and carry out acceptance at the end of December, 2022. The construction period is 5 years.

2.1.5 Engineering Investment

Total cost estimate of the project is RMB 174,073,600 yuan, which includes a proposed loan of U$20 million (RMB 130 million yuan) from the World Bank and RMB 42,073,600 yuan of supporting funds from the superior support and local governments' self-funding.

2.2 Project Analysis

2.2.1 Analysis of Pollution Source

(1) Wastewater during the construction period

Wastewater during the construction period is mainly from domestic sewage and construction wastewater by construction workers.

①Domestic sewage

During peak period of construction, the number of construction workers averages 120. These workers are scattered in each pipeline construction section and waste collection and transportation stations. Water consumption of construction workers is calculated to be 50 L/d·person, and discharge coefficient is calculated to be 0.8, so domestic sewage produced by construction workers is 4.8 m^3/d. COD in wastewater is 250 mg/L, BOD_5 150 mg/L, SS 200 mg/L and NH_3-N 35 mg/L, so pollutant production is: COD is 1.2 kg/d, BOD_5 0.72 kg/d, SS 0.96 kg/d and NH_3-N 0.18 kg/d.

Domestic sewage produced during the construction period will be collected and disposed by local collection and disposal facilities, not discharged out.

②Construction wastewater

Wastewater produced during the construction period is mainly divided into two categories. One is muddy water discharged from excavated pipeline and produced by machinery and vehicle flushing in small quantity; another is construction wastewater produced in construction process like flushing sands and stones, mixing and casting concrete. Pollutants in construction wastewater are SS and petroleum. Construction wastewater is sprayed to control dust after being settled.

(2) Exhaust gas during the construction period

①Construction dust

Dust is the main exhaust gas pollution source during the construction period, including dust produced in the process of transporting and dust in construction sites (such as dust produced by channel excavation, earth stacking and loading and unloading of building materials).

According to relevant materials, in the construction process, dust produced during traveling accounts for over 60% of the total, and the quantity is related to road surface and vehicle speeds. In general, influenced by natural wind, roads under construction produce dust whose impact scale is within 100m. During the construction period, if water is sprayed on roads to control dust 4-5 times a day, dust in the air can be reduced by 70% or so. It is good for falling dust and can reduce the TSP distance into the scale of 20-50m. The testing results of spraying water are shown in the following table.

Table 2-11 Testing Results of Spraying Water to Control Dust during the Construction Period

Distance away from roadside (m)		5	20	50	100
Concentration of TSP (mg/m^3)	Not spraying water	10.14	2.810	1.15	0.86
	Spraying water	2.01	1.40	0.68	0.60

During the construction period, another dust source is dust raised by wind power on open storage yard and exposed yard. The characteristic of this kind of dust is that it is influenced by yard's humidity and wind speed during operation. Thus, spraying water on road surface and yards, prohibiting operating in windy days and reducing exposed pilings are effective to restrain this kind of dust.

②Exhaust gas produced by construction machinery

During the construction period, exhaust gas of vehicles and fuel exhaust gas produced by construction machinery are also sources of exhaust gas. Their main pollutants are HC, CO, NOx in small quantity.

③Odor from dredged silt

The project intends to dredge sludge in Zoujiazui Lake to the east side of Chengxi Avenue, with dredging amount being about 8000 m^3 and dredging depth being about 0.3 m. Construction method is dryly cleaning and digging method. That is to cofferdam the lake and drain the water in dry seasons, then after drying, the long-arm diggers are used to excavate it in blocks. During drying period, lake bottom silts will produce some odor, which will influence living environment of surrounding residents and construction.

(3) Noise during the construction period

Noise is mainly from construction machinery in the process of material transportation, channel excavation loading and unloading of pipes, for instance, loaders, bulldozers, excavators and trucks. The way of noise emission is intermittent emission. Equipment noise values are about 75 dB(A)-90 dB(A). If not being controlled, it will cause impacts on surrounding environment.

Table 2-12 Main Noise Source Intensity of Construction Machinery (dB(A))

No.	Type of machinery	Distance between monitoring sites and machinery (m)	Maximum sound level
1	Loader	5	90
2	Road Roller	5	81
3	Bulldozer	5	86
4	Excavator	5	84
5	Large truck		86
6	Light truck		75

(4) Solid waste

Solid waste produced during the construction period is mainly domestic waste generated by construction workers, construction waste, spoil and dredges silt in the process of construction, and waste in dredged water body.

①Domestic waste

Domestic waste generated by construction workers will be 120 people and 0.5 kg/p·d, so production of domestic waste during the construction period is about 60 kg/d. EIA suggests installing waste collection bins at construction sites during the

construction period, and commissioning sanitation department to clean waste after unification of collecting domestic waste.

②Construction waste and spoil

Earthwork under the project is mainly produced from Urban Wastewater Pipe Network Improvement Subproject and Zoujiazui Lake water system ecological restoration and protection subproject. In particular, excavation amount is 164,499 m^3, fill soil amount is 138,442 m^3, and digging soil amount is 26,057 m^3. Meanwhile, certain construction waste with production of about 1810 m^3 will be generated during construction, including cement concrete, broken bricks, and sands and gravels.

③Dredged silt

In view of solving the problems of poor liquidity, serious deterioration of water quality, and influence of sediments in the lake bottom on water circulation and pondage action of lake, this project intends to desilt part of Zoujiazui Lake to the east side of Chengxi Avenue through dredging sludge. The area of this part of lake is about 25,610 m^2. Dredging depth is about 0.3 m and dredging amount is about 8,000 m^3.

④Waste in the dredged region

There are solid pollutants such as waste and biological residues in dredged region of Zoujiazui Lake which is in the east side of Chengxi Avenue. Those wastes will be cleared in the process of dredging sludge. The quantity of those waste is small, about 0.1 tons.

(5) Ecological impacts and soil erosion

According to on-site surveys along recommended pipe network layout, drainage network improvement engineering under the project seldom involves resettlement but the engineering needs temporary acquisition.. The project will newly construct 3 waste transfer stations, 1 room for water environment monitoring system, 2 water environment automatic monitoring stations at monitoring cross section of the boundary and 7 automatic water environment measurement sites. The construction process may destroy partial vegetation, and influence ecological environment. Necessary engineering and vegetation measures shall be taken to afforest exposed areas and hill slope, so as to reduce environmental impacts and prevent soil erosion.

2.2.2 Analysis for Pollution Source during the Operation Period

(1) Exhaust gas

Exhaust gas during the operation period is principally from dust and odor produced by waste transfer stations and waste transport vehicles. Since there are easily fermentative organic matters in collected domestic waste, especially in summer when temperature is high, domestic waste will release smelly odors during the process of storage, compression and transportation. These odors contain odorous gases like NH_3 and H_2S. Odor pollution influences environment mainly through human's smell. On the basis of survey, daily transfer quantity with 2000 tons of domestic waste will release NH_3 of 68 kg/d, H_2S of 9.2 kg/d. In the process of unloading waste and compression (including waste leachate), odor released is about 60% of the total. According to *Content Determination for Odorant of NH_3 and H_2S in Waste Transfer Station of Guangzhou City* (Guangzhou City Institute of Environmental Health, October, 2009), with no deodorization facilities, concentrations of NH_3 and H_2S are respectively 0.038 mg/m^3-0.094 mg/m^3 and 0.010 mg/m^3-0.025 mg/m^3. Besides odorous waste gas, dust will also be produced when waste collection trucks unload waste in transfer stations. The quantity of dust produced when waste is dumped in dry conditions is about 1.5% of the waste transfer quantity, and its concentration is 0.5 mg/m^3.

The project will construct one waste transfer station respectively in Beishan Township, Wangdun Township and Dashu Township. BENTAX deodorization system with energetic and active oxygen ions and the method of spraying to control dust are proposed to treat waste gas. The efficiency of deodorization and dedusting is 90%, and working hours per day are calculated at 8 h/d. Production and emission of waste gas in the 3 waste transfer stations are provided in the following table.

Table 2-13 Exhaust Gas of Odor Production in each Waste Transfer Station during the Operation Period

Item	Construction Scale	Daily transfer quantit	Pollutant	Production	Concentration	Emission quantity	Emission concentration	Proposed measures

		y								
	t/d	t/d		kg/h	t/a	mg/m^3	kg/h	t/a	mg/m^3	
Beishan Township waste transfer station	22	10.3	NH_3	0.026	0.077	0.038-0.094	0.003	0.008	0.0038-0.0094	BENTAX deodorization system with energetic and active oxygen ions and the method of spraying to control dust. The efficiency of deodorization and dedusting is over 90%.
			H_2S	0.004	0.010	0.010-0.025	0.0004	0.001	0.0010-0.0025	
			Dust	0.019	0.056	0.5	0.002	0.006	0.05	
Wangdun Township waste transfer station	29	13.8	NH_3	0.035	0.103	0.038-0.094	0.004	0.0103	0.0038-0.0094	
			H_2S	0.005	0.014	0.010-0.025	0.0005	0.0014	0.0010-0.0025	
			Dust	0.026	0.076	0.5	0.003	0.008	0.05	
Dashu Township waste transfer station	25	12	NH_3	0.031	0.089	0.038-0.094	0.0031	0.009	0.0038-0.0094	
			H_2S	0.004	0.012	0.010-0.025	0.0004	0.0012	0.0010-0.0025	
			Dust	0.023	0.066	0.5	0.0023	0.007	0.05	

In accordance with the table above, emission concentrations of NH_3 and H_2S in waste transfer stations under the project all meet Category II standard ($NH_3 \leq 1.5$ mg/m^3, $H_2S \leq 0.06$ mg/m^3) in *Emission Standards for Odor Pollutants* (GB14554-93); emission concentrations of dust meet fugitive emission monitoring concentration limited values (1.0 mg/m^3) in *Comprehensive Atmospheric Pollutant Emission Standards* (GB16297-1996).

(2) Wastewater

Wastewater during the operation period comes from leachate produced by waste compression in waste transfer station, wastewater produced after flushing grounds and equipment, domestic sewage from staff in transfer stations and rooms for water environment monitoring system and wastewater from public toilets under Zoujiazui Lake water system ecological restoration and protection subproject.

①Leachate in waste transfer station and flushing water

Waste leachate is formed by water in waste when waste ferments and decays. Contents of kitchen waste and peel rubbish are main factors which influence the quality and quantity of leachate. Waste of the project will stay in transfer stations for a short time, so its leachate is mainly from water in waste and water produced through waste fermentation in the process of compression. Comparatively, water produced through waste fermentation is less than water in waste. Waste leachate is featured with high concentration of organic pollutant and NH_3-N. After completion of daily work, working places and containers shall be cleaned.The flushing water contains wastewater washing road surfaces, equipment and vehicles.

According to pre-project research, average leachate produced by compression in waste transfer stations is 1% of waste quantity, and flushing water is 10%. As for leachate, pH is 4-5, COD is 2,500 mg/L, BOD_5 is 1,000 mg/L, SS is 1,000 mg/L and NH_3-N and 180 mg/L; as for flushing water, pH is 6-8, COD is 280 mg/L, BOD_5 is 250 mg/L, SS is 300 mg/L, and NH_3-N is 30 mg/L.

②Domestic sewage in waste transfer station

Domestic sewage in waste transfer stations is mostly from working and domestic water consumption of management personnel in transfer station. 2 management personnel are assigned in per transfer station and annual working days are 365. If domestic water consumption is 50 L/person·d, domestic water consumption is 0.1 m^3/d and discharge rate is 80%, therefore production of domestic sewage is 0.08 m^3/d, 29.2 t/a.

Pursuant to Construction Standards for Domestic Garbage Transfer Station Project (construction standard 117-2009): according to centralized pollution control principle and project scale principle, medium and small transfer stations should not build waste leachate treatment system alone, they shall directly discharge leachate into municipal sewage pipe network for centralized disposal. Waste leachate, flushing water and domestic sewage of the project will be discharged into wastewater collection tanks. After mixing these wastewater, concentrations of all kinds of sewage meet Category B Standard in *Water Quality Standards of Sewage Discharged into*

Urban Sewers (GJ343-2010). Then wastewater will be cleaned and transported by suction sewage trucks to Duchang County wastewater treatment plant at regular intervals.

According to analogy analysis, production and emission of water pollutant after the mixing of different kinds of sewage are listed in the following table.

Table 2-14 Production and Emission of Wastewater in Waste Transfer Station

Location	Pollution source		Wastewater quantity (t/a)	Concentration water pollutant (mg/L)					Discharge mode and emission direction
				pH	COD	BOD_5	SS	NH_3-N	
Beishan Township waste transfer station	Production	Leachate	37.60	4-5	2,500	1,000	1,000	180	Then wastewater will be cleaned and transported by suction sewage trucks to Duchang County wastewater treatment plant at regular intervals.
		Flushing water	375.95	6-8	280	250	300	30	
		Domestic sewage	29.20	7-8	250	220	200	25	
	Mixing		442.75	/	466.53	311.71	352.84	42.41	
Wangdun Township waste transfer station	Production	Leachate	50.37	4-5	2,500	1,000	1,000	180	
		Flushing water	503.70	6-8	280	250	300	30	
		Domestic sewage	29.20	7-8	250	220	200	25	
	Mixing		583.27	/	470.21	313.27	355.44	42.70	
Dashu Township waste transfer station	Production	Leachate	43.80	4-5	2,500	1,000	1,000	180	
		Flushing water	438.00	6-8	280	250	300	30	
		Domestic sewage	29.20	7-8	250	220	200	25	
	Mixing		511.00	/	468.57	312.57	354.29	42.57	
Total			1,537.02	—	—	—	—	—	—
Category B Standard in *Water Quality Standards of Sewage Discharged into Urban Sewers* (GJ343-2010)			/	6.5-9.5	500	350	400	45	

③Domestic sewage in rooms for water environment monitoring system

Staff in rooms for water environment monitoring system are total 10 people,

annual working days are 255, domestic water consumption is 50 L/person·d, domestic water consumption is 0.1 m^3/d and discharge rate is 80%, so production of domestic sewage is 0.4 m^3/d, 29.2 t/a. Through municipal sewage pipe network, sewage is discharged into Duchang County wastewater treatment plant for disposal.

④Wastewater in public toilets

Zoujiazui Lake Water System Ecological Restoration and Protection Subproject intends to build 4 pieces of public toilets along banks of Zoujiazui Lake. The area of each one is 56 m^2, and the total area is 224 m^2. According to *Municipal Water Consumption Quota in Jiangxi Province* (DB36/T419-2011), water consumption quota of public toilets is 1.5 L/m^2·d, and the water consumption is 0.336 m^3/d. If discharge rate is 80%, therefore, sewage quantity is 0.27 m^3/d, 98.55 t/a. Through municipal sewage pipe network, sewage is discharged into Duchang County wastewater treatment plant for disposal.

(3) Solid waste

①Domestic waste

During the operation period, solid waste is principally domestic waste produced by staff in domestic waste transfer station and room for water environment monitoring system. See the following table for generation condition of domestic waste.

Table 2-15 Generation Condition of Domestic Waste

Location	Number of people (person)	Annual working days (day)	Production per capita (kg/person·d)	Daily production (kg/d)	Annual production (t/a)
Waste transfer station	6 (2 for per piece)	365	0.5	3 (1 for per piece)	1.1
Room for water environment monitoring system	10	255	0.5	5	1.28
Total				8	2.38

② Waste liquid in water environment laboratory

During the operation period, laboratory of County rooms for water environment monitoring system will produce waste acid (HW34), waste alkali (HW35), and waste organic solvents (HW42), which are all hazardous waste. Compared with laboratory

of similar scale, production of waste liquid mentioned above is about 300kg. After consistent collection, they are sent to qualified hazardous waste treatment unit for disposal, not discharged out.

(4) Noise

During the operation period, noise is principally from waste compression room and transport vehicles, whose source intensity is about 60 dB(A)-85 dB(A). Main noise source and control measures are presented in the following table.

Table 2-16 Main Noise Source and Control Measures Unit: dB(A)

No.	Noise source	Number in one station	Source intensity of sound pressure level	Noise reduction measures
1	Compression equipment	2 sets (one with one standby)	85	Compression system is set in closed workshop, every equipment is installed with vibration damping pads, doors and windows are sound-proof, and no honking in station.
2	Waste transfer truck	1 vehicle (one vehicle for one station)	80	
3	High pressure washer	1 set (one set for one station)	85	
4	Waste collector	A Few	80	
5	Deodorization equipment and dedusting equipment	1 set (one set for one station)	60	

2.3 Production and Predicted Emission of Major Pollutants

Table 2-17 Main Pollutant Production and Estimated Emission Condition under the Project

Item \ Content		Emission source (No.)	Pollutant name	Concentration and production	Emission concentration and discharge amount
Water pollutant	Construction period	Domestic sewage	Quantity of wastewater COD BOD_5 SS NH_3-N	4.8 m^3/d 1.2 kg/d, 250 mg/L 0.72 kg/d, 150 mg/L 0.96 kg/d, 200 mg/L 0.18 kg/d, 35 mg/L	It will be disposed with the help of domestic sewage treatment facility of local residents, not discharged out.
		Construction wastewater	SS	Small quantity, fugitive emission	Small quantity, fugitive emission
		Sludge water	SS	Small quantity	Small quantity
	Operation period	Beishan Township waste transfer station	Quantity of wastewater COD BOD_5 SS NH_3	442.75 t/a 466.53 mg/L, 0.21 t/a 311.71 mg/L, 0.14 t/a 352.84 mg/L, 0.16 t/a 42.41 mg/L, 0.02 t/a	After collection, these wastes will be cleaned and transported by suction sewage trucks to

Item \ Content		Emission source (No.)	Pollutant name	Concentration and production	Emission concentration and discharge amount
		Wangdun Township waste transfer station	Quantity of wastewater COD BOD_5 SS NH_3	583.27 t/a 470.21 mg/L, 0.27 t/a 313.27 mg/L, 0.18 t/a 355.44 mg/L, 0.21 t/a 42.70 mg/L, 0.02 t/a	Duchang County wastewater treatment plant at regular intervals
		Dashu Township waste transfer station	Quantity of wastewater COD BOD_5 SS NH_3	511.00 t/a 468.57 mg/L, 0.24 t/a 312.57 mg/L, 0.16 t/a 354.29 mg/L, 0.18 t/a 42.57 mg/L, 0.02 t/a	
		Waste liquid water of laboratory in room for environment monitoring system	Quantity of wastewater COD BOD_5 SS NH_3	102 t/a 0.025 t/a, 250 mg/L 0.022 t/a, 220 mg/L 0.020 t/a, 200 mg/L 0.003 t/a, 25 mg/L	Through municipal sewage pipe network, sewage is discharged into Duchang County wastewater treatment plant for disposal.
		Domestic sewage from room for environment monitoring system	Quantity of wastewater COD BOD_5 SS NH_3	98.55 t/a 0.034 t/a, 350 mg/L 0.025 t/a, 250 mg/L 0.03 t/a, 300 mg/L 0.002 t/a, 25 mg/L	Through municipal sewage pipe network, sewage is discharged into Duchang County wastewater treatment plant for disposal.
Atmospheric pollutants	Construction period	Construction dust	TSP	Small quantity, fugitive emission	Small quantity, fugitive emission
		Construction machinery fuel exhaust gas	HC, CO, NOx	Small quantity, fugitive emission	Small quantity, fugitive emission
		Sludge odor	NH_3, H_2S	Small quantity, fugitive emission	Small quantity, fugitive emission
	Operation period	Beishan Township waste transfer station	NH_3 H_2S Dust	0.038-0.094 mg/m^3, 0.077 t/a; 0.010-0.025 mg/m^3, 0.010 t/a; 0.5 mg/m^3, 0.056 t/a	0.0038-0.0094 mg/m^3, 0.008 t/a; 0.010-0.025 mg/m^3, 0.001t/a; 0.05 mg/m^3, 0.006t/a
		Wangdun Township waste transfer station	NH_3 H_2S Dust	0.038-0.094 mg/m^3, 0.103 t/a; 0.010-0.025 mg/m^3, 0.014 t/a; 0.5 mg/m^3, 0.076t/a	0.0038-0.0094 mg/m^3, 0.0103 t/a; 0.0010-0.0025 mg/m^3, 0.0014 t/a; 0.05 mg/m^3, 0.008 t/a
		Dashu	NH_3	0.038-0.094 mg/m^3,	0.0038-0.0094 mg/m^3,

Item	Content	Emission source (No.)	Pollutant name	Concentration and production	Emission concentration and discharge amount
		Township waste transfer station	H_2S Dust	0.089 t/a; 0.010-0.025 mg/m^3, 0.012 t/a; 0.5 mg/m^3, 0.066 t/a	0.009 t/a; 0.0010-0.0025 mg/m^3, 0.0012t/a; 0.05 mg/m^3, 0.007 t/a
Noise	Construction period	Construction machinery	Sound pressure level	75 dB(A)-90 dB(A)	
	Operation period	equipment and transport vehicle	Sound pressure level	60 dB(A)-85 dB(A)	
Solid Waste	Construction period	Engineering construction	Spoil	26,057 m^3	26,057 m^3
			Construction waste	1,810 m^3	1,810 m^3
			Silt	8,000 m^3	8,000 m^3
			Waste in lake region	0.1 t	0.1 t
		Construction Life	Domestic waste	60 kg/d	60 kg/d, all is cleaned and transported by sanitation department
	Operation period	Daily office work	Domestic waste	2.01 t/a	2.01 t/a, all is collected and then transported to Duchang County waste landfill
		Waste liquid water of laboratory in room for environment monitoring system	Waste acid (HW34), Waste alkali (HW35), waste organic solvents (HW42)	300 kg/a	Being sent to qualified hazardous waste unit for disposal

3 Environmental Status Quo

3.1 Natural Environment

3.1.1 Geographic Location

Situated in the north of Jiangxi Province, affiliated to Jiujiang City, with Wushan Mountain to the north, Poyang Lake to the south, Duchang County is located at 28°50’28”-29°38’ N and 01’34”-116°38’27” E. It is linked with Poyang County on the east, faced with Hukou County and Pengze County to the north. Its west is close to the water with Xingzi County on the other side, and it looks in the distance with Nanchang County, Xinjian County and Yugan County at the other side of lake. Beishan Township is located in the north of Duchang County, Wangdun Township in the northeast and Dashu Township in the southeast. Project location sees Figure 1.

3.1.2 Landform

The landform is dominated by hills and lakeside plain. The water region is wide and low hills are distributed in part of waters. The topography which is high in north and low in south taking the uplift belt from Dagang to Wangjiaozhe as the axis tilts to northwest and southeast. The peak point is Sanjianyuan in the northeast with altitude of 647.3 m, and the lowest altitude in lakeside zone just reaches 10 m. The landform varies from northeast to southwest from low mountains, high mountains, low hills, plains to lake regions.

3.1.3 Geology

Duchang County is located in the depressed area of Poyang Lake and a part of Yantze Paraplatform with the crust being around 31 km thick. It is situated in earthquake belt of the middle and lower reaches of Changjiang River, mainly controlled by Gan River fracture belt, Tancheng-Lujiang fracture belt, and Yangzhou-Tongling fracture belt. The geological structure is complicated.

3.1.4 Weather and Climate Conditions

Located in the subtropical monsoon climate zone and influenced by Poyang Lake, the large water body, Duchang features cold winter, warm spring, hot summer and cool autumn. Its temperature varies greatly in four seasons, and the annual average

temperature is 17.8℃. January is the coldest month with the extremely low temperature being -10.2℃ (February 5, 1969). July is the hottest month with the extremely high temperature being 40.5℃ (August 29, 1967).

The whole county has sufficient rainfall with the annual average being 1,490mm. The biggest annual rainfall reached 2,274.7 mm in 1998, and the smallest just reached 904 mm in 1978. Most of the rainfall is in April-June, which accounts for half of the rainfall of a year, and it will see less rainfall in November-February (in the next year).

The average sunshine duration for years is 2,067.3 hours and annual solar radiant is 114 k cal/cm^2. The prosperous period of crop growth in April-October enjoys over 100 hours of monthly average sunshine.

The frost-free period lasts a long time with the annual average being 261 days, the longest 300 days and shortest 227 days. The relative humidity is 78%.

Southerly winds dominate the county in summer days and the northerly winds in winter days with the average wind speed for years being 2.9 m/s.

3.1.5 Water System and Hydrology

3.1.5.1 Water System and Hydrology of the Urban Area

Duchang County boasts plenty of water resources. There are various sizes of rivers and ports within Duchang with the total length of 359.6 km. They are roughly divided in to 7 water systems including Dagang, Daxi Lake, Xinmiao Lake, Dashu Lake, Damian Lake, Xiejia Lake and Tuanzikou, and the annual average runoff totals 978 billion m^3. Water system and river ports run along mountain range alignment into Poyang Lake.

3.1.5.2 Zoujiazui Lake Water System

The project intends to restore and protect ecology of Zoujiazui Lake water system. The water system originates from Furong Mountain, through Furongshan industrial concentration district, passes Beishan Township to the intersection of Wanli Avenue and Chengxi Avenue. Then the water flows in direction of north-to-south from the west side of Chengxi Avenue to Zoujiazui Lake, then reaches Jishan Lake and finally converges in Poyang Lake through Jishan Lake Electrical Pumping Station. The whole basin passes Furongshan Industrial Park, and villages like Xuzhongshi and Zoujiazui. Its original function was to drainage storm water runoff in the west side of

Furong Mountain.

Furong Mountain is located to the northeast of the urban area with peak altitude of 228.3 m (It is measured according to Yellow Sea Height System. It is the same if not indicated.). Rainwater in the west side of mountains whose area is 1.0 km^2 converges in Furongshan Industrial Park. Initially, these water will be drained to Zoujiazui Lake water system through natural channels like lowlands, wastelands and mini water systems, then reach water system in lower reaches. However, recently the development and construction of Furongshan industrial park occupies the primary lowlands and wastelands, consequently the runoff path from the west side of Furongshan Mountain to Zoujiazui System is cut off, and the increasing surface rainwater runoff causes rainwater runoff to slowly flow along park roads to the west or south. As a result, urban ponding and waterlogging will happen in partial districts.

The whole basin of Furong Mountain water system (from Furong Mountain to Jishan Lake Electrical Pumping Station) is about 14.0 km long. It can be divided into two sections: the former one is Zoujiazui Lake basin (from Furong Mountain to Zoujiazui Lake), and the latter one is Jishan Lake (from Zoujiazui Lake drainage sluice to Jishan Lake Electrical Pumping Station). See Figure 3-1.

Zoujiazui Lake basin (from Furong Mountain to Zoujiazui Lake drainage sluice) is about 6.5 km long with rainfall collection area of about 7.92 km^2. It can be fallen into three sections according to current situations: the section in upper reaches, above the west side of Furongshan Avenue, is about 3.5 km long; the section in middle reaches, from west side of Furongshan Avenue to intersection of Wanli Avenue and Chengxi Avenue, is about 1.5 km long; the section in lower reaches, from intersection of Wanli Avenue and Chengxi Avenue to Zoujiazui drainage sluice, is about 1.5 km long. See Figure 3-2.

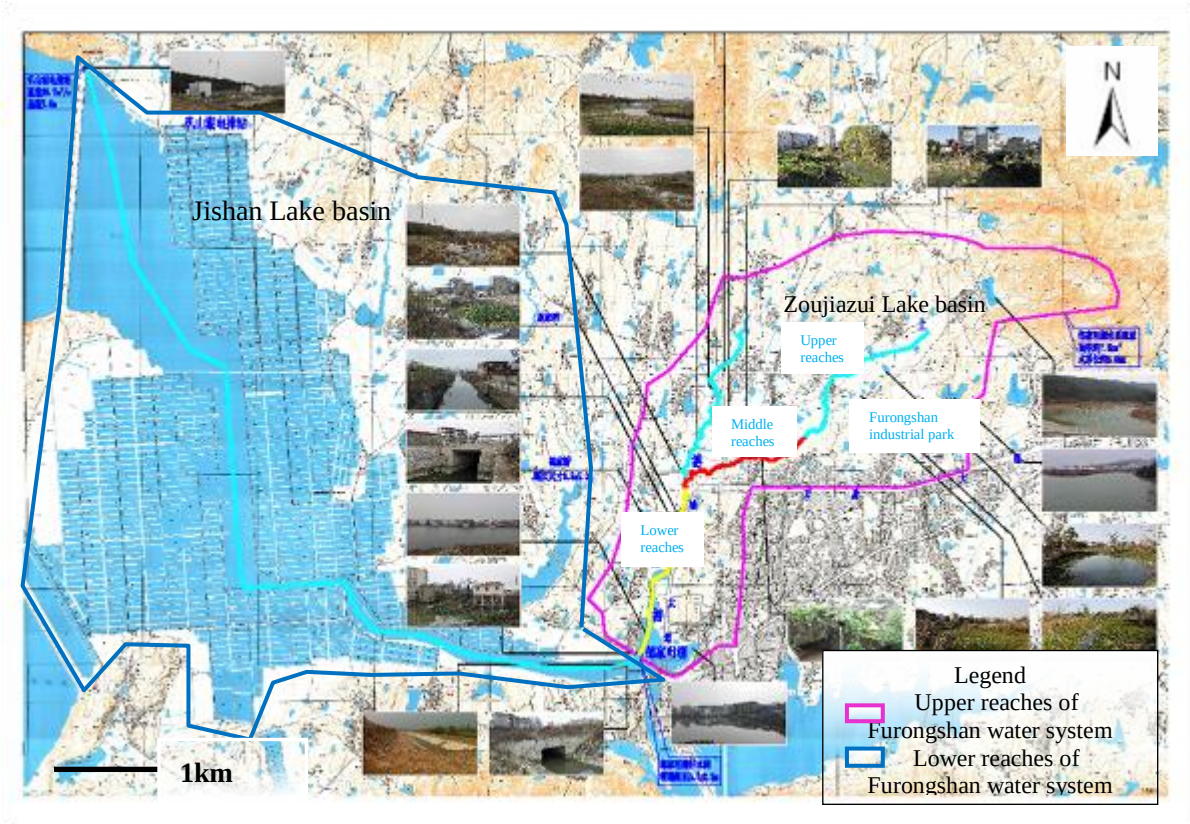


Figure 3-1 Map of the whole Basin of Furong Mountain Water System

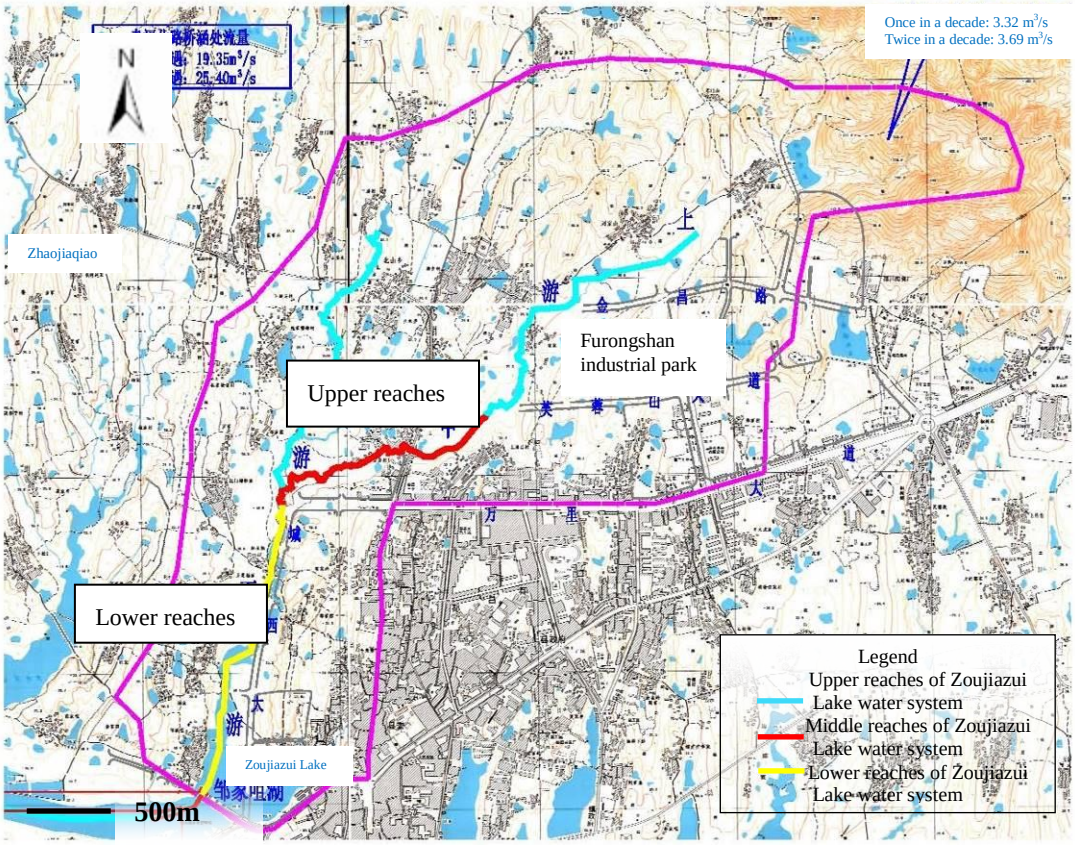


Figure 3-2 Map for Zoujiazui Lake Water System

3.2 Social Environment

1. Administrative Division and Population

Table 3-2 Administrative Division and Population in Project Areas

Region	Area (km^2)	Administrative division	Population
Whole county	2669.5	12 designated towns, 12 townships, 259 villager committees, 39 resident committees, and 4,352 villagers' groups	810,500
Central urban area	14.28	It is involved in East Street, West Street, West Lake, Xingfu, East Lake, Baiyanglong, Changling, Chengxi, Furong, Xinghuo, Huimin resident committee, Nanshan Village, Xihe Village in Duchang town, Xuzhongshi Village and Xiajiashan Village in Beishan Township, Watang Committee in Dashu Township and partial villages of Beishan Township and Dashu Township.	153,000 people
Beishan Township	67.2	13 administrative villages, 2 resident committees, total 154 natural villages	Total households of 7,936, total population of 26,000 people
Wangdun Township	171.9	23 villager committees, 1 resident committee, total 286 natural village,	11,232 households, 48,043 people
Dashu Township	55.1	13 administrative villages, 1 resident committee, and 102 natural villages	6,464 households, 29,484 people

2. Economic Conditions

In 2014, the regional GDP reached RMB 8.51 billion, which is RMB 1.03 more than that in 2013. It achieved the "1 billion goal" for continuous three years. The regional GDP in 2014 increases by 9.4%, and decreases by 0.8% over 2013. In particular, the primary industry generated RMB 1.74 billion of added value, up by 4.5%; the secondary industry registered RMB 4.10 billion of added value, up by 11.6%, and the tertiary industry realized RMB 2.66 billion of added value, up by 9.6%. The structure of the three industries was 20.4:48.2:31.4.

Regional GDP and resident incomes of Duchang County in recent years are provided in the following table.

Table 3-3 Regional GDP of Duchang County in Recent Years

	Primary industry (10,000	Secondary industry (10,000	Tertiary industry (10,000	Regional GDP (100 million

	yuan)	yuan)	yuan)	yuan)
2009	10.20	13.70	12.10	36.00
2010	12.90	19.50	12.60	45.00
2011	14.00	24.85	15.22	54.07
2012	15.60	31.41	17.48	64.49
2013	16.45	35.07	23.27	74.79
2014	17.40	41.04	26.65	85.09

Table 3-4 Rural and Urban Resident Incomes of Duchang County in Recent Years

	Rural per capita net income (yuan)	Urban per capita income (yuan)
2009	3,273	13,532 (average wage)
2010	3,482	15,162 (average wage)
2011	3,872	20,518 (average wage)
2012	4,186	27,680 (average wage)
2013	4,775	17,144 (disposal income)
2014	5,461	18,974 (disposal income)

3.3 Ecological Environment

Current assessment of ecological environment combines field investigations and collecting and analyzing materials.

3.3.1 Terrestrial Ecology

1. Terrestrial plants

Duchang county is rich in forest resources with wide varieties, including mainly masson pines, pine forests in constructed wetlands, broad-leaved trees, and China firs. After consultation to Forestry Department and on-site survey, no precious and rare wild plants or famous and ancient trees are found. Plants of artificial cultivation are many.

The crops which are commonly seen in winter and spring are rapes. There are mainly peanuts, soybeans, sweet potatoes and vegetables planted in dry lands.

2 Terrestrial animal sources

There are dense population in the villages and towns in the assessed area. Vegetation mainly consists of agricultural vegetation, cunnighamia lnceolata forest, Chinese red pine forest, wetland pine forest and bushes. Animal species are those commonly seen in Jiangxi Province. Due to frequent human activities, and as the quality of Zoujiazui water system is now Category V, few activities of precious and rare animals exist in this region. There are no animal species which are under state protection.

(1) Animals

Animals in the assessed area mainly include rhizomys sinensis, sewer rat, rattus flavipectus, north niviventer and lepus sinensis. In particular, lepus sinensis and murine are common.

(2) Birds

Among the commonly-seen birds in the assessed area, resident birds include tree sparrows, turdus merula, and lonchura striata; summer birds include hirundo daurica, barn swallow, and nyctlcorax nycticorax. Winter birds include turdus naumanni, brambing and emberiza spondocephala. There are few precious and rare birds in Zoujiazui water system and other subproject areas, and there are no fixed habitats or areas of concentrated distribution for birds.

(3) Amphibians

Commonnly seen species in the assessed area include bufo gargarizan, rana limnocharis and rana guentheri, living in the bushes that are close to waters or moist, river valleys or areas around village houses.

(4) Reptiles

Reptiles in the assessed area are dominated by takydromus septentrionalis, ptyas korros, pphuwi and enhydris chinensis. No wild animals under national and provincial key protection have been found in the assessed area.

3.3.2 Aquatic Ecosystem

Zoujiazui Lake is located in the urban area of Duchang County. There are mainly wastelands, vegetable fields and villages along the water system. The lake region is influenced by pollution discharge of surrounding villages and Furongshan Industrial

Zone. The current water quality is worse than Category V, and especially the quality of water in the east side of lower reaches is poor. Aquatic plants in Zoujiazui Lake are mainly chlorophyta; fishes in the lakes are commonly seen species like grass carps and Pengze crucian carps; benthic invertebrates are general species such as cipangopaludina chinensis and hyriopsis cumingii. There are no fish spawning grounds, feeding grounds or wintering grounds in the river courses involved. There are no precious and rare aquatic creatures in Zoujiazui Lake, so the lake is not a key natural habitat.

3.4 Current Situation of Land Use

According to status investigations, current situations of land use in project areas are shown by Table 3-5.

Table 3-5 Current Situation of Land Use in Project Areas

No.	Subproject type	Location	Land type
1	Pipe network engineering	Urban areas	Construction land
2	Waste transfer station	Matang Village, Dashu Township	Paddy field
		Bachuan Village, Beishan Township	wasteland
		Yanggang Village, Wangdun Township	wasteland
3	Water environment monitoring system room	Lands of Nanshan Avenue that are close to Huanhu Road	wasteland
4	Water environment automatic monitoring station at monitoring cross section of the boundary	At the intersection of Laowucao Village, Shishan Township and Tieluxia Village, Sanchagang Town;	wasteland
		Xiaojishangang near Zhongbawangjia	wasteland
5	Automatic water environment measurement sites	West of Jinchang Road (Furongshan Industrial Park), west of Furongshan Avenue (Furongshan Industrial Park), middle reaches of Zoujiazui Lake water system (west of Wanli Avenue), Zoujiazui sluice, east of Zoujiazui Lake (sewage intercepting well and overflow well), and Donghu Lake (total 7 sites)	wasteland

3.5 Overview of Furongshan Industrial Park

3.5.1 Overview of Industrial Zone

Furongshan industrial concentration zone is one of the three Duchang industrial parks. Founded in 2002 and approved to be provincial development zone by provincial people's government in 2006, Duchang industrial parks cover the total planned area of 20.43 km^2, and the developed area of 6 km^2. At present, industrial parks have formed the development pattern of "one zone and three parks", namely Furongshan industrial concentration zone, Cailing industrial concentration zone, and Sushan stone processing zone. Furongshan industrial concentration zone lies in the north of the county, and southwest of Furongshan Mountain, with the planned area of 10.36 km^2, and the developed area of 3 km^2. According to the city functions, Furongshan industrial concentration zone is divided into the new urban area. The zone is an important platform for Duchang County to attract labor-intensive enterprises and agriculture industrialization leading enterprises, for migrant workers to go back for starting business, for laid-off workers to find new jobs, and for urban enterprises to "withdraw from city and enter into suburbs". Furongshan industrial concentration zone has initially formed the rudiment of the three main industries, such as aquatic products and other agricultural and by products deep processing, textile and clothes industries, and automobile components and other machine manufacture industries. The zone has formed the development pattern of "2 latitudinal lines and 2 longitudinal lines", and they are respectively Xinmiaohu Avenue, Huangci Road, Furongshan Avenue, and Jinchang Road (Industry Avenue).

Over 130 enterprises are mainly engaged in aquatic products and agricultural and by products processing, clothes industries and automobile component industries in Furongshan industrial concentration zone. The GDP in the zone is RMB 16.247 billion in 2014 and RMB 17.248 billion in 2015.

3.5.2 Water Consumption in Industrial Zone

According to materials which are provided by Water Supply Company on water consumption of Furongshan Industrial Park in recent months, there are about 201

enterprises of Furongshan Industrial Park using water in recent months. The average water consumption is around 1600 m^3/d, accounting for 7.0% of average water sales volume of Water Supply Company in a day. Partial enterprises have not started production yet or have stopped production.

3.5.3 Status Quo of Drainage Network of Enterprises in Industrial Zone

Drainage system in Furongshan Industrial Park is rain and sewage combined drainage system. The pipeline laid is along Xinmiaohu Avenue, Huangci Road, Industry Avenue (Jinchang Road) and Furongshan Avenue. The drainage direction is form north to south and from east to west.

In the east district of Xinmiaohu Avenue, sewage (wastewater) converges from east to west in Xinmiaohu Avenue, then flows from north to south to Wanli Avenue, and finally reaches urban sewage pipe network. In the west district of Xinmiaohu Avenue, sewage (wastewater) is discharged along Jinchang Road and Furongshan Avenue to low-lying wastelands which are in the west of the zone, and Zoujiazui Lake water system. The drainage direction is from east to west. The sewage (wastewater) does not join the drainage network, which causes serious pollution to surface water.

3.6 General Situation of Drainage and Sewage Treatment

3.6.1 Present Situation of Urban Drainage

1. Sewage

Major drainage system in Duchang County is intercepting combined drainage system. Combined pipes (channels) are mostly built by bricks into rectangle drainage ditches, partly by reinforced concrete. Drainage ditches (channels) are spread out along sides of roads, and the drainage direction is mostly from northeast to southwest. Pollution interception pipelines are laid along with Donghu Avenue and the south side of Dongfeng Mid Road. The pipeline will finally reach wastewater treatment plants. The sewage interception pipeline in the county is about 14.5 km long, and the combined pipe (cover plate ditch) is about 51.6 km long. In particular, the rainwater and sewage combined pipeline is about 19.7 km long, and the combined pipe (or cover plate ditch) is about 31.9 km.

The combined pipe (or cover plate ditch) almost covers the built-up area of the urban area. The sewage pipeline is mainly distributed in Donghu Avenue, Dongfeng Mid Road, Nanshan Road, and Xihe Avenue. Sewage pipes are mainly reinforced concrete pipes, and inspection wells are all made of bricks. Cover plate ditches made of bricks are mostly found in Dongfeng Avenue, Wanli Avenue, Furong Road, Xianfu Road, Baiyang Road, Xingfu Road, Xiaokang Road, Renmin Road and Yanhu Road in the old urban area.

Figure 3-3 Partial Urban Sewage Outlets

On account of lacking unified planning and other historical reasons, the county drainage system has not yet been completed. The followings are the key problems:

(1) The design standard of the original pipeline network is low. The interception ratio of interception sewer is n_0=1, which is lower than the lowest interception ratio of current design standard n_0=2; the pipes employed are reinforced concrete pipes, and inspection wells for sewer are all made of bricks.

(2) The construction quality of pipe networks is not good, and leakage phenomenon is severe. Partial pipeline network may be permeated with a huge

amount of groundwater, which will cause the low COD concentration of the inlet water in wastewater treatment plant.

(3) Before entering wastewater treatment plant, the total dry pipeline is buried shallowly. As a result, wastewater needs to be elevated by three sewage pumping station, which costs a lot for operation.

(4) Cover plate ditches are commonly seen in old urban area. Drainage pipe laid in the period of the twelfth five-year plan is buried shallowly and the road elevation of both sides is low. That is to say, the pipeline network can hardly collect construction and domestic sewage. There are about 29 sewage concentration outfalls which cannot be connected with the pipeline network system. Domestic wastewater within an area of about 3.7 km^2 is uncollected. The water inflow of wastewater treatment plant does not meet the design requirement for a longer term, and the rate of collecting sewage is low.

2 Rainwater

Major drainage system in old urban area is intercepting combined drainage system. Combined pipes (channels) are mostly built by bricks into rectangle drainage ditches. The drainage direction is mostly from northeast to southwest.

The rainwater drainage in the south of old urban area mainly depends on the rainwater and sewage combined pipeline. Through many interception wells of the pollution interception pipeline in Donghu Avenue, the rainwater is discharged into Donghu Lake. The rainwater in the north is mainly discharged through combined pipe (cover plate ditch) interception wells to the front of 2 sewage elevation station, and finally discharged into Zoujiazui Lake.

The rainfall in the west districts of Xingfu Road, Wanli Avenue, is mainly discharged through the d1000 rainwater pipe on both sides of Wanli Avenue, and reaches into the west of Zoujiazui Lake system. The flowing direction of rainwater in the rainwater pipe is from east to west. see Figure 3-4.

The rainfall in Furongshan industrial park is mainly discharged through the bilateral rainwater and sewage combined pipeline to low-lying wastelands and water system in the west (see Figure 3-4). Then the rainfall will flow through Zoujiazui

Lake system to Jishan Lake.

Figure 3-4 Rain Water Discharge of Chengxi Avenue and Furongshan Industrial Park

Due to development and construction, Furongshan Industrial Park occupies the original low-lying wastelands, so the runoff path from the west of Furongshan Mountain to Zoujiazui water system is cut off. And the increasing surface rainwater runoff causes rainwater runoff to slowly flow along park roads (like Furongshan Avenue and Xinmiaohu Avenue) towards west or south. As a result, urban ponding and waterlogging will happen in partial districts, which will bring inconvenience to residents' daily life. See Figure 3-5.

Figure 3-5 Urban Ponding and Waterlogging

3.6.2 Wastewater Treatment Plant

Duchang County now has completed one urban domestic wastewater treatment plant which is constructed in two phases. Recently it has seen a complete scale of 20,000 m^3/d, with an area of 2.94 ha within the walls. The collected water in the project will be transported to Duchang County wastewater treatment plant. See

Chapter Five Due Diligence for detailed situations of Duchang County wastewater treatment plant.

3.7 Water System of the Basin

(1) Upper reaches of Zoujiazui Lake basin

The shoreline in the upper reaches of Zoujiazui Lake basin is indefinite. There are mostly wastelands and vegetable fields along the water system. A lot of ponds, swamps and river beaches are distributed along the line. There are also many small ditches flowing into the water system. Characteristics of wetlands are evident, which are presented in Figure 3-6 and 3-7. A sewage outlet in Furongshan Industrial Park is discharged at the west of Jinchang Road, and the sewage finally sheetfloods to Zoujiazui Lake water system. See Figure 3-8.

Figure 3-6 Benchlands in the Upper Reaches of Zoujiazui Lake Water System

Figure 3-7 Wetlands and Ponds in the Upper Reaches of Zoujiazui Lake Water System

Figure 3-8 A Sewage Outlet in Furongshan Industrial Park to the West of Jinchang Road

(2) Middle reaches of Zoujiazui Lake basin

Middle reaches of Zoujiazui Lake basin start from the west of Furongshan Avenue, and reach the intersection of Wanli Avenue and Chengxi Avenue. Middle reaches pass through Dawanlv Village and Xuzongshi Village. Rainwater in pipelines (d2000 mm) in Furongshan Avenue flows to west and converges in Zoujiazui Lake water system. The water system section of middle reaches is about 2.5-6.0 m wide and 2.5-4.0 m high. There are mostly vegetable fields and a few farmlands along the water system section. Around part of the water system which passes through villages, domestic sewage is randomly discharged into the water system and waste is randomly dumped or piled up (Figure 3-9). Meanwhile, another sewage outlet in Furongshan Industrial Park discharges water at the west side of Furongshan Avenue. The sewage also enters into the Zoujiazui Lake water system, which causes great threat to the water ecological environment and the living environment of surrounding residents.

Figure 3-9 Direct Discharge of Sewage and Random Dumping or Piling up of Waste

(3) Lower reaches of Zoujiazui Lake basin

Lower reaches of Zoujiazui Lake basin start from the intersection of Wanli Avenue and Chengxi Avenue, pass through Zhaoshengmian Villiage and Zoujiazui Villiage, and finally flow from north to south into Zoujiazui Lake along the west side of Chengxi Avenue.

Figure 3-10 Current Situation of Zoujiazui Lake

Pursuant to relevant data from Duchang County Water Resources Bureau, the normal water level of Zoujiazui Lake is 13.576 m, the low water level 12.576 m, and the flood level once in a decade 14.576 m. Zoujiazui Lake basin area is about 7.92 km^2. The normal water level of Jishan Lake is 11.076 m, and the flood level once in a

decade 12.076 m. Jishan Lake basin area is about 60.52 km^2, and the control water level in electrical pumping station is 11.076-11.876 m.

The waster system section of lower reaches is about 8.0-24.0 m wide and 2.0-5.0 m high. The wider water surface is convergence of water from lower reaches to Zoujiazui Lake, and the less narrow section is the culvert of Yangjia Bridge. Along lower reaches are mostly vegetable fields and a few farmlands. Around part of the water system which passes through villages, domestic sewage is randomly discharged into the water system and waste is randomly dumped or piled up (Figure 3-11). These actions will cause great threat to the water ecological environment and the living environment of surrounding residents.

Living and production activities of surrounding villagers, such as exploiting vegetable fields and building houses, will encroach and destroy shores of Zoujiazui Lake water system to a varying degree (Figure 3-12).

Figure 3-11 Random Dumping or Piling up of Waste in the Lower reaches of Zoujiazui Lake Water System

Figure 3-12 Encroaching to Shores of Zoujiazui Lake Water system by Rural Houses

Influenced by surrounding villages and sewage of Furongshan Industrial Park,

the water in the west side of Chengxi Avenue is classified into Category V. The nitrogen and phosphorus pollutants exceed the standards. The water quality in the west side of Chengxi Avenue is worse than that in the east side. If measures are not taken, the water quality of Zoujiazui Lake will worsen, which will further pollute the water in Poyang Lake.

3.8 Overview of Solid Waste Treatment

3.8.1 Status quo of Urban Sanitation and Problems

According to materials from Duchang County Sanitation, daily production of domestic waste in Duchang County is 130-150 t/d. Duchang County has 13 waste collection stations, of which 11 are waste compressing stations. Now Duchang County has set up domestic waste comprehensive treatment plant by BOT, with designed disposal capacity being 300 t/d. The plant uses anaerobic fermentation technology and mainly receives domestic waste in the urban area. Domestic waste in the urban area is collected and transported by County Sanitation to comprehensive treatment plant. But waste in suburban townships such as Beishan Township, Wangdun Township and Dashu Township can not be totally collected and transported into the urban area, because the collecting and transporting treatment system is not perfect. There are many phenomena that domestic waste is randomly dumped or piled up, or randomly buried in wastelands, or directly burned on the piles, all of which will pollute ecological environment of Poyang Lake banks.

3.8.2 Current Situation of the Three Townships Sanitation and Problems

3.8.2.1 Current Situation of the Sanitation and Problems

According to the survey, the total population of Beishan Township, Wangdun Township and Dashu Township is about 104,000, and permanent population is about 74,000. The quantity of domestic waste produced by residents is around 52 t/d. However, waste collection and transportation systems in the three towns are not prefect. The waste collection devices in the three townships vary: most of natural villages have no fixed waste collection equipment; just a few better-off villages, towns and market town districts are equipped with some waste bins and waste tanks.

Recently, in order to improve the dirty and disordered environment in rural areas, County Party Committee and County Government actively carry out rural domestic garbage treatment work for "Beautiful Villages, Harmonious Society." The Agro-industrial Department of County Party Committee and New Rural Construction Office (hereinafter referred to as New Rural Office) positively apply for funds to carry out rural cleaning actions. Every natural village is given 240 L waste bins according to the standard that every 15 households will get one waste bin. Several waste tanks are built as waste collection spots according to population of natural villages.

According to the materials supplied by the Agro-industrial Department of Duchang County Party Committee, due to limit funds, the waste collectors bought by New Rural Office for townships are available but limited. In the three townships under the project, each township is given one hanging bucket refuse collector (3 t) and 1-2 detachable container garbage collectors (0.8 t). At present, these vehicles can only serve townships, market towns, schools and other densely populated places. To form a waste collection and transportation system which covers the whole townships, large numbers of waste collectors are needed. Nowadays, the service life of waste bins bought by New Rural Office is about 3 years. When the project starts, waste bins mentioned above must be replaced. Besides, sanitation managerial personnel are in great shortage in the three towns. In line with surveys, rural waste treatment work in the three townships is led by the Agro-industrial Department of Township Party Committee and only one sanitation keeper is appointed in each town. The deficiency of managerial personnel raises difficulty to waste treatment work in project areas.

There are still many defects existing in waste collection and transportation systems in project areas:

(1) The collection spots do not take measures against rain and wind, then the garbage is scattered with the wind, and sewage is out of control. Surrounding environment is seriously polluted.

(2) Most damaged waste bins are not replaced in time.

(3) Since the waste collection bins are not cleaned in time, some are full and the waste spills out.

(4) There are no classification measures in the collection spots.

(5) Each village waste tank is termly treated by entrusted social clearing teams. Their trunks are mostly open-air during traveling, which easily causes secondary pollution.

(6) With no perfect collection and transportation treatment system in the three townships, a great deal of domestic waste is dumped and placed everywhere, or burned in waste tanks, or dumped and embedded beside the lakes, or randomly buried in wastelands. All of these will pollute groundwater and Poyang Lake ecological environment.

Short of waste collection devices, a great deal of rural domestic waste is dumped and buried, or dumped beside lakes or piled up or burned in the open air. All of these will cause heavy contamination to Poyang Lake water environment and ambient environment (shown in the following picture).

Figure 3-13 Randomly Piling and Burning of Rural Waste

3.8.2.2 Waste Components

An investigation was carried out on October 19, 2015, on waste components of collection spots located in Xingfu Road, Beishan Township, the west of Wangdun Township government and Dashu Township police station. The results are listed in the following table.

Table 3-6 List for the Investigation on Waste Components of Collection Spots in the Three Townships (%)

Location	Proportion of Recyclable materials					Proportion of bulk	Proportion of compostable waste (kitchen	Proportion of combu	Proportion of hazard	Proportion of others (coal
	Paper	Metal	Glass	Textiles	Plastic					

						waste	garbage, branches, flowers and grass)	stible waste	ous waste	cinders, dust and broken stones)
Xingfu Road, Beishan Township	4.77	3.78	6.16	3.68	5.17	Unseen	35.39	15.51	Unseen	25.55
west of Wangdun Township government	3.67	4.48	8.55	8.96	5.30	Unseen	31.36	17.31	Unseen	20.37
Dashu Township police station	2.46	0.98	1.38	9.85	4.92	Unseen	37.74	16.41	Unseen	26.26

3.8.2.3 Management Department

Waste in the three townships are in the charge of Township Sanitation Office. The Office undertakes the work of distributing waste bins, waste cans, waste collectors and managing and maintaining transfer stations. Each natural village takes charge of their own waste management: cleaning and maintaining roads; arranging and maintaining waste bins, waste cans and waste tanks; at the same time urging residents to take out the trash thrown into rubbish cans. The Agro-industrial Department of County just supervises the rural waste treatment work.

3.8.3 Duchang County Domestic Waste Comprehensive Treatment Plant

County Government attracts investment of Yuansheng Environmental Protection Technology Co., Ltd in form of BOT. Therefore the company established an urban domestic waste treatment plant in the west of Duchang County. Waste in the three townships under the subproject will be transported to the plant for disposal. See Chapter Five Due Diligence for details of the domestic waste comprehensive treatment plant

3.9 Current Environment Quality

3.9.1 Current Atmospheric Environment Assessment

In order to know current ambient air quality in project regions, the assessment quotes 2014 Environment Quality Bulletin issued by Jiujiang City Environmental Protection Agency.

(1) Monitoring factors

Monitoring factors of atmospheric environment quality are: PM_{10}, $PM_{2.5}$, SO_2, NO_2.

(2) Assessment methods

Singular standard index method is employed in current atmospheric environment assessment, that is:

$$I_{ij}= C_{ij} /C_{si}$$

In which, Iij—the index of pollutant i at monitoring point j;

Cij—average monitoring values of pollutant i at monitoring point j (mg/m3);

Csi—assessment standard of pollutant i (mg/m^3).

(3) Assessment standard

Category II standard in Ambient Air Quality Standards (GB3095-2012) is applied to project regions.

(4) Monitoring and assessment results

Table 3-7 Table of Monitoring Results

Item / Factor	Average time	Monitoring value ($\mu g/m^3$)	Category II standard ($\mu g/m^3$)	Standard index	Whether reaching the standard
PM_{10}	Average value	86	70	1.23	Not reaching
$PM_{2.5}$	Average value	46	35	1.31	Not reaching
NO_2	Average value	31	40	0.76	reaching
SO_2	Average value	30	60	0.5	reaching

(5) Result analysis

According to Table 3-1, in project regions, the standard indexes of SO_2 and NO_2 are all less than 1, and PM_{10} and $PM_{2.5}$ are more than 1. Monitoring results of PM_{10}

and $PM_{2.5}$ do not meet Category II standard in *Ambient Air Quality Standards* (GB3095-1996), which indicates the air quality in regions is average.

3.9.2 Current Surface Water Environment Assessment

Detecting results of water quality in Zoujiazui Lake basin are provided in Table 3-7, and the monitoring sites can be seen in Figure 3-14.

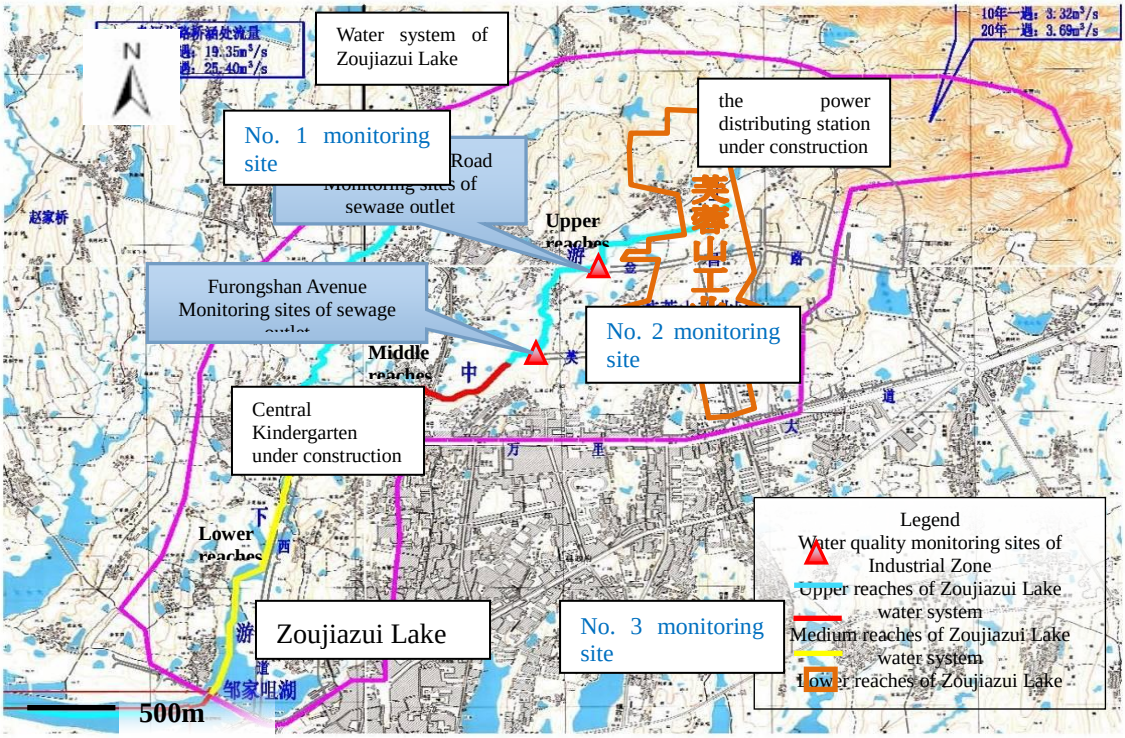


Figure 3-14 Location of Water Quality of Monitoring Sites of Zoujiazui Lake Water System

Table 3-8 Monitoring Results of Water Quality in Zoujiazui Lake (Unit: mg/L)

Location	COD	BOD_5	TN	NH_3-N	TP	Note
1# water body in the upper reaches of Zoujiazui Lake (to the west side of Chengxi Avenue)	--	7.81	7.6	2.73	0.62	Sampling time at 16:00, on November 3, 2015, sunny
2# water body in the lower reaches of Zoujiazui Lake (to the west side of Chengxi Avenue)	--	1.45	9.4	4.52	0.19	
3# water body in the Zoujiazui Lake (to the	87.0	66.5	15.5	11.20	1.10	

east side of Chengxi Avenue)						
1# water body in the upper reaches of Zoujiazui Lake (to the west side of Chengxi Avenue)	2.5	--	8.5	6.0	1.36	Sampling time at 13:00, on March 18, 2015, sunny
2# water body in the lower reaches of Zoujiazui Lake (to the west side of Chengxi Avenue)	20.2	5.0	2.3	1.9	5.12	
3# water body in the Zoujiazui Lake (to the east side of Chengxi Avenue)	83.2	21.7	22.5	20.4	6.41	
GB3838-2002 Standard limited value (Category V)	40.0	10.0	2.0	2.0	0.4 (lake, reservoir 0.2)	

Seen from the table above, the water quality in the upper reaches, lower reaches and lake regions of Zoujiazui Lake does not meet Category III standard in *Surface Water Environment Quality Standards* (GB3838-2002), and the water quality is classified into Category V. Zoujiazui Lake water system is influenced by industrial waste of Furongshan Industrial Park, domestic sewage directly discharged by both banks of residents and domestic waste randomly dumped and piled up, thus causing relatively high degree of eutrophication in Zoujiazui Lake. In particular, water body in the east side of lower reaches almost belongs to black and odorous water body of Category V. The overall development of the city is expanding to the west. If measures are not taken, the water quality will further worsen, polluting water body of Poyang Lake.

3.9.3 Current Acoustic Environment Assessment

In order to fully understand and analyze the current quality of the acoustic environment in project areas, the assessment monitors surrounding acoustic environment.

Type of Sound-level meter: HS5618A integral Sound-level meter;

Monitoring time: May 9, 2015;

Measuring meteorological conditions outdoors: there is no rain, no snow, and no thunder, and the wind power is lower than fourth level (5m/s);

Four noise monitoring sites are set up, and the monitoring results are listed in the following table.

Table 3-9 Monitoring Results of Current Quality of Acoustic Environment (dB(A))

No. of monitoring sites	Monitoring sites involved	Monitoring value in the daytime	Assessment	Standard
N1	Duchang Experimental Primary School	56.7	Reaching the standard	Category II standard in *Acoustic Environment Quality Standards* (GB3096-2008): 60 in the daytime
N2	The Third Primary School in Duchang	54.1	Reaching the standard	
N3	County Maternal and Child Care Service Center	55.8	Reaching the standard	
N4	Qinjiafan Primary School	53.6	Reaching the standard	
N5	1m outside the east boundary of Beishan Township waste transfer station	50.1	Reaching the standard	Category I standard in *Acoustic Environment Quality Standards* (GB3096-2008): 55 in the daytime
N6	1m outside the south boundary of Beishan Township waste transfer station	50.3	Reaching the standard	
N7	1m outside the west boundary of Beishan Township waste transfer station	50.4	Reaching the standard	
N8	1m outside the north boundary of Beishan Township waste transfer station	50.1	Reaching the standard	
N9	1m outside the east boundary of Wangdun Township waste transfer station	51.2	Reaching the standard	
N10	1m outside the south boundary of Wangdun Township waste transfer station	51.5	Reaching the standard	

N11	1m outside the west boundary of Wangdun Township waste transfer station	51.1	Reaching the standard	
N12	1m outside the north boundary of Wangdun Township waste transfer station	51.2	Reaching the standard	
N13	1m outside the east boundary of Dashu Township waste transfer station	52.6	Reaching the standard	
N14	1m outside the south boundary of Dashu Township waste transfer station	52.5	Reaching the standard	
N15	1m outside the west boundary of Dashu Township waste transfer station	52.4	Reaching the standard	
N16	1m outside the north boundary of Dashu Township waste transfer station	52.5	Reaching the standard	

From the monitoring results, each monitoring site under the subproject all meets correspondent limited requirements of acoustic function region in *Acoustic Environment Quality Standards* (GB3096-2008), and current quality of acoustic environment is good in project areas.

3.9.4 Bottom Silt

With the aim of solving the problems of poor liquidity, serious deterioration of water quality, and influence of sediments in the lake bottom on water circulation and pondage action of lake, this project intends to desilt part of Zoujiazui Lake to the east side of Chengxi Avenue through dredging sludge.

Figure 3-15 Location of DuchangZoujiazui Lake Bottom Silt Monitoring Sites

1 Monitoring agency and plan

Zoujiazui Lake, west side of Chengxi Avenue

Chengxi Avenue

Zoujiazui Lake, east side of Chengxi Avenue

Monitoring site in the north side

Monitoring site in the south side

Monitoring site for bottom silt

gency a an of Bottom Silt Monitoring Sites

Dredging planning	M ing agency and plan of monitoring si	Testing index
In Zoujiazui Lake, to the east side of Chengxi Avenue, the dredging depth is about 0.3 m and dredging amount is about 8000 m^3.	T engxi A does not involve industrial pollution source. Two tes will be respectively a rth and south sides of the lake.	pH, Cu, Zn, Pb, Cd, and Cr

2 Sample collection and monitoring r

Sampling will be conducted accor equirements on wat body sediments in *Specifications for Water Environment Monitoring* (SL219-201 sample is processed and monitored following requirements *Technical Specifications for Soil Environment Monitoring* (HJ/T166-2004).

①Sampling

Samples shall be collected by tube sediment sampler and restored in sealed glass containers under 4℃ in dark places. Signs with sample names and numbers shall be put up on the containers.

②Pre-treatment for samples

Open-air drying: natural drying is used. The silt sample (generally not less than 500 g) is divided by quartering, and every part is 100 g. Then the samples are placed on drying plate for natural drying in thin layers of 2-3 cm thick. At the same time, screes and remains of dead animals and plants shall be removed by properly crushing and turning over samples.

Separation: the sample shall be crushed with a wooden rod, until it can pass through a nylon sieve with a hole diameter of 2 mm. Then the pass-through sample shall be crushed in an agate mortar until it can totally pass through a nylon sieve with a hole diameter of 0.49 mm. These samples shall be mixed as standbys.

③Monitoring and analysis methods

Methods for analyzing factors of bottom silt monitoring are provided in the following table.

Table 3-11Analysis Method for Bottom Silt Monitoring Factors

Factor	Gauge	Method	Origin of method
Cu	Atomic absorption spectrophotometer	Flame atomic absorption spectrophotometry	GB/T17138-1997
Zn	Atomic absorption spectrophotometer	Flame atomic absorption spectrophotometry	GB/T17138-1997
Pb	Graphite furnace atomic absorption spectrophotometryon spectrophotometer	Graphite furnace atomic absorption spectrophotometry	GB/T17141-1997
Cd	Graphite furnace atomic absorption spectrophotometryon spectrophotometer	Graphite furnace atomic absorption spectrophotometry	GB/T17141-1997
Cr	Atomic absorption spectrophotometer	Flame atomic absorption spectrophotometry	GB/T17137-1997

Table 3-12 Results of Bottom Silt Monitoring and Evaluation in Zoujiazui Lake (mg/kg)

Samples and monitoring time	pH	Cu	Zn	Pb	Cd	Cr	Moisture content
Bottom silt in the north of the lake (November 3, 2015)	6.52	26.05	53.86	17.03	Not detected	29.20	90%
Bottom silt in the south of the lake (November 3, 2015)	6.56	33.45	97.15	19.85	Not detected	28.38	90%
Bottom silt in the north of the lake (March 18, 2015)	6.54	36.83	93.20	16.06	Not detected	28.69	90%
GB/15618-1995 Category II (pH=6.5-7.5)	6.5-7.5	100	250	300	0.3	300	--
GB4284-84 Limited concentration value (pH≥6.5)	≥6.5	500	1000	1000	20	1000	--

According to the results, the dredged silt of Zoujiazui Lake meet Category II standard (pH=6.5-7.5) in *Soil Environment Quality Standards* (GB15618-1995), and *Standards for Control of Pollutants in Agricultural Sludge* (GB4284-84) (pH≥6.5). The dredged sludge can be used for farmlands, afforestation and gardens.

4 Comparison and Selection of Alternatives

Analysis for comparison and selection of alternatives will be conducted from 4 aspects: comparison and selection of zero-plan, comparison and selection of technical alternatives, comparison and selection of techniques, comparison and selection of location selected.

General principles of analysis of alternatives are:

(1) Quantitative principle of comparison and selection: quantifying impacts of project implementation on environment for every alternative.

(2) Comprehensive principle of comparison and selection: comprehensively analyzing alternatives from environment, technology, economy and society.

(3) Conformity principle of comparison and selection: the selected alternative must conform to related development planning and standard requirements and adapt to local conditions.

4.1 Comparison and Selection of Zero-plan

From the perspectives of environmental cost-benefit and society and economy, the project EIA analyzes and compares alternatives with zero alternative. Detailed results are provided in Table 4-1.

Table 4-1 Comparison and Selection of Zero-plan

Item	Project implementation alternative	No-project alternative (zero alternative)
Advantage	(1) The project implementation meets national policies for urban domestic sewage treatment and pollution control technologies; (2) It meets the plan for Poyang Lake ecological economic zone; (3) It is beneficial to protect water quality of Poyang Lake basin. By 2023, it is estimated that pollutants discharged into Poyang Lake will be reduced. The reduced quantity per year of COD is 239.4 t, TN 17.5t and TP 4.4 t; (4) The amount of reduced waste which flows into Poyang Lake is 17,000 t/y. (5) It will further improve urban infrastructure.	(1) The existing environment will maintain. For example, vegetation will not be damaged; (2) It will not change land utilization value (will not occupy land); (3) It will not lead to environmental impacts during the construction period such as vegetation damage and dust.
Disadvantage	(1) It will occupy land resources : land acquisition;	(1) Sewage with no treatment

	(2) It will damage vegetation and generate dust and noise during construction; desilting will have impacts on water body and ambient air; (3) Exhaust gas, equipment noise and sewage in waste transfer station during the operation period will influence environment.	directly flows into surface water and severely pollutes surface water; (2) It can not solve current poor drainage system; (3) Domestic waste can not be all collected, part of it is randomly dumped and piled up, which influences city appearance, living conditions, and safety of water and ecological environment.
Overall Analysis	From the social and environmental perspectives, the implementation alternative is superior to the zero alternative.	

From Table 4-1, there are no environmental impacts during construction and operation period for no-project alternative, but existing sewage and waste directly discharged into environment will definitely cause pollution; the project implementation though will bring some environmental impacts, correspondent environmental measures taken will avoid and reduce these impacts. What's more, impacts during the construction period are temporary, but social and environmental benefits brought by project implementation and operation can last for long term. In particular, it plays a positive role in protecting and promoting water quality of Poyang Lake basin, and perfecting urban infrastructure. Therefore, from perspectives of enhancing social and economic development and protecting environment, implementation of the project is better than zero alternative, and project construction is necessary.

4.2 Comparison and Selection of Technical Alternatives

4.2.1 Criteria for Comparison and Selection of Technical Alternatives

Criteria for comparison and selection of technical alternatives shall be subjected to following principles (technology solutions are compared and selected based on the following principles):

(1) Small investment. Investment benefits shall be given full play. The most economical technology solutions shall be used according to waste treatment demands.

(2) Convenient management and low running expenditure. In view of local

management level and operation costs after completion per year, technology solutions which are equipped with convenient management and low operation costs shall be employed.

(3) Small adverse environmental impacts.

4.2.2 Comparison and Selection of Sewage Pipeline Layout Techniques

In line with scientific, rational and operational principles, 2 sets of designs of comparison and selection of sewage pipeline layout are taken into consideration. Comparison and selection of alternatives are summarized in the following table.

Table 4-2 Comparison and Selection of Alternative for Sewage Pipelines

Item	Alternative 1 (recommended)	Alternative 2
Overview	It will discard 2# sewage pumping station, add a sewage pipeline which can flow to wastewater treatment plant by gravity, simultaneously accept several sewage outlets of Zoujiazui Lake, sewage pipelines of Chengxi Avenue and interception sewer on the west side of Zoujiazui Lake. The total length of the pipeline is 1925 m .	It will join up sewage pipelines of Chengxi Avenue and sewage outlets around Zoujiazui Lake with 2# sewage pumping station, and reform the pumping station as a station with a scale of 12,000 m^3/d
Construction costs	5,641,000 yuan, and the present cost is 834,661,200 yuan	3,686,000 yuan, and the present cost is 96,522,500 yuan
Operation costs	About 100,000 yuan/a	About 638,000 yuan/a
Feasibility	There is the height difference which meets requirement for flowing by gravity between the inlet of 2# sewage pumping station and the inlet of wastewater treatment plant; there is no need to remove houses along the line. It is feasible.	It will expand the scale of 2# sewage pumping station, and join up surrounding outlets into the pumping station. It is feasible.
Environmental impacts	It can reduce impacts of the pumping station on environment.	It will expand the scale of pumping station, new pumping station is needed, and noise impacts increase.
Advantages	1) Saving the operation and management fees of the pumping station; 2) Reducing investment and operation and management fees of the pumping station at the end of interception sewer in the west side of Zoujiazui Lake; 3) Joining up sewage outlets surrounding Zoujiazui Lake into wastewater treatment	1) Saving initial investment; 2) Joining up sewage outlets surrounding Zoujiazui Lake into wastewater treatment plant

Item	Alternative 1 (recommended)	Alternative 2
Overview	It will discard 2# sewage pumping station, add a sewage pipeline which can flow to wastewater treatment plant by gravity, simultaneously accept several sewage outlets of Zoujiazui Lake, sewage pipelines of Chengxi Avenue and interception sewer on the west side of Zoujiazui Lake. The total length of the pipeline is 1925 m .	It will join up sewage pipelines of Chengxi Avenue and sewage outlets around Zoujiazui Lake with 2# sewage pumping station, and reform the pumping station as a station with a scale of 12,000 m^3/d
	plant	
Disadvantages	New inlets of wastewater treatment plant are needed, and initial investment increases.	1) Adding annual operation and management fees of the pumping station; 2) Adding the pumping station at the end of interception sewer in the west side of Zoujiazui Lake.

It can be seen from the table above that Alternative 2 causes greater environmental impacts, and increases noise impacts of pumping station. The present cost of Alternative 1 is 83,461,200 yuan, and the present cost of Alternative 2 is 96,522,500 yuan. The present cost of Alternative 1 is less than that of Alternative 2. In addition, Alternative 1 decreases 2 pumping stations, which will help with maintenance and management of the urban drainage system. Therefore Alternative 1 is recommended. That means discarding 2# sewage pumping station and adding sewage pipeline which can flow by gravity to wastewater treatment plant. At the same time the wastewater plant shall take over wastewater from sewage outlets in Zoujiazui Lake, sewage pipeline in Chengxi Avenue and interception sewer in the west side of Zoujiazui Lake.

4.2.3 Comparison and Selection of Waste Transfer Technology

The service scope of the subproject is the three suburban towns in Duchang County. According to on-the-spot surveys, village roads can only bear small waste collection trucks with a load of about 1 t. The plan considered 2 alternatives: Alternative 1 is to set up a waste transfer station in each township, so that waste can be transported to the urban waste treatment plant after being compressed in the waste transfer station; Alternative 2 is to use waste collection trucks to directly transport

waste to the urban waste treatment plant. The project conducted comparison and selection for two alternatives above.

Table 4-3 Comparison and Selection of Waste Transfer Technology

Item	Alternative 1 (recommended)	Alternative 2
Overview	One waste transfer station shall be set up in each township, so that waste can be transported to the urban waste treatment plant after being compressed in the waste transfer station	Waste collection trucks shall be used to directly transport waste to the urban waste treatment plant
Construction cost	Beishan Township: 5,729,000 yuan; Wangdun Township: 6,150,000 yuan Dashu Township: 5,942,000 yuan	Beishan Township: 3,959,000 yuan; Wangdun Township: 4,980,000 yuan; Dashu Township: 4,622,000 yuan
Operation costs	Beishan Township: 827,700 yuan Wangdun Township: 1,047,800 yuan Dashu Township: 920,500 yuan	Beishan Township: 870,000 yuan Wangdun Township: 1,366,000 yuan Dashu Township: 1,125,000 yuan
Net present value (of construction investment and operation expenditure)	Beishan Township: 16,062,600 yuan; Wangdun Township: 19,235,000 yuan; Dashu Township: 17,436,700 yuan	Beishan Township: 14,828,000 yuan; Wangdun Township: 22,037,000 yuan; Dashu Township: 18,681,000 yuan
Impacts of land acquisition	Involving the land acquisition of three townships	No land acquisition
Environmental impacts	Constructing three transfer stations will bring odor impacts and equipment noise impacts	Mainly waste transportation noise and dust impacts on the traffic
Advantages	The alternative will decrease waste collection distance, save overall operation expenditure, lower overall net present value of construction investment and operation expenditure; it can also help promote waste management capacity of the three townships	The alternative does not have environmental impacts from transfer stations. There is no land occupation and impacts of land acquisition
Disadvantages	The alternative involves the land acquisition and transfer stations have environmental impacts	The alternative has high operation costs and overall net present value. It does not meet the requirement that every township shall build at least one waste transfer station in the *Work Program of Special Treatment for Rural Domestic Waste in Jiangxi Province*

From the table above, compared with Alternative 1, Alternative 2 reduces

environmental impacts of land acquisition and stations. But it will increase waste transportation frequency with no transfer station, which has great impacts on the traffic.

As for Beishan Township, the primary construction cost of Alternative 1 is 1,770,000 yuan, which is higher that of Alternative 2; but Alternative 1 can save an annual operation expenditure of 42,000 yuan; and the net present value of construction investment and operation expenditure of Alternative 1 is 1,235,000 yuan, which is higher than that of Alternative 2.

As for Wangdun Township, primary construction costs of Alternative 1 is 1,170,000 yuan, which is higher that of Alternative 2; but Alternative 1 can save annual operation expenditure of 317,000 yuan; and the net present value of construction investment and operation expenditure of Alternative 1 is 2,802,000 yuan lower than that for Alternative 2.

As for Dashu Township, primary construction costs of Alternative 1 is 1,320,000 yuan, which is higher that of Alternative 2; but Alternative 1 can save annual operation expenditure of 204,000 yuan; and the net present value of construction investment and operation expenditure of Alternative 1 is 1,244,000 yuan lower than that of Alternative 2.

From economic comparison, Alternative 2 is a little superior than Alternative 1 for Beishan Township, but Alternative 1 is much superior than Alternative 2 for Wangdun Township and Dashu Township. Since constructing township waste transfer station can help promote township waste management capacity, in addition, compressed waste can help improve using efficiency of waste trucks, reduce transportation times and relieve the traffic stress, the engineering recommended constructing at least one or more waste transfer stations for each township in the project areas. What’s more, this meets the requirement that every township shall build at least one or more waste transfer stations in the *Work Program of Special Treatment for Rural Domestic Waste in Jiangxi Province.*

4.3 Comparison and Selection of Techniques

4.3.1 Comparison and Selection of Dredging Construction Technique

Current lake dredging employs methods of dryly cleaning and digging and wetly pumping. The former method shall firstly cut off water supply and drain the lake, then dredge with machines after drying lake sludge; the latter method mainly includes dredger construction. The dredgers can be divided into grab dredger, cutter suction dredger and bucket dredger according to various structure and performance of dredgers.

Table 4-4 Comparison and Selection of Lake Desilting

Item	Dryly cleaning and digging	Wetly pumping
Method introduction	During dry seasons, cutting off water supply and draining the lake, then dredging with machines after drying lake sludge.	Keeping water supplying, using dredgers to dig in the water and transporting the silt to specified region through closed channels.
Scope of application	Due to draining water and drying by air, it is suitable for small lake body with small dredging quantity.	It is suitable for large and medium lakes and reservoirs which have large engineering works, often applied to environmental protection desilting engineering of river channels, lakes and reservoirs.
Construction area	No temporary occupation of lands	Temporary occupation of 2000 m^2 is needed.
Construction operation and schedule	in dry seasons, simple to construct, easy to operate	in flood seasons, difficult to construct and operate
Environmental impacts	in dry seasons, few impacts on water quality and aquatic eco-environment	few impacts on water quality
Cost	Less costs	More costs
Advantages	Through desilting, the quality can be guaranteed, low requirements for equipment and technology; the silts have low moisture contents and are convenient for later treatment; low construction costs	①Dredging equipment shall have higher accuracy of positioning and digging, to prevent missing digging and over digging, do not harm primary soil and avoid impacts on water environment during desilting process. ②This method will not reduce turbidity of water during desilting process.
Disadvantages	Due to construction in dry seasons, construction period is constrained,	Sanitation cutter suction dredger is large, and it is difficult for it to enter

	construction process is liable to weather influence.	construction sites. The dredger needs high construction management, lands with large areas for temporary occupation and high costs.

After overall considering desilting scale, construction management demands and cost and situations of lake region, the project intends to use method of dryly cleaning and digging, that is to cofferdam the lake and drain the water in dry seasons, then after drying, the long-arm diggers are used to excavate it in blocks. It has a small impact on water quality and aquatic ecosystem.

4.3.2 Comparison and Selection of Compression Techniques for Waste Transfer Station

Nowadays, popular waste compression techniques at home are mobile waste compression technique, horizontal waste compression technique, container waste compression technique, vertical waste compression technique, and prestressed waste compression technique. In particular, vertical waste compression technique is product at an early stage, which has many shortcomings, for example the base is deep, and it is difficult to flush and sanitation condition is poor. Vertical waste compression technique is washed out gradually and not recommended in the project. Prestressed waste compression technique is commonly used in large waste transfer station with high investment, so it is not suitable for the project. Mobile waste compression technique, horizontal waste compression technique, and container waste compression technique are compared and selected in the assessment. The comparison is listed in the following table.

Table 4-5 Comparison and Selection of Waste Compression Equipment

Type	Mobile	Horizontal	Container
Outlook			

Type	Mobile	Horizontal	Container
Supporting transporter	 Hook-armed waste truck	 Closed waste truck	 Hook-armed waste truck
Max stand-alone production capacity	50 t/d	100 t/d	120 t/d
Garage weight of a truck	8-14 t	8-10 t	8-16 t
Number of support equipment in a station	2 machines, 1 vehicle	2 machines, 1 vehicle	2 machines, 1 vehicles, 3 boxes
Unit power	5.5 kW	22 kW	22 kW
Occupied area of equipment	20 m^2	42 m^2	35 m^2
Supporting building area	160 m^2	220 m^2	325 m^2
Investment of a station	1,500,000 yuan	2,800,000 yuan	3,500,000 yuan
Environmental impacts	Fully-sealed structure is used for waste transfer, which eliminates the secondary pollution of waste and solves dripping and leakage	Dripping and leakages of waste	Dripping and leakages of waste

Type	Mobile	Horizontal	Container
	problems of waste.		
Advantages	1 Equipment base is simple, there is no need to construct pits, so it is convenient for cleaning. Sanitation condition is better. 2 few impacts on environment. 3 Energy saving	1 The waste transportation is fast, and compressors can run continuously	1 Separating compressors and containers can save oil consumption for transporting compressors.
Disadvantages	1 Transport waste compressors shall travel with waste to waste treatment plant, and oil consumption is increased a little.	1 Equipment rooms must construct pits, and the base is complex. So it is not convenient for cleaning. Sanitation condition is poor. 2 Waste blocks may be dispersed during transportation process, and waste leachate may seep on the way and pollute environment. 3 Compressor power is large and energy consumption increases.	1 High investment. 2 Large power of compressors and more energy consumption.

From the table above, rooms for horizontal compression equipment must construct pits. What's more, it is not convenient for cleaning, the sanitation condition is poor, secondary pollution may occur during transportation, and it is not suitable for Duchang County's conditions. Container equipment has the complex base, with high investment, power consumption and running expenditure, but it is more suitable for medium-sized waste transfer station. Mobile compression equipment has low environmental impacts with small occupied areas, it is convenient for construction, operation and cleaning. Therefore the project recommends Alternative 1, namely mobile waste compression technique.

4.3.3 Comparison and Selection of Deodorization Techniques

The project intends to arrange deodorization system in the waste transfer stations mentioned above. At present, the widely applied deodorization technique is

deodorization technique with energetic and active oxygen ions and deodorization system of spraying vegetation liquor. These two deodorization techniques are compared and selected in the assessment.

Table 4-6 Comparison and Selection of Deodorization Techniques

Item	BENTAX method using energetic and active oxygen ions	Spraying vegetation liquor
Purification technique	Adopting advanced air purification with positive and negative oxygen ions	Letting vegetation liquor have absorption reaction and oxidation reaction with odorous gas in the air
Purification mechanism	Combination of physics and chemistry	Mainly absorption reaction and oxidation reaction
Purification agents	Fresh air in outdoor	Plant extracts
Maintenance method	Ionic tubes shall be replaced according to the actual condition after long-term operation (2-3 years).	Nozzles shall be frequently washed to avoid being blocked
Maintenance form	Guard and maintenance by designated persons are not necessary. Simple cleaning is enough.	It will be led by designated persons, and maintained and changed by designated persons.
Purification effect	Efficient and stable operation for long term, no fluctuation	Low
Energy consumption	Low, there is just energy consumption of exhaust fans and inoizers	Low
Operation	It is instant-on, no guard of designated persons is needed.	It is complicated and needed changing and adding vegetation liquor at regular basis.
Anti-shock loading capacity	Good	Low
Equipment body	Small, no need for special basic treatment	Small, no need for special basic treatment
Equipment transportation Installation and commission	Simple and convenient	Simple
Scope of application	It has good effects for different treatment spaces. It is suitable for waste transfer stations and landfills.	It is suitable for the open-air space which is difficult to collect, such as landfills and chemical plants.
Selection of processing objects	No special requirements. It has good effects for organic and inorganic exhaust gas in wasteyards.	No special requirements
Investment	Investment of a single set of equipment is 265,000 yuan.	Investment of a single set of equipment is 125,000 yuan.

Operating expenditure	The annual operation expenditure is 33,000 yuan.	The annual operation expenditure is 64,000 yuan.

From the table above, method of spraying vegetation liquor is complex during operation and post-maintenance, and deodorization effect is not good enough. Though the investment of a single equipment is low, post-operation expenditure is high. And BENTAX method using energetic and active oxygen ions is simple during both operation and post-maintenance, and deodorization effect is good. Even though the investment of a single equipment at early stage is twice as much as that of equipment of spraying vegetation liquor, and annual running expenditure is half of that of former. Over a long term, BENTAX method using energetic and active oxygen ions is more advantageous. Therefore BENTAX deodorization technique with energetic and active oxygen ions is recommended.

4.3.4 Comparison and Selection of Location Selected

Table 4-7 Comparison and Selection of Location for Waste Transfer Station in Beishan Township

Alternatives of station location / Comparison and selection content	Alternative 1: station location of Bachuantang	Alternative 2: station location of Xingfu Road
Geographic location	In a waste grass land on the west side of Bachuantang Village	At the intersection of Xingfu Road and Keji Road
Landforms	The region where the station location is situated in now is a forest land, close to present village roads. The topography rises and falls greatly with the largest altitude difference of 5 m.	The region where the station location is situated in now is vegetable fields, 110 m away from present Xingfu Road, and close to north extension of planned Xingfu Road. The land is flat.
Transportation condition	It will pass through a village road of 3 km. The transportation condition is poor.	It will pass through a village road of 1.1 km. The transportation condition is good.
Surrounding environmental condition	1. The distance between the location and private houses is more than10m; 2. Population density in the neighborhood is small, and it is not convenient for collecting waste.	1. The location is situated in central town of Wangdun Township, the population density is large, and it is convenient for collecting waste; 2. The distance between the location and private houses is more than 10m; 3. The surrounding is well equipped with electric power and other infrastructure, and recently water supply

		and drainage pipelines will be constructed;
Earthwork engineering	10,000 m^3	—
Transportation distance to Duchang waste treatment plant	6 km	4 km
Environmental impact	It has less impacts on ambient air after taking deodorization and dedusting measures, and few impacts on water environment with proper treatment for leachate.	It has less impacts on ambient air after taking deodorization and dedusting measures, and few impacts on water environment with proper treatment for leachate.
Advantages	1. The land expropriation cost is low; 2 It is far away from residential districts, and has few impacts; 3. The township government has done residents' ideological work, and residents all agree with the location selected; 4. Constructing transfer station here has low social impacts.	1. The transportation distance is short; 2. Two waste collecting lines can converge here, and it is convenient for collecting waste;
Disadvantages	1. The transportation distance is long, and the transportation condition is poor; 2. The waste collecting route is devious, which will influence the traffic; 3. There will be large engineering quantity for leveling the land;	1. There are many private houses around the location, and residents have strong psychological resistance; 2. It will charge certain land expropriation cost.
Conclusion	Recommended	

From the table above, Alternative 2: station location of Xingfu Road is well-equipped with municipal facilities with a short transportation distance, but it is involved in land acquisition and the public have some objections. Alternative 1 has almost the same environmental impacts, but influence brought by land acquisition can be avoided. Therefore Alternative 1: station location of Bachuantang is recommended.

Table 4-8 Comparison and Selection of Location for Waste Transfer Station in Wangdun Township

Alternatives of station location / Comparison and selection content	Alternative 1:station location of Xinqiao	Alternative 2: station location of brickyard

Geographic location	To the south side of Ducai Highway, Yanggang Village	To the north of Wangdun Township gas station
Landforms	The region where the station location is situated in now is a simple dumping site, close to Ducai Highway. The land is flat.	The region where the station location is situated in now is a wasteland, 175 m away from Zhezuo Highway, and the land is flat.
Transportation condition	It is close to Ducai Highway, and the transportation condition is good.	It is close to Ducai Highway, and the transportation condition is good.
Surrounding environmental condition	1. The closest distance between station and residential houses is about 70m 2. The population density in the neighborhood is small, and it is not convenient for collecting waste;	1. The location is situated in central town of Wangdun Township, the population density is large, and it is convenient for collecting waste; 2. The distance between the location and private houses is more than10 m; 3. The surrounding is well equipped with electric power and other infrastructure;
Transportation distance to Duchang waste treatment plant	15 km	12 km
Environmental impact	It has less impacts on ambient air after taking deodorization and dedusting measures, and few impacts on water environment with proper treatment for leachate.	It has less impacts on ambient air after taking deodorization and dedusting measures, and few impacts on water environment with proper treatment for leachate.
Advantages	1. There is no land expropriation cost; 2. It is far away from residential districts, and has few impacts; 3. The township government has done residents' ideological work, and residents all agree with the location selected; 4. Constructing transfer station here has low social impacts.	1. It conforms to the overall planning of townships, and it is convenient for land management; 2. The transportation distance is short; 3. Two waste collecting lines can converge here, and it is convenient for collecting waste;
Disadvantages	1. The transportation distance is long,	1. There are many private houses in the neighborhood, and relief work shall be done for government;
Conclusion	Recommended	

From the table above, Alternative 2: station location of brickyard is well-equipped with municipal facilities with short transportation distance, but there are many resident houses in the neighborhood, which may causes great social impact.

But Alternative 1 has almost the same environmental impacts, and has gained recognition of residents. Therefore Alternative 1: station location of Xinqiao is recommended.

5 Environmental Impact Analysis and Mitigation Measures

5.1 Environmental Impact Analysis and Mitigation Measures during the Construction Period

5.1.1 Water Environment Impact Analysis during the Construction Period and Mitigation Measures

5.1.1.1 Water Environment Impact Analysis during the Construction Period

1 Impacts of dredging on water quality

The project intends to dredge sludge in part of Zoujiazui Lake which is in the east side of Chengxi Avenue dredging quantity is about 8,000 m^3, the dredging depth is 0.3 m, and the dredged area of the lake is about 25,610 m^2. The dredging will be carried out during dry seasons, and cofferdam construction will be used to dryly dig sludge after draining water in relevant area. Therefore, it has no impact on the water quality. As the sludge amount is not massive, there will be no temporary storage yard. Sludge will be dried on site, dredged up onto van trucks and transported with tarpaulin covered on the vacant land in Guling col in Wandun Township to be further dried for earth sheltered plantation. This project uses the autochthonous lake as the storage yard to dry sludge and progressively digs trenches to drain water in the lake bottom. So, the residual water will be drained into the western side of the lake through existing ditches, leaving few impacts on water quality.

2 Impacts of construction wastewater

Pollutants in domestic sewage are COD, BOD_5, SS and NH_3-N, with production being 4.8 m^3/d; construction wastewater mainly includes muddy water discharged from excavated pipelines and produced by flushing of machinery and vehicles, whose quantity is small; in addition, it construction wastewater includes wastewater produced in the construction process like flushing sands and stones, mixing and casting concrete, whose pollutants are SS and petroleum.

Random discharge of wastewater and domestic sewage above produced during the construction period will pollute surrounding water body. Domestic sewage of the subproject produced during the construction period will be collected and disposed by

local collection and disposal facilities, not discharged out. Construction wastewater is sprayed to control dust after being settled.

After measures above, wastewater produced during the construction period will have no adverse impacts on surrounding water environment.

5.1.1.2 Mitigation Measures

The following protection measures are taken for water environment during the construction period:

1. Construction wastewater

Wastewater from sand and gravel processing system shall be treated in settling ponds, then it can be used in concrete mixing, dust controlling and watering. It will not be discharged into the water body along the line. Mud generated during construction process shall be pumped into settling ponds by mud pumps. After treatment in the pond, the mud will be solidified by being drained and evaporated. It will not be discharged into the water body along the line. Flushing water of mechanical equipment will be sprayed to control dust on construction sites after treatment in settlement and oil separation ponds. It will not be discharged into the water body along the line.

As for the layout of construction sites, drainage demands shall be fully considered and they shall keep away from rivers and water body as far as possible. It shall be assured that construction sites, warehouses, fields for storing diesel and asphalt, and devices producing asphalt can not be set up in areas within 500m of rivers. What’s more, pollutants shall be prevented from flowing into rivers during operation of devices. Especially in rain seasons, pollutants shall avoid being leaked through land and surface water.

During construction process, working places shall be kept clean, sewage and pollutants shall be prevented from flowing into excavating ditches, which can cause sewage infiltration.

If oils storage at sites is needed, storerooms shall be conducted anti-seepage treatment. Measures shall be taken when storing and using, to prevent dripping and leakage which can pollute water.

Foundation construction shall be conducted during non-flood seasons as possible, so that to reduce impacts of shallow depth of groundwater on construction.

2. Domestic sewage

Domestic sewage produced during the construction period will be collected and disposed by local collection and disposal facilities, not discharged out. Measures against seepage and leaking shall be taken according to relevant requirements in temporary storage for domestic waste.

3. Residual water of sludge dredging

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.

Far from the mud outlets, water outlets should be built in the cornet pocket 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.

Emergency treatment facilities of residual water include accidental water storage pool, agent-feeing facilities for emergencies, etc. If it is possible, an emergent accidental water storage pool of different volumes should be built 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. Or flocculant agent and agent-feeding facilities for emergent treatment shall be prepared to increase the quantity of reagent in case of emergencies.

To dewater bottom sludge of the storage yard, we can dig ditches to drain water and use existing ditches to drain water into the western side of the lake. The monitoring results of the bottom sludge indicate that the bottom sludge of this project has no heavy metal pollution, meeting the Category II standard (6.5<pH<7.5) in *Soil*

Environment Quality Standards (GB15618-1995) and the *Standards for Control of Pollutants in Sludge for Agricultural Use* (GB4284-84) (pH≥6.5). Based on natural sediment of the storage yard, qualified residual water can be discharged into the western side of the lake.

The storage yard should be covered with tarpaulin to avoid rain wash.

5.1.2 Ambient Air Impact Analysis during the Construction Period and Mitigation Measures

5.1.2.1 Ambient Air Impact Analysis during the Construction Period

(1) Dust produced during vehicle transportation of construction

According to relevant document literature, during construction process, dust produced by driving vehicles accounts for over 60% of the total dust. In completely dry conditions, dust produced by driving vehicles can be calculated by the following empirical formula:

$$Q = 0.123(V/5)(W/6.8)^{0.85}(P/0.5)^{0.75}$$

In which, Q—dust produced by driving vehicles, kg/km·vehicle;

V—vehicle speed, km/h;

W—load of vehicle, t;

P—dust quantity on road surface, kg/m^2.

Table 5-1 shows the dust quantity produced by a 10-ton truck which passes through a road of 1 km long under conditions of different degrees of road surface cleaning and speeds. Thus it can be seen that dust quantity is larger when speed is faster under the same degree of road surface cleaning; but under the same condition, dust quantity is larger when the road surface is more dirty. Therefore, limiting vehicle speeds and keeping road surface clean can effectively reduce dust produced by driving construction vehicles.

Table 5-1 Dust Quantity under Conditions of Different Speeds and Different Degrees of Road Surface Cleaning

Dust quantity / Vehicle speed	0.1 kg/m^2	0.2 kg/m^2	0.3 kg/m^2	0.4 kg/m^2	0.5 kg/m^2	1.0 kg/m^2
5 (km/m^2)	0.0511	0.0859	0.1164	0.1444	0.1707	0.2871

10 (km/m^2)	0.1021	0.1717	0.2328	0.2888	0.3414	0.5742
15 (km/m^2)	0.1532	0.2576	0.3491	0.4332	0.5121	0.8613
25 (km/m^2)	0.2553	0.4293	0.5819	0.7220	0.8536	1.4355

A the same time, during the construction period, if the road is sprayed water for 4-5 times a day, dust in the air can be reduced by 70% or so, which is good for falling dust.

(2) Dust at construction sites

During the construction period, another dust source is dust raised by wind power on open storage grounds and exposed grounds. For construction needs, building materials are stored in the open air, partial surface soils at operating sites shall be excavated by manpower and temporarily stored. Under conditions of dry weather with wind, it will produce dust, whose dust quantity can be calculated by the empirical formula of ground dust:

$$Q = 2.1(V_{50} - V_0)^3 e^{-1.023W}$$

In which, Q—dust quantity, kg/t·y;

V_{50}—wind speed in air 50m from the ground, m/s;

V_0—critical wind speed of dust, m/s;

W—moisture content of dust particles, %.

Critical wind speed of dust is related to particle sizes and moisture contents, so it is effective to reduce dust generated by wind through reducing storage on open grounds and keeping certain moisture contents, and reducing areas of exposed grounds. The diffusing dilution of dust in the air is related to wind speeds and other weather conditions, also related to settling velocities of dust itself. See Table5-2 for settling velocities of dust with different particle sizes. The table indicates, settling velocity of dust increases sharply with the increase of particle sizes. Settling velocity of dust is 1.005 m/s when particle size is 250 μm. Therefore, when particle size is more than 250 μm, main influenced scope is within the small range of downwind of dust points. But the real influential dust to outside environment is that of small particle sizes.

Table 5-2 Settling Velocity of Dust in Different Particle Sizes

Dust particle size (μm)	10	20	30	40	50	60	70
Settling velocity (m/s)	0.003	0.012	0.027	0.048	0.075	0.108	0.147
Dust particle size (μm)	80	90	100	150	200	250	350
Settling velocity (m/s)	0.158	0.170	0.182	0.239	0.840	1.005	1.829
Dust Particle size (μm)	450	550	650	750	850	950	1050
Settling velocity (m/s)	2.211	2.614	3.016	3.418	3.820	4.222	4.624

(3) Emissions of construction machinery and transport vehicles

Construction machinery like bulldozers, excavators, and transport trucks will produce certain amount of exhaust gas during traveling, which contains pollutants like HC, CO, NO_x and so on. And the exhaust gas will pollute surrounding ambient air. In general, when vehicles travel at reduced speeds, their emission amount and discharge concentrations of pollutants are all small. In order to reduce impacts of exhaust gas, transportation vehicles, bulldozers and excavators shall travel at reduced speeds when passing villages or entering construction areas. Meanwhile, repairing and maintaining construction machinery are to make them run normally and reduce exhaust emission.

(4) Odor from dredged silt

The project intends to desilt in Zoujiazui Lake to the east side of Chengxi Avenue, with dredging quantity being about 8000 m^3 and dredging depth being about 0.3 m. Construction method is dryly cleaning and digging method. That is to cofferdam the lake and drain the water in dry seasons, then after drying the lake, the long-arm diggers are used to excavate it in blocks. During drying period, lake bottom silts will release some odorous gases, which will influence living environment of surrounding residents and construction of workers. Dry seasons often from November to January is in autumn and winter, in which odor is less than that in summer.

There are no sensitive spots like schools, hospitals and nursing homes around the lake being silted. There are mainly two residential districts of Bajiazui Village and Siguayan Village, which are respectively located 30 m to the northeast side and 20 m

to the east side of lake region. Corresponding measures shall be taken to reduce odor.

5.1.2.2 Mitigation Measures

During the construction period, exhaust gas is mainly construction dust and exhaust gas and silt odor generated by construction machinery and vehicles. The following measures shall be taken to protect ambient air during the construction period:

1. Advanced construction techniques shall be used; wet crushing method shall be employed in aggregate processing system and concrete system, and dust collection system shall be used; vehicle speeds, automobile exhaust, exhaust gas of fire coals shall be controlled; water shall be sprayed as required (4-5 times per day). Construction team shall use clean energy like liquefied gas and electricity. The green in construction areas and labor protection for construction workers shall be enhanced. All of these will reduce impacts on ambient air.

2. Vehicle washing platforms shall be set up at the access of transportation vehicles which carry building materials and muck.The following requirements shall be met: spill-proof holders shall be set up around washing platforms to prevent washing wastewater from spilling out. Before vehicles leave construction sites, wheels and bodies shall be washed at washing platforms with no sludge on surfaces. As for transport vehicles which carry building materials and muck, stowage should not be higher than the top edge of ledge, and car hopper shall be covered or closed car hopper shall be employed.

3. Concrete mixing stations and asphalt stations are not allowed to be set up at construction sites. Ready-mixed concrete and asphalt shall be used.

4. Transportation vehicles, bulldozers and excavators shall travel at reduced speeds when passing villages or entering construction areas. Meanwhile, repairing and maintaining construction machinery are to make them run normally and reduce exhaust emission.

5. Dustproof screens shall be set up around construction regions, especially in those close to residential districts, hospitals and schools.

6. The production of dust and particulate matters shall be decreased as much as

possible to avoid impacts on surrounding resident living and business activities. Attention shall be paid to protecting sensitive people (like children and old people).

7. Deodorants shall be sprayed on drying sludge to reduce impacts on ambient air.

8. Drying sludge shall be timely excavated and cleaned.

5.1.3 Acoustic Environment Impact Analysis during the Construction Period and Mitigation Measures

5.1.3.1 Acoustic Environment Impact Analysis during the Construction Period

Construction noise will disappear with the completion of construction. But strong noise will cause severe impacts on surrounding acoustic environment, such as sensitive spots like hospitals and schools. Controlling noise during the construction period shall be highlighted. As for pipeline construction, equipment changes its location constantly and the number of running equipment during different period varies. So it is difficult to exactly predict noise values at each construction site boundary. According to attenuation pattern of point noise source, noise values can be calculated when construction equipment is at different distances. Attenuation pattern of point source is as follows:

$L_P = L_{PO} -20Lg(r/ro)- \Delta L$

In which, L_P—sound pressure level (dB(A)) at site r (m) away from noise source;

L_{PO}—sound pressure level (dB(A)) at site ro (m) away from noise source;

ΔL—various attenuation quantities (excluding divergence attenuation), dB(A). Noise source ΔL at outdoor is zero.

Without regard to noise attenuation of trees and buildings, noise values (not overlaying with current values) of various kinds of construction machinery at different distances are predicted in the following table.

Table 5-3 Predicted Noise Values of Kinds of Construction Machinery at Different Distances

Unit: dB(A)

No.	Type of machinery	Predicted noise values								
		5m	10m	20m	40m	50m	80m	100m	150m	200m
1	Loader	90	84.0	78.0	72.0	70.0	66.0	64.0	60.5	58.0

2	Road roller	81	75.0	69.0	63.0	61.0	57.0	55.0	51.5	49.0
3	Bulldozer	86	80.0	74.0	68.0	66.0	62.0	60	56.5	54.0
4	Excavator	84	78.0	72.0	66.0	64.0	60.0	58.0	54.5	52.0
5	Large truck	86	80.0	74.0	68.0	66.0	62.0	60	56.5	54.0
6	Light truck	75	69.0	63.0	57.0	55.0	51.0	49.0	45.5	43.0

From comparison of table above, noise values beyond a 50 m radius around construction machinery in the daytime all can meet *Standards for Ambient Noise Emission at Construction Site Boundary* (GB12523-2011) (70 dB(A) in the daytime, and 55 dB(A) at night), but they seldom meet standard limited values at night within the scale of 200 m. It follows that construction noise has greater impacts on acoustic environment of regions within a 50 m radius around construction sites in the daytime, and construction at night has more serious impacts with the influential scale of 200 m. But noise impacts are short-term and temporary, they will come to an end with the completion of construction activities. The project will not conduct construction at night. Key sensitive spots in influenced scale in the daytime are provided in the following table.

Table 5-4 Conditions of Key Sensitive Spots Influenced by Construction Noise

No.	Sensitive spots	Location	Distance (m)	Number of influenced people
1	Duchang County Central Kindergarten	Lower reaches of Zoujiazui Lake basin	10	/
3	The Third Primary School in Duchang	North side of Wanli Avenue	15	4,000
4	County Maternal and Child Care Service Center	North side of Wanli Avenue	15	262
5	Qinjiafan Primary School	South side of Wanli Avenue	40	1,500

Therefore, some measures shall be taken to reduce impacts of construction noise on environment sensitive spots.

5.1.3.2 Mitigation Measures

The following measures shall be taken to protect acoustic environment during the construction period:

1. As for some road sections which are sensitive to acoustic environment, like hospitals, schools, kindergartens and nursing homes, warning signs of horn prohibition shall be set up; low-noise equipment shall be used; noise point source, routes of transmission and traffic noise shall be controlled; ear plugs shall be given to construction workers and construction time shall be reasonably arranged.

2. According to provisions in *Standards for Ambient Noise Emission at Construction Site Boundary* (GB12523-2011), construction time shall be reasonably arranged to avoid simultaneous constructions of amounts of high-noise equipment as possible, and to avoid noise at sensitive time points. Construction using high-noise equipment shall be arranged in the daytime as much as possible. Transportation at night shall be reduced, and carrying on construction work at night (22:00-6:00) is prohibited. As for those construction work that must be carried on at night, the approval of local environmental protection department shall be gained, and communication with residents must be conducted in advance. At the same time, noise reduction measures (such as setting up noise barriers) shall be taken to lower impacts of construction noise on residents to the least.

3. Traveling speeds of all construction vehicles on roads outside construction areas are not allowed to exceed 25 km/hour.

4. Speeds of vehicles at construction sites are not allowed to exceed 15 km/hour.

5. Noises of machinery and equipment should be kept below 90 dB to the greatest extent.

6. At sensitive spots (including schools, hospitals and sanatoriums), temporary noise barriers shall be set up on one side of sensitive spots when high-noise equipment is running.

7. Correct measures shall be taken to reduce impacts of construction noise and vibration on surrounding environment.

8. Consultation shall be conducted with schools and units in the neighborhood. Construction time shall be adjusted or other measures shall be taken to decrease disturbance of construction noise on teaching and working as possible.

9. Implementing unit must select construction machinery, instruments and

transportation vehicles which meet relevant state standards.

10. Construction unit shall instruct implementing unit to show construction notice and complaints hotline at construction sites. As soon as receiving case reports, construction unit shall contact local environmental protection department, so as to timely deal with various environmental disputes and keep construction going smoothly.

5.1.4 Solid Waste Impact Analysis during the Construction Period and Mitigation Measures

5.1.4.1 Solid Waste Impact Analysis during the Construction Period

Solid waste produced during the construction period is mainly domestic waste of construction workers, construction waste, spoil and dredged silt.

(1) Impacts of domestic waste of construction workers

Production of domestic waste during the construction period is about 60 kg/d, this kind of domestic waste is mainly organic waste. Decay and fermentation will occur to waste after being discarded, which not only pollutes water body but also breeds mosquitoes and flies and produces odor to pollute environment. EIA suggests setting up waste collection bins at construction sites during the construction period. Commission sanitation department shall clean waste after domestic waste is collected.

(2) Impacts of construction waste

Earthwork under the project is mainly from Urban Wastewater Pipe Network Improvement Subproject and Zoujiazui Lake Water System Ecological Restoration and Protection Subproject. In particular, excavation amount is 164,499 m^3, fill soil amount is 138,442 m^3, and digging soil amount is 26,057 m^3. Meanwhile, certain construction waste will be generated during construction, including cement concrete, broken bricks, and sands and gravels. Part of these construction wastes can be recycled, others that can not be recycled will be transported to local construction landfills with capacity of 1,810 m^3.

If spoil grounds are not well arranged for construction waste, or implementing unit randomly piles up debris, this will easily cause non-planning distribution of discarded earthwork and waste along on both sides of construction regions. It will

occupy considerable city lands, and debris soil erosion will be out of control. It will cause greater adverse impacts on surrounding ecological system, bring difficulty to recover temporary grounds of debris, and also have greater adverse impacts on landscape environment. Implementing unit shall clean and transport spoil to specified places, then county sanitation office shall deploy them and transport them to other works that need earthwork; construction waste shall be timely transported to Jiujang City construction landfills for treatment.

(3) Dredged silt

Considering the small area of the lake, small dredging quantity and components of bottom silt, dryly cleaning and digging method is employed to dredge. That is to cofferdam the lake and drain the water in dry seasons, then after drying the lake, the long-arm diggers are used to excavate it in blocks. Through testing and previous analysis, heavy metal contents in the dredged silt of Zoujiazui Lake meet Category II standard (pH=6.5-7.5) in *Soil Environment Quality Standards* (GB15618-1995), and *Standards for Control of Pollutants in Agricultural Sludge* (GB4284-84) (pH≥6.5). The silt after dredging can be used in farmlands, afforestation and gardens.

Due to silt amount being small, there is no temporary site for storage. After the lake is drained and dried, the silt will be excavated and loaded to van trucks which shall be covered with tarpaulin. Dredged silt will be transported to wastelands in mountain ridges of Wangdun Township for application. Transportation distance is about 3km. Dredged silt will be disposed of through air drying and used as surface soil for afforestation. The project uses the lake as the storage yard. So the measures of cofferdaming, draining, disposing residual water and controlling odor shall be taken.. Dredging quantity of the subproject is 8000 m^3, moisture content is 90%, and the destiny is 1.0 kg/L, so the dry weight of sludge is 800 tons. Pursuant to *Standards for Control of Pollutants in Agricultural Sludge* (GB4284-84), the quantity of applied silt which meets this standard is generally within 2000 kg (of dry sludge) for every mu per year. The wasteland covers an area of 300 hectare, namely 4500 mu, and the dry weight of silt available is 900 tons. Therefore, it is feasible to transport silt to wastelands in mountain ridges of Wangdun Township for application. See chapters of

soil and water conservation for soil and water conservation measures when the application of silt. The wastelands are collective lands in Qijiao Village, Wangdun Township. See Annex I for Sludge Acceptance Letter.

According to the design manual of USA Environmental Protection Agency (land application of municipal sludge), the use of forest land is divided into surface application and injection application. Such silt is applied to the surface. For the sake of preventing the public from entering into the forest land, fences and warning signs should be set up after silt is mixed with soil. As the project applied area is small, the stir is not suggested, while earthing and virescence should be taken to prevent soil form erosion.

(4) Impacts of waste in the dredging area

There are solid pollutants, such as waste and organism remain, etc., in outlet channels of the dredging area. Solid pollutants should be cleared in the process of dredging. The waste quantity of this part is small and the estimated quantity is 0.2t. EIA proposes the unified collection of such waste by installing waste collection boxes on the construction site, and solid pollutants should be handed over to the environment and sanitation department. Moreover, cleared wastes should be transported to Yugan waste landfill by the environment and sanitation department and be treated in here.

5.1.4.2 Mitigation Measures

Solid waste produced during the construction period is mainly domestic waste and waste in dredging area generated by construction workers and spoil and dredged silt in the process of construction. The following mitigation measures shall be taken for solid waste produced during the construction period:

1 Project spoil

Construction spoil is temporarily stored on both sides of excavated pipelines, implementing unit shall clean and transport spoil to specified places, then county sanitation office deploy them and transport them to other works that need earthwork in Duchang County. The project and county sanitation office shall take the following measures at temporary spoil disposal sites:

① Temporary dump sites of earth and stone shall be laid out rationally away from sensitive spots such as residential area and schools as much as possible and from water bodies. It is suitable to lay out them on downwind and crosswind directions of summer prevailing wind direction of urban and residential areas;

② Less land shall be occupied as much as possible and temporary occupied area shall be restored based on the original land use types after completion of construction;

③ Earth and stone stacked temporarily shall be rammed, rolled and covered with tarpaulin with water-proof and wind-proof measures well adopted;

④ Mud drains shall be built around the temporary waste soil dump sites and mud detritus pits shall be built at the drains' outlet to slow down collected water and deposit silts;

⑤ Spoil shall be sealed during transportation to avoid scatter;

⑥ The operation of spoil work shall be conducted by specially-assigned persons in each section. Non-operating personnel shall be prohibited from entering into the operation area and operating personnel, vehicles and machine in the operation area follow managerial personnel's directions. The vehicles shall discard earth in accordance with the routes and areas designated by managerial personnel and not discard earth randomly, affecting normal earth discarding operation in the spoil grounds and outside the construction site;

⑦ Water- proof and drainage treatment shall be made to ensure smooth drainage and avoid inundation around the spoil grounds and the operation site as well as water and soil erosion and environmental pollution;

⑧ Safety standards on protection and construction in the temporary dump sites shall be made based on the relevant construction standard requirements;

⑨ Specially-assigned persons shall patrol the spoil grounds after work and handle and report potential safety hazards in time. Warning signs shall be set up; and the spoil on one day shall be handled on the same day as much as possible;

⑩ After completion of the project, the temporary facilities in the construction site shall be dismantled, waste soil be cleaned up and the sites be leveled in time to

restore the neighboring environment; During the construction and shut-down period the sanitation in the construction site and the neighboring environment shall be maintained.

11 During the process of dumping earth, the operation shall be carried out through strictly paving and rolling, and the soil layer shall be rolled before being paved with the new one. During the paving of soil layer, the slope shall be high inside and low outside according to the construction progress. A certain number of runoff gathering pits shall be placed in the runoff ditches to deposit mud in water. Weather and local flood situation shall be mastered in time. Dredging work in drains and runoff gathering pits shall be ready and drains be improved ahead of time;

12 After completion of earth work, equipment, surplus material, garbage and temporary facilities shall be cleared up in time.

2 Construction waste

As for recyclable waste (waste iron, steel, and packing bags for materials will be sold to salvage station, waste bricks will be taken as base materials for roads) shall be comprehensively sorted and recycled. Unrecyclable waste shall be timely cleaned and transported to construction waste landfill. Tracks shall be closed during transportation to avoid scattering. Waterproof and windproof measures shall be taken at temporary piling sites.

3 Domestic waste

Domestic waste collection bins shall be arranged at construction areas. They shall be cleaned, collected and sorted by designated persons, then be cleaned and transported by sanitation department.

4 Dredged silt

Desilting shall be conducted in dry seasons.

Desilting by cutting water supply and digging by excavators, cofferdaming the lake and draining the water in dry seasons, then after drying, using the long-arm diggers to excavate it in blocks.

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.

Water outlets, residual water treatment and emergency pools shall be built in the storage yard with permeable measures to dewater bottom sludge by progressively digging ditches to drain water. Based on natural sediment of the storage yard, qualified residual water can be discharged into the western side of the lake.

The storage yard should be covered with tarpaulin to avoid rain wash.

Deodorants should be sprayed at regular intervals to dry sludge to avoid the impacts of ambient air.

Decreasing temporary occupied lands as possible, timely cleaning and transporting them.

Bottom silt will be directly transported by closed trucks to wastelands in mountain ridges of Wangdun Township for application on the ground surface. And fences and warning signs shall be set up to prevent people from entering.

Temporary fences shall be set up at silt grounds of wastelands in mountain ridges of Wangdun Township to reduce soil erosion. See water and soil conservation measures for details.

Bottom silt at silt grounds of wastelands in mountain ridges of Wangdun Township is disposed of through air drying and used as surface soil for afforestation.

5 Waste in dredging area

Waste collecting bins shall be set up at the construction sites for collecting waste. Then those wastes shall be cleared and transported by sanitation department to Duchang County waste comprehensive treatment plant for disposal.

5.1.5 Ecological Impact Analysis during the Construction Period and Mitigation Measures

5.1.5.1 Ecological Environment Impact Analysis during the Construction Period

(1) Impacts on plants in construction regions

Drainage network is mainly laid along city roads, and has few impacts on regional plants. Waste transfer station and monitoring rooms mostly occupy wastelands. Ancient and rare trees are not found in construction regions, and

temporary occupancy districts will be restored according to original land types after construction completion, that is to say, there are seldom impacts on regional vegetation.

(2) Impacts on regional animals

Zoujiazui Lake, located in the urban area of Duchang County, is an area of frequent human activity. Areas along the lake are mainly vacant land, vegetable plots and villages. Due to the emitted pollution from neighboring villages and Furongshan Industrial Park, the water quality of the lake is worse than Category V, especially in the eastern side of the lower stream where this project intends to dredge sludge. According to surveys, most aquatic organisms in Zoujiazui Lake are common species. No fish spawning site, feeding ground, wintering ground or precious aquatic life is found and Zoujiazui Lake is not an important natural habitat. This project will dredge sludge of about 8000m^3 at 0.3m depth of the lake, covering an area of about 25610m^2. The lake area and the sludge dredging quantity are not massive. It will be carried out during dry season and only drain water in specific area. With the construction of the cofferdam, some benthos will disappear. Yet, they will come back upon the completion of sludge dredging.

All in all, within engineering zones, poultry and common aquatic animals are main, and no wild animals under key protection and their habitats are found. In addition, the dredging quantity is not massive and Zoujiazui Lake desilting subproject is conducted during dry seasons. The desilting region will just be cofferdamed, drained and dryly excavated during construction. Therefore, engineering construction has few impacts on regional animals and aquatic creatures and will not have severe impacts on Zoujiazui Lake.

(3) Aggravating soil erosion

During construction process, the present of construction sites damages surface vegetation, and leads to soil erosion increase. Temporary stockyards will crush and bury surface vegetation, meanwhile, new soil erosion area formed by piling debris and sludge storage yard will cause soil erosion in rainy seasons.

During the construction period, damage to ecology and landscape is limited and

temporary. Only if construction workers do good jobs in management, and restoration of temporary occupancy districts after construction completion, the engineering's environmental impacts on ecology and landscape during the construction period are acceptable.

5.1.5.2 Mitigation Measures

1 Construction sites shall be scientifically arranged, land occupancy shall be reduced as possible, and temporary occupancy districts will be restored according to original land types after construction completion.

2 Publicity and education shall be strengthened. During construction process, If rare and endangered wild plants, ancient and rare trees and endemic plants are found, they shall be reported to relevant department and on-site conservation measures shall be taken. Construction noise shall be controlled and disturbance of construction noise on animals shall be reduced.

3 During construction process of stripping surface soil, it shall be conducted by stratified excavation and stratified stack. Temporary facilities shall be timely removed after construction completion, loose harden soil, backfill surface soil layer by layer, and vegetation shall be restored. Suitable vegetation types shall be selected for local areas according to climate features, slope rate and geology conditions.

4 Measures of controlling soil erosion

(1) Reasonably selecting construction period, avoiding constructing in rainy seasons and days as possible. Setting up fences around construction operation area to prevent construction materials and wastes from entering into surface water.

(2) Combining landform conditions of construction sites, arranging soiling drainage around the sites, and arranging soil settling ponds at the outlets of drainage, so that converging water will slow down and leave settled sands.

(3) Key management shall be combined with surface protection of soil and water conservation, and engineering measures shall be combined with vegetation measures. On the basis of engineering measures, quick-acting and security roles of engineering measures shall be fully played. Vegetation measures can assist in conserving water, at the same time they can green and beautify surrounding environment of the project.

(4) Protecting leaf litter and its organism of surface soil, and backfilingl them to destroyed region to promote local plant growth.

(5) As for barren region which is eroded, covering with local grass seeds and vegetation, or hardening surface soil in the region.

(6) Before the coming of rainy seasons, erosion control measures shall be prepared, so as to carry out next construction work. When a construction site is completed, corresponding erosion control measures shall be perfected.

(7) In all construction sites, arranging settling control facilities to slow down runoff speed, changing flowing direction, settling sands before vegetation restoration. These settling control facilities including stockpiles, stone pathways, settling ponds, straw bales, hedgerows and dumps of sludge and slag.

(8) Preventing water flows from entering or disturbing construction sites by laying ditches, berms and grass fences and piling up stones.

(9) Continuously adopting erosion control measures until full restoration of vegetation.

(10) Spraying water on soil roads, excavation regions, and filling and soil storing regions to decrease wind erosion, if necessary.

5.1.6 Social Environment Impact Analysis during the Construction Period and Mitigation Measures

5.1.6.1 Social Environment Impact Analysis

1. Impacts of occupation of land

The state quo of construction temporary land occupation is that roads and wastelands in the urban area will be restored to original soil type after construction completion, spoil grounds will be covered with surface soil for afforestation, which almost has no impacts on regional land use.

2. Impact on municipal facility service

The laying of pipe network under the project is mainly on roadsides, sidewalks, non-motorized vehicle lanes or under original cover plate drainage. During construction process, temporary interruption may occur in drainage, electricity supply, gas supply and bus routes, and influence people’s living.

3. Impacts on business along streets

During the process of constructing pipe network, traffic blockage caused by excavation of road surface will impact on normal operation of street shops, for example, impeding the access of customers and inconvenience for loading and unloading goods.

4. Impacts on traffic and safety

The construction of pipe network will have evident impacts on road traffic. Although phased construction method can be adopted, temporary piling of earthworks during construction process, which is necessary, will cause effects on road traffic. When the pipeline crosses roads, adopting grooving methods will block roads, which has great impacts on traffic. Therefore, if geology and soil conditions permitted, pipe-jacking construction will reduce impacts of road excavation. But at that time, road bearing pressure (weight capacity) will decline, trucks are prohibited passing in a short time, and they all influence traffic in the urban area. It is estimated that pipeline crossing roads needs over 20 days of construction. That is to say, the impact on traffic will last for 20 days or so. Impacts of pipe network construction on traffic are great in main roads. Designed main roads and sensitive spots on both sides are listed in Table 5-5.

Table 5-5 City Main Roads under the Project

No.	Road name	Road grade	Width of red line	Engineering content in the section	Location of pipeline laying	Key sensitive spots
1	Wanli Avenue	Main Road	60 m	Sewage and rainwater pipeline	Pipeline laid on both sides	The Third Primary School in Duchang, County Maternal and Child Care Service Center, Qinjiafan Primary School

Consequently, civil construction contractor shall make thorough plans, lose no time to construct, and adopt pipe-jacking construction as possible. Before construction, contractor shall consult with local Traffic Management Department and make traffic management plans. Construction unit shall inform residents influenced by construction, set up signs at construction sites, and arrange designated persons to

disperse traffic. In addition, construction unit shall also strengthen management during the construction period, cut construction duration and take other measures to prevent traffic blockage.

5.1.6.2 Mitigation Measures

1. Mitigation measures for occupation of land

Construction sites shall be scientifically arranged, land occupancy shall be reduced as possible, and temporary occupancy districts shall be restored according to original land types after construction completion.

Reasonably arranging temporary earthwork stockyards, and keeping away from resident zones, school and other environment sensitive spots.

2. Mitigation measures for impacts on Municipal Facility Service of Pipe Network Engineering

(1) Informing people at least 5 days before service interruption (including water, electricity, gas and bus routes) by putting up notice at project sites, bus stations and affected residents and enterprises;

(2) On the basis of doing well construction organization, securing construction progress, cutting construction period as possible with safe construction, and trying to restore municipal service in short time.

3. Mitigation measures for impacts on business along streets

Setting up fences on the side facing business shops, reserving corridors for pedestrians, preventing business along streets from impacts.

4. Mitigation measures for impacts on traffic and safety

(1) Civil construction contractor shall consult with local Traffic Management Department and make traffic management plans before construction. Implementing unit shall provide construction and engineering schedule, traffic detouring routes, temporary bus routes and house removal on construction signs;

(2) Setting up warning sigh boards at the the access entering construction areas, intersections, road turns, lane changes, and traffic passages, and noting requirements for entering construction regions, speed limits, height limits and other limits.

(3) In principle, carrying on construction work at night (22:00-6:00) is prohibited.

As for those construction work that must be carried on at night, the approval of local environmental protection department shall be gained, communication with residents must be conducted in advance, at the same time noise reduction measures (such as setting noise barriers) shall be taken to lower impacts of construction noise on residents to the least.

(4) To reduce surrounding road traffic, other than special cases, earthwork vehicles shall try to avoid urban traffic hours. Night passage is proper. Operating times of other construction vehicles entering or getting out of construction sites shall be well arranged according to factors influencing traffic flows like seasons, climates, holidays and festivals, and emergency.

(5) As for construction engineering whose construction duration exceeds 30 days, fences shall be set up at the boundary or according to circumstances; the fence shall adopt color-coated steel plates, in general region, fences at construction sites shall be 2.5m high or above, at sensitive spots, fences at construction sites shall be 3m high above;

(6) Fences shall be upright, in order, clean and beautiful, and with no damage, and its outlook shall coordinate with surrounding;

(7) Fences which occupies road construction shall be within 5m of sight distance of intersections, metal mesh fence with stiffness should not block sight of drivers and pedestrians to secure traffic safety. All sorts of goods are prohibited to pile up within 5m of sight distance of fence;

(8) Distance between fence and houses shall be 5m or less, or as for distance between construction operating sites and sensitive buildings like houses, hospitals and schools is 15m or less, measures of heightening fence and lowing noise shall be adopted: fence height of sensitive districts shall be 3m; places within 5m beyond the fence shall be kept clean;

(9) Building materials like instruments and earthworks are prohibited to pile up within 5m inside the fence;

(10) Taking fence as retaining wall or support devices of other facilities is prohibiting.

(11) When construction line passes residents' access, impacts shall be reduced on neighboring residents and vehicles' travel. Half side construction and rush work shall be conducted. After completion of half side construction, soil shall be timely covered. Ditches shall not be covered with steel plates when work is finished at that very day to ensure normal passage and safety.

(12) Setting up full-time "traffic picket", and full-time team of safe traffic and civilized construction to be responsible for ensuring implementation of traffic guarantee measures, managing and maintaining traffic guarantee measures during the construction period, preserving traffic order in construction sections, and assisting solving traffic problems.

(13) During the construction period, vehicles and personnel entering or getting out of construction sites shall strictly obey traffic rules, be subjected to management of traffic management department. The construction sites shall accepting supervision of traffic management department and construction unit. Once problems affecting traffic are exposed, rectification shall be undertaken.

(14) Safe and civilized construction and measures to prevent disturbing shall be paid attention during the construction period, especially dust control measures, noise control measures, mud and earthwork management measures. Construction unit shall contact units and communities along in advance, and try to get understanding and support to ensure smoothness of construction.

(15) In preparation of construction organization program, cooperating with traffic shall be added as contents. Before construction, construction unit shall take initiative to contact traffic department, introducing and reporting engineering overview, construction programs, general layout and engineering materials, earthwork transport plans. Construction unit shall also require traffic department to give support and guidance to improve and perfect transport plans, and formulate implementation rules.

(16) On urban roads which are accessible, if opening or lifting blind shaft covers are needed to operate, folding construction barricades shall be set up on operating boundary.

(17) Pennants with red and white colors, isolated ropes for safety and other materials are not allowed to take place of construction barricades.

(18) The longer part of base channel of construction barricade shall face construction operating zone. Construction channels shall be reserved between construction barricade and construction zone with width of 0.6m or above.

(19) When painting or washing the surface of buildings (structures) totally enclose with construction barricades at the operating boundary, various machinery, instruments and materials shall be put outside the cofferdam

(20) Removing construction barricades is prohibited when temporary assess measures are not taken during the process of road construction or before the project completion.

(21) In key regions, pipeline construction shall adopt construction method of "excavating a section, paving a section, and renovating a section", and prohibiting simultaneous excavation along the whole line.

(22) As for construction occupying city roads, obey relevant provisions of public security and traffic department and highway management department, go through relevant approval procedures, arrange temporary passages according to specifications.

(23) Construction duration shall strictly obey permitting, prohibit occupying roads without authorization, or constructing beyond permitted duration.

(24) As for construction occupying city roads and affecting passage of vehicles and pedestrians, temporary passage roads shall be arranged according to rules, especially hospital temporary passages shall be arranged for convenient assess of hospital ambulance; after setting temporary passages in construction sections of kindergartens and schools, construction sites shall be strictly closed, infants or children are prohibited to entering construction region;

(25) When construction occupies sidewalks, solid, smooth and consecutive pavements which have limb safe envelope shall be set up on the side of access of neighboring business, enterprises, office buildings schools, hospitals, nursing homes, kindergartens and residential houses, and safe passage shall be secured;

(26) As for excavating pits or pipeline ditches on city roads, if works can not be

completed in the same day, implementing unit shall use steel plates to level the road.

(27) Bracing reinforcement program shall undertake safety analysis, and be reported to construction unit for recognition; covering steel plates have a thickness of 0.03m or above. Edges of steel plates or metal frames selected shall be polished to ensure no sharp corner and burrs and safe passage of personnel and vehicles.

(28) Excavation width of ditches (pits) is 0.8 m or more, covering steel plates shall be supported and enforced by metal materials.

5.1.7 Health and Safety during the Construction Period

Although with a small engineering quantity and a few construction workers under the project, living conditions and sanitation conditions are poor, workers' labor intensity is large, so diseases can easily become epidemic. To ensure construction safety, construction workers entering construction sites shall be comprehensively examined, personnel with infectious diseases are prohibited to enter construction sites; periodic examinations shall be made for canteen staff, if any epidemic disease is found, the person shall be timely treated and leave canteen in case of infectious diseases. Constructing centralized water supply facilities in construction sites or utilizing municipal water supply, and providing health care facilities and medical personnel. Protect health and safety of construction workers and ensure smoothness of construction.

5.2 Environmental Impact Analysis and Mitigation Measures during the Operation Period

The project is Water Environment Management Project, including Urban Wastewater Pipe Network Improvement Subproject, Zoujiazui Lake Water System Ecological Restoration and Protection Subproject, Domestic Waste Collection and Transportation of the Three Suburban Townships Subproject and Water Environment Monitoring System Subproject. The assessment for environmental impact analysis during the operation period is analysis for positive impacts of project on environment and other environmental impacts including exhaust gas (odor) waste transfer station, wastewater (leachate, flushing water for equipment and domestic sewage), solid waste

(domestic waste) and noise.

5.2.1 Positive Impacts

In a short term of the project completion, collection rate of urban sewage reaches 80%, and newly increasing treated sewage quantity reaches 8,000 m^3/d, forming sewage treatment scale of 30,000 m^3/d. Every year reduced pollutants discharged into Poyang Lake are COD of 239.4 tons, TN of 17.5 tons and TP of 4.4 tons. The quantity of reduced waste which flows into Poyang Lake is 17,000 t/y. It will improve urban living environment, reduce water logging region and rate in rainy seasons. In particular, water quality of Zoujiazui Lake is improved and surrounding environment of Chengxi Avenue gains great improvement with a soar in land value. The project will strengthen management on river and lake water environment basin in Duchang County, establishing effective water quality monitoring system and public participants. The project is beneficial to sustainable development of economy and society of Duchang County: direct beneficiaries are 257,000 people, including 122,000 women.

5.2.2 Water Environmental Impact Analysis and Mitigation Measures during the Operation Period

5.2.2.1 Water Environmental Impact Analysis during the operation period

1 Drainage Network Improvement Engineering

(1) Normal conditions

After completion of drainage network improvement engineering, sewage will be collected through channels. Then there is no access for sewage to slowly flow and infiltrate to pollute water body. After operation pipe network, city sewage converges into wastewater treatment plant, which will greatly reduce leakage of sewage into groundwater. It can almost avoid sewage infiltration, and groundwater and surface water environment will be gradually improved.

After project completion, collection rate of urban sewage reaches 80%, and newly increasing treated sewage amount reaches 8,000 m^3/d, forming sewage treatment scale of 30,000 m^3/d. Every year reduced pollutants discharged into Poyang Lake are COD of 239.4 tons, TN of 17.5 tons and TP of 4.4 tons.

(2) Impacts of sewage from Furongshan Industrial Park on wastewater treatment

plant

According to Jiangxi Provincial Department of environmental protection' requirements in *Opinions on Constructing Urban Wastewater Treatment Plant and Wastewater Treatment Plan in Industrial Zone*: In order to fully utilize treatment capacity of current urban wastewater treatment plant and avoid repeated construction, in principle sewage of industrial zones except some special industrial zones like chemical industry and electroplating can be discharged into urban wastewater treatment plant for disposal. In line with treatment capacity and technique of current urban wastewater treatment plant at present stage in Jiangxi Province, industrial sewage discharged into urban wastewater treatment plant should not be over 30% of the total treatment quantity.

Service scale of pipe network collection is in urban built-up areas, including Furongshan Industrial Park. Enterprises in the industrial zone are mainly aquatic product and agricultural and by product processing, clothes industries and automobile component industries; they do not engage in heavy metal enterprises. Sewage (wastewater) is mainly domestic sewage of enterprise staff canteens, office buildings and dormitories. Most enterprises with domestic sewage being the main form do not have pretreatment facilities; some enterprises which produce industrial wastewater and with large quantity water consumption have built pretreatment facilities. Predicted quantity for wastewater in Furongshan Industrial Park is 3000 m^3/d in recent, and 8,000 m^3/d for a long term, accounting respectively for 10% and 15% of total collection quantity under the project.

Two sewage outfalls in Industrial Zone are in the west of Jinchang Road and west of Furongshan Avenue, whose drainage water quality are detailed in the following table.

Table 5-6 Results of Water Quality Monitoring of Sewage Outfalls in Furongshan Industrial Park (mg/L)

Item / Location	COD	BOD_5	TN	NH_3-N	TP	Note
Sewage outfall in the west of Jinchang Road	--	3.65	4.3	4.04	0.31	Sampling time: at 16:00, November 3, 2015, sunny

Sewage outfall in the west of Jinchang Road	14.5	4.2	1.7	1.6	1.51	Sampling time: at 13:00, March 18, 2015, sunny
Sewage outfall in the west of Furongshan Avenue	35.6	12.9	10.9	9.5	2.88	
Category B Standard in *Water Quality Standards of Sewage Discharged into Urban Sewers* (GJ343-2010)	500	350	70	45	8	/

Table 5-7 Heavy metal contents of Sewage Outfalls in Furongshan Industrial Park (mg/L)

Sampling site	Total Cd	Total Pb	Total Cr	Total Ni	Total Zn	Total Cu	Total Mn	Total Fe	Total As	PH
outfall in the west of Furongshan Avenue	Not detected	Not detected	0.001	0.011	0.002	0.067	0.316	0.030	0.027	7
outfall in the west of Jinchang Road	Not detected	0.004	Not detected	0.011	0.012	0.050	0.082	0.013	0.017	6
Category B Standard in *Water Quality Standards of Sewage Discharged into Urban Sewers* (GJ343-2010)	0.1	1	1.5	1	5	2	5	10	0.5	6.5-9.5

Notes: sampling time is on July, 29, 2016, and it’s sunny.

Figure 5-1 Monitoring Sites for Water Quality of Outlets from Industrial Zone to Zoujiazui Lake

From data above, sewage from Furongshan Industrial Park can fundamentally meet Category B Standard in *Water Quality Standards of Sewage Discharged into Urban Sewers* (GJ343-2010), and can reach requirements of accepting water quality of Duchang County wastewater treatment plant, industrial sewage of Furongshan Industrial Park are below 30% of the total treatment quantity and with no heavily polluted enterprises. Its sewage is mainly domestic sewage, and inlet water quality will not impact wastewater treatment plant. Therefore sewage from Furongshan Industrial Park can be discharged into urban wastewater treatment plant for disposal.

However, in order to prevent excessive discharge of industrial wastewater in industrial zone, environmental agency shall sample and monitor at discharge outlet in industrial zone on a regular basis. If abnormality occurs in water quality, causes shall be found in main pollution source of catchment system. Relevant enterprises shall

take emergency measures, and emissions of microorganisms and hazardous substances shall be controlled. Industrial sewage of enterprises in industrial zone must be pretreated and reach emission standards of nation and industries, and urban drainage license shall be applied according to relevant provisions, all of which will be supervised by County Environmental Protection Bureau.

2 Waste Collection and Transportation Engineering

Waste leachate and flushing water of waste transfer station have a high concentration of organic pollutants and NH_3-N, if it is not dealt with properly when people collect, store and transfer waste, leachate and flushing water will infiltrate and pollute groundwater. In order to reduce pollution to water body, all waste trucks under the project adopt closed vehicles, and install leachate collection devices, so that waste will not be exposed and waste and leachate will not be scattered. Waste collection tanks with seepage control shall be arranged. After mixing waste leachate, flushing water and domestic sewage in waste transfer stations, concentrations of all kinds of pollutants meet Category B Standard in *Water Quality Standards of Sewage Discharged into Urban Sewers* (GJ343-2010). After collection, wastewater willl be cleaned and transported by suction sewage trucks to Duchang County wastewater treatment plant at regular intervals.

With the implementation of waste collection and transportation engineering, taking measures like arranging waste bins and, waste tanks and collecting and sorting domestic waste of townships will significantly improve old sanitation and perfect collection and transportation system and equipment, so that phenomena like spilling out of waste bins, randomly filling and direct dump beside lake or burning in the open air will decrease.

The project is both urban public facilities and environmental protection facilities. After the project implementation, it will be avoided that city sewage is directly discharged into river channels. Sewage will enter wastewater treatment plant through sewage pipe network, and be discharged when reaching standards. Proper treatment of domestic waste significantly reduce pollutants discharged into water body, it will promote water quality of Poyang Lake basin, and further improve ecological

environment.

3 Room for water environment monitoring system

Domestic sewage quantity of room for water environment monitoring system is 0.4 m^3/d, 102 t/a. Sewage will enter wastewater treatment plant through sewage pipe network, and be discharged when reaching standards.

4 Wastewater in public toilets

Zoujiazui Lake water system ecological restoration and protection subproject intends to build 4 pieces of public toilets along banks of Zoujiazui Lake with sewage quantity of 0.27 m^3/d, 98.55 t/a. Through municipal sewage pipe network, sewage is discharged into Duchang County wastewater treatment plant for disposal, and has no adverse impacts on environment.

After overall analysis, the engineering completion will help reduce pollution accesses of water environment and protect water environment.

5.2.2.2 Mitigation Measures

1. Urban Wastewater Pipe Network Improvement Subproject

(1) Timely cleaning pipe network, replacing damaged pipe network and avoiding leakage of sewage which will pollute surrounding water body and groundwater.

(2) Sampling and monitoring at discharge outlets in industrial zone on a regular basis. If abnormality occurs in water quality, causes shall be found in main pollution source of catchment system. Relevant enterprises shall take emergency measures, and emissions of microorganisms and hazardous substances shall be controlled.

(3) Paying attention to the following points when inspection wells are maintained and cleaned:

① Before cleaning the inspection well, it is required to set the warning sign, remove barriers at the surface of the inspection well and ensure the traffic smoothness; before opening the inspection well cover, it is required to evacuate operators;

②Steel bar and anvil etc can not be used for prying the inspection well cover to avoid spark, thereby causing burning or explosion;

③When motor is used for pumping or draining sewage, leakage of motor, power source, line and switch etc should be checked to avoid shock accident;

④ Before the worker enters the inspection well for desilting, carbonic oxide, carbon dioxide, hydrogen sulfide, methane and harmful gases should be removed through natural ventilation; moreover, the instrument should be used for detection and the worker can not enter the tank for working unless innocuousness and safety are determined;

⑤ The operating personnel who enters the inspection well should wear the anti-static clothes. It is not allowed to enter the inspection well with keys and hard metals;

⑥The operating personnel above the inspection well should hold the safety belts with hands and can keep the contact with the operating personnel who enters the inspection well;

⑦ After completing the cleaning, timely repair after recovering the inspection well cover and the trench cover. The warning sign or the protective fence should be provided if works can not be completed in the same day.

(4) Pay attention to following points when maintaining and managing

① The inspection well should be periodically cleaned and dregs should be removed, and also should be frequently checked and timely repaired to ensure smoothness and perfectness of sewage interception pipelines and inspection well;

② It is not allowed to pour wastes, pollutants and sundries into the inspection well. Stacking sundries or building houses above the inspection well is prohibited. And it is not allowed to reconstruct the sewage pipeline without permission;

③ The cover plate of the inspection well should be covered tightly in normal times to avoid odor and accident;

④Hot work beside the inspection well is prohibited;

⑤ Sludge from inspection well cleaning must be transported to the professional treatment plant designated by the municipal sanitation competent department for treatment. Records should be well made to avoid the cross contamination.

2. Domestic Waste Collection and Transportation of the Three Suburban Townships Subproject

Garbage trucks are all closed vehicles; impermeable collection tanks are

arranged in waste transfer station, so that domestic sewage, flushing water and leachate produced in waste collection station will be discharged into municipal wastewater treatment plant for disposal through pipe network after being settled.

3 Rooms for water environment monitoring system

Domestic sewage is collected by pipe network, and then discharged into Duchang County wastewater treatment plant for disposal.

5.2.3 Ambient Air Impact Analysis during the Operation Period and Mitigation Measures

5.2.3.1 Ambient Air Impact Analysis during the Operation Period

In the process of normal operation, the pipe network system is totally enclosed. There is seldom odorous gas. There is only a few odorous gas released during inspection process. Since the covers of sewage wells shall be removed when inspection is needed. Odorous gas released during inspection process is a few and discharge time is not frequent, so there is little influence on surrounding environment. Exhaust gas during the operation period is mainly from exhaust gas in waste transfer station, and dust and odor from waste transport vehicles.

1. Waste gas from waste transfer station

Atmospheric pollution of the project is mainly from odorous gas and dust when domestic waste is stored, compressed, and transported. Atmospheric pollutants are mostly NH_3 and H_2S and particulate matters and they will cause some impacts on surrounding residents and transfer station staff. In order to guarantee the working environment of staff in transfer stations, on the basis of affected residents' views, and accordance with the requirements in T*echnical Code for Transfer Station of Municipal Solid Waste* (GJJ47-2006), the project intends to install deodorization and dedusting system in transfer stations. After comparison and selection of alternatives mentioned above, the project intends to intend to adopt BENTAX energetic and active oxygen ions to deodorize. Deodorization technique with energetic and active oxygen ions originates from Europe, and it is based on study on atmospheric characteristics of 60 km high altitude ionosphere. It simulates troposphere natural regulating system of "Oxygen community", realizes quantity balance of air ions (including positive ions

and negative ions) with small particle size in local space by artificial methods, and can accelerate "atmospheric metabolism" within controllable range under natural air and electric field conditions. So that it can make air get safe, natural and fast purification and improvement. The technique has advantages like low energy consumption, small area of land occupation, no secondary pollution, long service time, and convenience to maintain. The efficiency of deodorization reaches 90%. Dedusting equipment adopts spraying to control dust with an efficiency of 90%. See the following table for conditions of exhaust gas emission and sensitive spots of 3 waste transfer stations under the project.

Table 5-8 Emission of Exhaust Gas Pollutants in Waste Transfer Station and Environmental Protection Targets

Item	Pollutant	Exhaust gas pollutant			Condition of sensitive spots			
		Production kg/h	Production t/a	Concentration mg/m^3	Name	Location	Distance	Number of influenced people
Beishan Township waste transfer station	NH_3	0.003	0.008	0.0038-0.0094	Bachuantang	East side of Beishan Township waste transfer station	200m	10 households
	H_2S	0.0004	0.001	0.0010-0.0025				
	Dust	0.002	0.006	0.05				
Wangdun Township waste transfer station	NH_3	0.004	0.0103	0.0038-0.0094	Yanggang Village	North side of Wangdun Township waste transfer station	70m	3 households
	H_2S	0.0005	0.0014	0.0010-0.0025				
	Dust	0.003	0.008	0.05				
Dashu Township waste	NH_3	0.0031	0.009	0.0038-0.0094	Matang Village	South side of Dashu Township	20m	10 households
	H_2S	0.0004	0.0012	0.0010-0.0025				
	Dust	0.0023	0.007	0.05				

transfer station						waste transfer station		

Pursuant to *Technical methods for making local emission standards of air pollutants* (GB/T13201-91), "when harmful gas of fugitive emission enters breath or atmosphere, if its concentration exceeds concentration limited values of residential areas stipulated by GB3096 and TJ36, sanitation protection distance shall be reserved between production units (production areas, workshops and work sections) where fugitive emission source is and residential areas." From the project analysis for the project, after the treatment in deodorization system, as for odorous pollutants of transfer stations, emission concentrations of NH_3 and H_2S are less than that in *Hygienic Standards for the Design of Industrial Enterprises* (TJ36-79) (NH_3 is 0.2 mg/m^3 and H_2S is 0.01mg/m^3). Therefore, the project just considers atmospheric protection distance.

Atmospheric environment protection distance model in recommended models of Technical Guidelines on EIA: Atmospheric Environment (HJ/T2.2-2008) is employed to calculate atmospheric environment protection distance of fugitive sources. Calculated distance is the control distance centered around pollution source. Floor plan of project areas shall be used to define the scale of control distance. The scale beyond boundary is the atmospheric environment protection region. Permanent living people should not live in atmospheric environment protection distance. If fugitive source emits various pollutants, they shall be calculated separately, and the maximum of calculation results is used to determine its atmospheric environment protection distance.

Table 5-9 Fugitive Emission of Atmospheric Pollutants and Atmospheric Protection Distance

Item	Pollutant	Effective height of surface source (m)	Width of surface source (m)	Length of surface source (m)	Emission rate (kg/h)	Emission concentration (mg/m^3)	Emission (t/a)	Emission standard (mg/m^3)	Prediction result
Beishan Township waste	NH_3	6	12	12	0.003	0.0038-0.0094	0.008	1.5	No points above standards

transfer station	H_2S	6	12	12	0.0004	0.0010-0.0025	0.001	0.06	No points above standards
	dust	6	12	12	0.002	0.05	0.006	1.0	No points above standards
Wangdun Township waste transfer station	NH_3	6	12	12	0.004	0.0038-0.0094	0.0103	1.5	No points above standards
	H_2S	6	12	12	0.0005	0.0010-0.0025	0.0014	0.06	No points above standards
	dust	6	12	12	0.003	0.05	0.008	1.0	No points above standards
Dashu Township waste transfer station	NH_3	6	12	12	0.0031	0.0038-0.0094	0.009	1.5	No points above standards
	H_2S	6	12	12	0.0004	0.0010-0.0025	0.0012	0.06	No points above standards
	dust	6	12	12	0.0023	0.05	0.007	1.0	No points above standards

From table above, emission concentrations of NH_3 and H_2S in waste transfer stations under the project all meet Category II standard ($NH_3 \leq 1.5$ mg/m^3, $H_2S \leq 0.06$ mg/m^3) in *Emission Standards for Odor Pollutants* (GB14554-93); emission concentrations of dust meet fugitive emission monitoring concentration limited values (1.0 mg/m^3) in *Comprehensive Atmospheric Pollutant Emission Standards* (GB16297-1996). According to calculation results of atmospheric protection distance, all kinds of pollutants have no points above standards, so there is no need to reserve atmospheric protection distance. The project has low impacts on ambient air.

2 Dust and odor impacts during transport

Waste collection and transfer vehicles all use closed ones with cover design and fully enclosed structure. Waste transfer station employs mobile waste compression technique, after waste compression, waste compressors together with waste will be transported to landfills. Waste collection and transfer of the project demolish

secondary pollution of waste, and solve problems of waste dripping and leakage, avoid impacts of dust and odor during waste load and transport.

5.2.3.2 Mitigation Measures

1. All of waste transfer stations use BENTAX deodorization method with energetic and active oxygen ions to dispose exhaust gas.

2. Flushing equipment of transfer stations and grounds on a regular basis to reduce odorous pollutants.

3. Selecting vehicles and containers which can reduce exhaust gas emission to lowest level when waste acceptance, unloading, disposal and storage.

4. Often cleaning waste collection station and roads in the neighborhood, and spraying water to control dust if necessary.

5. Fast cleaning and disposing all of biomass wastes, and strictly carrying out disposing of on the same day.

6. Keeping plants which have efficiency of deodorization and sterilization all around.

7. Waste transport vehicles shall be enclosed to prevent waste leakage and littering.

8. Developing and optimizing waste transport routes, try to avoid impacts of vehicle emissions on sensitive spots along roads like residential districts, schools and hospitals.

5.2.4 Acoustic Environment Impact Analysis during the Operation Period and Mitigation Measures

5.2.4.1 Acoustic Environment Impact Analysis during the Operation Period

There is no noise produce in operation period of drainage network improvement engineering, noise of waste collecting and transporting station is mainly from waste compression room and waste transport vehicles.

1. Equipment noise of waste compression room

Equipment of waste compression room are provided in the following table.

Table 5-10 List of Main Noise Source and Control Measures Unit: dB(A)

No.	Location	Noise source	Number	Source intensity of sound pressure level	Noise reduction measures
1	Beishan Township Waste Transfer Station	Compression equipment	2 sets (one with one standby)	85	Selecting low-noise equipment, arranging compression system in closed workshop, installing every equipment with vibration damping pads, using sound-proof doors and windows, and prohibiting honking in station
		High pressure washer	1 set (one set for one station)	85	
		Deodorization equipment, and dedusting equipment	One set each	60	
2	Wangdun Township Waste Transfer Station	Compression equipment	2 sets (one with one standby)	85	
		High pressure washer	1 set (one set for one station)	85	
		Deodorization equipment, and dedusting equipment	One set each	60	
3	Dashu Township Waste Transfer Station	Compression equipment	2 sets (one with one standby)	85	
		High pressure washer	1 set (one set for one station)	85	
		Deodorization equipment, and dedusting equipment	One set each	60	

Select noise prediction model in Technical Guidelines on EIA: Acoustic Environment (HJ2.4–2009). According to acoustic environment of guidelines on EIA, select prediction model. Each noise source is disposed as point source, the basic formula of its predictive calculation is:

$$L_A(r)=L_A(r_0)—A_{div}$$

In which, $L_A(r)$—equivalent sound level which away from sound source r, dB(A);

$L_A(r_0)$—equivalent sound level at reference site r_0, dB(A);

A_{div}—sound level attenuation caused by geometric divergence of sound waves, dB(A). Namely attenuation caused by distance, the basic formula of geometric divergence attenuation at omni-directional point source is : $A_{div}=20\ \lg(r/r_0)$;

The calculating formula of total equivalent and consecutive sound level A under simultaneous operation of several machines is:

$$Leq_t = 10\ \lg(10^{0.1 leqi})$$

In which, Leq_i — equivalent sound level of sound source i at certain prediction point.

As for predicting noise value at certain prediction point, firstly use the formula above to calculate total equivalent and consecutive sound level A, then add background values at that point. The specific calculating formula is as follows:

$$L_{eq}=10\ lg(10^{0.1Leqg}+10^{0.1Leqb})$$

In which, L_{eq}—predicted equivalent sound level at prediction point; dB(A)

L_{eqg}—contribution value of equivalent sound level of project sound source at prediction point, dB(A);

L_{eqb}—background noise value of prediction point, dB(A).

As for equipment selection, the project selects low-noise equipment which lowers acoustic pressure level of noise source; equipment uses basic vibration damping devices (rubber vibration damping or spring vibration damping), and enclosed setups; compressor room sets up sound-proof doors and windows to reduce noise spreading outside. With measures above, noise of production devices will be reduced by 30dB(A). Boundary noise values of waste transfer stations under the project shall be predicted according to the closest distance between devices and boundary. See the following table for details.

Table 5-11 Prediction Results of Boundary Noise under the Project in the Daytime unit: dB(A)

Prediction points		Distance (m)	Contribution value	Background value	Prediction value	Standard value	Assessment result
Beishan Township waste transfer station	1m outside the East Boundary	9	38.95	51.5	51.73	55	Reaching the standard
	1m outside the South Boundary	24	30.43	51.2	51.24	55	Reaching the standard
	1m outside the West Boundary	21	31.59	51.2	51.25	55	Reaching the standard
	1m outside the North Boundary	9	38.95	51.5	51.73	55	Reaching the standard
Wangdun Township waste	1m outside the East Boundary	24	30.43	51.2	51.24	55	Reaching the standard

transfer station	1m outside the South Boundary	9	38.95	51.5	51.73	55	Reaching the standard
	1m outside the West Boundary	9	38.95	51.1	51.36	55	Reaching the standard
	1m outside the North Boundary	21	31.59	51.2	51.25	55	Reaching the standard
Dashu Township waste transfer station	1m outside the East Boundary	9	38.95	52.6	52.78	55	Reaching the standard
	1m outside the South Boundary	9	38.95	52.5	52.69	55	Reaching the standard
	1m outside the West Boundary	24	30.43	52.4	52.43	55	Reaching the standard
	1m outside the North Boundary	21	31.59	52.5	52.54	55	Reaching the standard

From prediction results, sites 1m outside the boundary of waste transfer stations all meet Category I standard limited values in the daytime in Acoustic Environment Quality Standards (GB3096-2008), there is no operation at night, and impact on acoustic environment is small.

2. Noise of waste transport vehicles

Noise source of waste transport vehicles is 80 dB(A), and the noise values shall be predicted and calculated according to line sound source under the condition of no protection facilities. Calculation results are presented in Table 5-12.

Table 5-12 Noise Values along Traffic Artery

Distance (m)	5	10	15	20	25	30	35	40
Noise value (dB(A))	58	55	53	52	51	50.7	50	49

Category IVa standard in Acoustic Environment Quality Standards is applied at sites within 50 m away from both sides of traffic artery (70 dB(A) in the daytime, and 55 dB(A) in the nighttime); Category I standard is applied in other regions (60 dB(A) in the daytime, and 50 dB(A) in the nighttime).

After calculation, under conditions of no any barriers along roads and neglect of background noise, equivalent and consecutive sound level at sites 5 m away from road sides is 58 dB(A). That is to say, at sites 5 m away from both sides of transporting routes, traffic noise meets the requirement that equivalent and consecutive sound level shall be below 70 dB(A) along traffic artery in the daytime, no transportation at night;

at sites 10m away from roads, equivalent and consecutive sound level is 55 dB(A), it can be seen that at sites 10 m outside road sides, traffic noise meets standard values that equivalent and consecutive sound level along traffic artery in the daytime shall be below 55 dB(A), and requirements for functional division of acoustic environment.

5.2.4.2 Mitigation Measures

1. Strengthening management and maintenance for waste transport vehicle to reduce vehicle accident rate.

2. Staff of transporting waste shall accept professional training and hold relevant certificates.

3. Developing and optimizing waste transporting routes to avoid impacts of traffic noise on sensitive spots along routes like residential districts, schools and hospitals.

4. With rational layout, employing low-noise equipment, strengthening maintenance of devices, and adopting vibration damping and sound insulation measures.

5.2.5 Solid Waste Impact Analysis during the Operation Period and Mitigation Measures

5.2.5.1 Solid Waste Impact Analysis during the Operation Period

1. Domestic waste

Solid waste during the operation period is mainly domestic waste produced by in domestic waste transfer station and room for water environment monitoring system. Domestic waste production in waste transfer station is 2 kg/d, 0.73 t/a; waste production in room for water environment monitoring system is 5 kg/d, 1.28 t/a.

2. Hazardous waste

Waste acid (HW34), waste alkali (HW35), and waste organic solvents (HW42) produced in laboratory of room for water environment monitoring system are all hazardous waste, whose production is about 300kg/a. After collection, they are sent to qualified hazardous waste treatment unit for disposal, not discharged out.

5.2.5.2 Mitigation Measures

1 Domestic waste

After collection, domestic waste produced in the project will be compressed in domestic waste transfer stations and then transported to landfills for bury. So domestic waste will have few impacts on environment.

2. Hazardous waste

Laboratory will produce waste acid (HW34), waste alkali (HW35), and waste organic solvents (HW42) during the operation period, which are all hazardous waste. Its production is about 300kg. Controlling measures for it are as follows:

(1) Collecting and sorting hazardous waste, then putting it in impermeable and leakproof closed containers with clear color signs.

(2) Arranging impermeable and leakproof temporary store rooms for hazardous waste, and no storage in the open air;

(3) Hazardous waste shall be handed to units possessing business license of hazardous waste to collect, transport and dispose. Treatment fees shall be paid.

(4) Carrying out hazardous waste transfer permitting system and transferring table system;

(5) No discarding, littering and leaking hazardous waste during transit; no dumping, piling up hazardous waste in non-storage sites or mixing it in domestic wastewater or domestic waste; undertake hazardous waste collection, storage, transportation, and disposal without business license or not accord with regulations of business licensing will be prohibited.

5.2.6 Ecological Impact Analysis during the Operation Period and Mitigation Measures

5.2.6.1 Ecological Impact Analysis during the Operation Period

1. Impacts on amphibians, reptiles and beasts

After engineering completion in project areas, restore partial ecological environment, reptiles and beasts will gradually move back and reduce adverse impacts.

2. Impacts on birds

After project completion, with water quality improvement and ecological environment restoration, a good living environment for birds will be gradually formed.

Meanwhile, wetlands have abundant water and food, it can be predicted that bird species will increase gradually after project completion.

3. Impacts on aquatic plants

After project completion and operation, partial water areas will expand greatly, it will benefit aquatic plants, since their living space expands and it benefit their survival.

4. Impacts on aquatic animals

After project completion and operation, with water quality improvement, more places which is proper for aquatic animals to seek food and habitat. Accordingly, from perspective of a long term, the project construction is beneficial to survival of aquatic animals.

5. Impact analysis of foreign species invasion

The impacts of project implementation on biological invasive species include two conditions: the first, whether the project implementation may create conditions for biological invasion and cause new biological invasion; the second, whether the project implementation can cause further transmission and diffusion of existing alien invasive species. The above two problems are to be analyzed by combining project features, and from aspects such as transmission means of alien invasive species, factors affecting invasion of alien species, biological features of existing invasive species in the project areas and transmission mechanism, etc.

①Whether the project implementation causes new biological invasion

Standards for defining the invasive species: introduced to one non-source area through conscious or unconscious human activities; forming the natural regeneration capacity in local natural or constructed ecosystem; caused obvious damage or impacts to local ecosystem or geographical structure. Alien species successfully invade mainly through two means: the first is the species introduced for the purposes of farming, forestry, husbandry and fishing production, ecological environment construction and ecological protection, etc, then developing into invasive species (conscious introduction); the second is the species introduced with trades, transportation, tourist and other activities (unconscious introduction).

The project implementation mainly involves urban water regions and the project does not involve the international trade. So there is no unconscious introduction of foreign species because of the international trade. Furthermore, the project has a small scale and will not cause large changes of ecological environment and land utilization way, so no conscious introduction will be made. The project implementation will not cause new biological invasive species based on above analysis.

②Whether the project implementation causes further transmission and diffusion of existing alien species

No alien invasive species along the Zoujiazui Lake water system, which is determined according to the *List of Alien Invasive Species of China* (the first group, the second group and the third group) and by combining on-the-spot investigation. Therefore, the possibility that the project implementation causes further transmission and diffusion of existing alien invasive species doesn't exist.

5.2.6.2 Mitigation Measures

1. Aquatic plants and terrestrial plants are the main part in plant design. Based on considering plant species variety, local species shall be selected but the introduction of foreign species is prohibited

2 After construction completion, quantity and composition of organism species in the project 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.

3. Strengthening management. Owners shall appoint designated persons to do well in greening and managing. Owners shall also make up corresponding rules and regulations, protect Zoujiazui Lake wetlands and protect ecological environment

5.2.7 Social Environment Impact Analysis during the Operation Period and Mitigation Measures

5.2.7.1 Social Environment Impact Analysis during the Operation Period

After operation of urban drainage network improvement engineering under the

project, it can effectively improve current situation that regional sewage is not collected in sewage pipe network system but directly discharge into surrounding surface water body, and effectively solve urban ponding and waterlogging in partial districts; after setup of waste transfer stations, it promotes waste collection and transport capacity with increasing quantity of collection and transportation, effectively solves waste cleaning and transportation problem and change the phenomenon that waste surrounds the city, helps to improve town appearance of Duchang County, and create a good living environment for residents in all towns and townships in Duchang County. The project construction has apparent social and environmental benefits and it is a livelihood project that benefits people.

At the same time, sanitation of waste transfer stations shall be highlighted. Worse sanitation conditions and more mosquitoes, flies, insets and mice are the frequent problems reflected by residents near waste transfer stations. In particular, flies come with increased fruits and vegetables in summer, thought they are reduced by spraying insecticide, but their numbers return after a few days. To prevent stations and construction regions under the project being breeding places for mosquitoes, flies and bacteria, collection stations shall keep clean and tidy appearance, collection containers shall be washed on a regular basis, insecticide shall be sprayed to eliminate mosquitoes at regular intervals inside and outside transfer station.

5.2.7.2 Mitigation Measures

1. Waste station shall prepare regulations for operation, maintenance and safe operation, and operate according to regulations.

2. Collection stations shall keep clean and tidy appearance, collection containers shall be washed on a regular basis, spray biological fungi to control mosquitoes and flies, use biological ways to eliminate bacteria, mosquitoes and flies, and adopt light and liquid sterilization system; mechanical equipment and grounds shall be cleaned, washed and sterilized at regular time, as so to keep surface clean, and with no adherent dirt and leachate. It is required that insecticide shall be sprayed to eliminate mosquitoes at regular intervals inside and outside transfer station.

3. When collection station operates, management and operation personnel must

be trained before work, acquire technique process, technology requirements, main technology index of relevant facilities and equipment and operation and management requirements in collection station;

4. Collection station shall be opened strictly according to stipulated time;

5. Operation personnel shall inspect waste components at random, prohibit hazardous waste and banned substance entering stations;

6. Recyclable materials and organic waste shall be sorted, so that it is convenient for recycling and stacking manure;

7. Piling up sundries in collection stations is prohibited.

5.2.8 Occupational Health and Safety Impacts during the Operation Period and Mitigation Measures

5.2.8.1 Occupational Health and Safety Impact Analysis during the Operation Period

Waste transfer stations will release odorous gases during the process of storage, compression and transportation of domestic waste, which mainly include odor pollutants of NH_3 and H_2S. Emission concentrations of NH3 and H2S can meet Category II standard in *Emission Standards for Odor Pollutants* (GB14554-93), and dust concentration can meet fugitive emission monitoring concentration limited values in *Comprehensive Atmospheric Pollutant Emission Standards* (GB16297-1996). Since staff in transfer stations work in an environment containing NH3 and H2S for long time, they shall have occupational health and safety protection from harmful gas.

5.2.8.2 Mitigation Measures

1. Waste transfer stations shall prepare regulations for operation, maintenance and safe operation; waste transfer stations shall operate according to regulations; and perfect plan shall be established for emergency rescue.

2. When collection station operates, management and operation personnel must be trained before work, acquire technique process, technology requirements, main technology index of relevant facilities and equipment and operation and management requirements in collection station.

3. Training before work and regular training for occupational health knowledge shall be hold. In particular, knowledge about emergency rescue shall be guaranteed.

4. According to national relevant stipulations, workers who engage in contact with occupation hazards in the work shall accept pre-job, on-the-job, post-job occupational health examination. Examination results shall be honestly disclosed to workers, no arrangement without occupational health examination of workers engaged in contact with occupation hazards in the work. No arrangement of workers with occupational contraindication to do what their contraindications prohibit.

5. Collection stations shall keep clean and tidy appearance, collection containers shall be washed on a regular basis, spray biological fungi to control mosquitoes and flies, use biological ways to eliminate bacteria, mosquitoes and flies, and adopt light and liquid sterilization system; mechanical equipment and grounds shall be cleaned, washed and sterilized at regular time, as so to keep surface clean, and with no adherent dirt and leachate. It is required that insecticide shall be sprayed to eliminate mosquitoes at regular intervals inside and outside transfer station.

6. Operation personnel shall inspect waste components at random, prohibit hazardous waste and banned substance entering stations.

5.3 Due Diligence

5.3.1 Duchang County Wastewater Treatment Plant

Collected sewage in the project will be transported to Duchang County wastewater treatment plant. The due diligence of wastewater treatment plant is as follows.

1. Location of wastewater treatment plant

Duchang County wastewater treatment plant is located beside original water department of Jishan Lake.

2. Construction Conditions and Scale Wastewater Treatment Plant

Wastewater treatment plant started to be constructed in 2008. In particular, Phase I engineering (the first stage) was completed and put into use in July, 2010 with scale of 10,000 m^3/d, and Phase I engineering (the second stage) was completed and put into use in 2014 with scale of 10,000 m^3/d. That is to say, total built-up scale of wastewater treatment plant is 20,000 m^3/d with an area of 2.94 ha. The total planned

area is 4.45 ha, so the scale of the plant will be 40,000 m^3/d in 2020, and 80,000 m^3/d in 2030 for a long term.

3. EIA and acceptance of environmental protection

EIA of Duchang County wastewater treatment plant was approved by primary Jiangxi Province Environmental Protection Bureau in July, 2008 (20,000 m^3/d), and the approval number is Gan Huan Du Zi [2008] NO. 326 (Annex II). The wastewater treatment plant has been accepted and approved. Phase I engineering (the first stage) was accepted and approved by Jiangxi Province Department of Environmental Protection in June, 2011, and the approval number is Gan Huan Ping Han [2011] NO. 57 (Annex III); Phase I engineering (the second stage) was accepted and approved by Jiangxi Province Department of Environmental Protection in January, 2015, and the approval number is Gan Huan Ping Han [2015] NO. 8 (Annex IV).

4. Treatment process

In the wastewater treatment plant, the oxidation ditch treatment technique is adopted. The treatment technical process is shown as follows:

Influent→Coarse screen and elevation pumping house→Fine screen and rotational flow settling pond→ Improved oxidation ditch→Secondary settling pond →UV disinfection pond→Effluent pumping house→Tail water discharge

Operation monthly report data of wastewater treatment plant provided by The branch company of Environmental Protection Co., Ltd. Jiangxi Seong Water Industry in Duchang are shown in the following table.

Table 5-13 Operation Monthly Report of Duchang Wastewater Treatment Plant (Flow)

Date	Average influent flow (m^3/h)	Date	Average influent flow (m^3/h)
2015/8/1	723.40	2015/9/1	697.06
2015/8/2	683.11	2015/9/2	346.44
2015/8/3	689.17	2015/9/3	712.80
2015/8/4	700.62	2015/9/4	682.10
2015/8/5	685.88	2015/9/5	726.05
2015/8/6	713.44	2015/9/6	720.28
2015/8/7	664.20	2015/9/7	695.30

2015/8/8	732.01	2015/9/8	707.19
2015/8/9	727.49	2015/9/9	718.92
2015/8/10	671.03	2015/9/10	711.65
2015/8/11	691.10	2015/9/11	727.53
2015/8/12	564.18	2015/9/12	698.90
2015/8/13	736.97	2015/9/13	700.64
2015/8/14	700.50	2015/9/14	720.34
2015/8/15	675.61	2015/9/15	679.06
2015/8/16	694.23	2015/9/16	733.70
2015/8/17	701.66	2015/9/17	719.46
2015/8/18	672.77	2015/9/18	723.03
2015/8/19	702.45	2015/9/19	729.36
2015/8/20	700.08	2015/9/20	734.48
2015/8/21	683.67	2015/9/21	725.68
2015/8/22	687.89	2015/9/22	708.32
2015/8/23	696.67	2015/9/23	732.54
2015/8/24	576.86	2015/9/24	729.25
2015/8/25	684.80	2015/9/25	727.33
2015/8/26	676.85	2015/9/26	741.27
2015/8/27	713.53	2015/9/27	728.67
2015/8/28	717.15	2015/9/28	726.75
2015/8/29	702.08	2015/9/29	706.50
2015/8/30	640.31	2015/9/30	727.16
2015/8/31	727.33		
Average value (m3/h)	688.29		704.59
Average value (10,000 m3/h)	1.65		1.69

In line with the flow data of the operation monthly report above, recently the real inlet of the wastewater treatment plant is about 16,700 m^3/d.

In August and September, 2015, the quantity of the dewatered sludge is respectively 143 $m^3$and 155 m^3, daily average dewatered sludge output is about 4.9 m^3/d, moisture rate of sludge is 75%. The disposed sludge is mainly for landfill, afforestation and agriculture. Now Duchang County domestic waste comprehensive

treatment plant has been completed and put into use, sludge from wastewater treatment plant intends to be transported to Duchang County domestic waste comprehensive treatment plant for disposal.

Table 5-14 Operation Data of Duchang Wastewater Treatment Plant Unit: mg/L

Item / Date	COD		BOD_5		SS		TN		NH_3-N		TP	
	Inlet	Effluent	Inlet	Effluent	Inlet	Effluent	Inlet	Effluent	Inlet	Effluent	Inlet	Effluent
2014/3	119	28	55	15	54	12	16.5	8.9	12.4	6.1	1.54	0.78
2014/4	116	23	52	16	48	6	20.4	6.5	16.7	4.3	1.59	0.75
2014/5	99	18	55	15	30	7	15	6.2	11.7	4.54	1.66	0.82
2014/6	99	28	57	14.8	32	9.6	20.6	10.6	17.9	5.33	1.85	0.62
2014/7	106	33	57	14.6	41.2	11.4	20.3	8.7	16.4	5.1	1.65	0.57
2014/8	101.7	27.7	51.3	12.9	40.7	10.6	25.2	13	19.2	5.22	2.29	0.48
2014/9	111	31	51.2	12.8	39.1	11.3	19.2	10.6	16.8	5.07	2.3	0.79
2014/10	124	28	58	10.7	41	11	20.6	10.1	17.4	5.11	2.38	0.74
2014/11	119	32.5	58	12.8	32	11.7	19.6	9.74	16.8	5.46	2.34	0.72
2014/12	121	38.5	62.5	13.5	43	13	23.8	17.7	19.9	5.06	2.26	0.63
2015/2	130	33.2	76	13.5	39	10	25.8	18	23.5	5.3	2.21	0.78
2015/3	123	31	56.3	13.9	37.4	11.4	23.9	11.8	21	4.9	2.4	0.5
Average	114.1	29.3	57.4	13.8	39.8	10.4	20.9	11.0	17.5	5.1	2.0	0.7

Table 5-15 Inlet and Effluent Quality of Duchang Wastewater Treatment Plant Unit: mg/L

Item	COD	BOD_5	SS	TN	NH_3-N	TP
Actual average effluent	29.3	13.8	10.4	11.0	5.1	0.7
GB18918-2002 Category IB Standard	60	20	20	20	8(15)	1

From data above, it can be easily seen that the sewage can reach GB18918-2002 Category IB in *Pollutant Discharge Standards for Urban Wastewater Treatment Plants* after treatment. Then the tail water will be discharged through pumping house into Poyang Lake.

5. Match analysis of water treatment quantity

Sewage collection quantity of the project is shown in the following table.

Table 5-16 Collection Quantity of Wastewater (10,000 m^3/d)

Item	2023 (in short term)	2027 (in medium term)	2030 (in long term)
Average quantity of newly increased Furongshan industrial wastewater	0.3	0.59	0.8
Average quantity of newly increased urban domestic sewage	0.5	0.56	0.6
Amount of newly increased sewage	0.8	1.15	1.4
Amount of collected sewage	3.0	4.26	5.2

After the completion of pipe network improvement engineering, collection amount of urban sewage is 30,000 m^3/d in 2023, 52,000 m^3/d for a long term; the scale of wastewater treatment plant is 40,000 m^3/d in medium term, 80,000 m^3/d in long term, the planning of wastewater treatment plant can meet requirements of all terms of the project. It is suggested that wastewater treatment plant shall reach overall designed scale of long term of 80,000 m^3/d.

All in all, according to due diligence for Duchang County wastewater treatment plant, the treatment capacity and technique meet project requirements and with good operation, it can effectively dispose sewage collected by pipe network of the project.

5.3.2 Duchang County Waste Comprehensive Treatment Plant

Waste in the three townships under the project intends to be transported to Duchang County waste comprehensive treatment plant. Due diligence of the plant is presented as follows.

1. Location of waste treatment plant

The address is on the north side of Shunfeng Road in the west suburb of Duchang County, and west side of Duchang County wastewater treatment.

2. Construction condition of waste treatment plant

The plant started to construct in May, 2015, civil works have been fundamentally completed, and the equipment has been installed and commissioned. The plant has been completed in May, 2016, and now is under trial production.

Figure 5-2 Installation and Commission of Duchang County Waste Treatment Plant

3. EIA and acceptance

EIA of Duchang County domestic waste comprehensive treatment plant subproject was replied by Jiujiang City Environmental Protection Bureau in April, 2014, and the approval number is Jiujiang Huan Ping Zi [2014] NO. 48 (Annex V). It will apply for environmental protection acceptance in this September.

4. Service scope

It mainly covers residents' domestic waste of urban areas, Beishan Township, Wangdun Township and Sanchagang Township, and sludge from Duchang County wastewater treatment plant.

5. Scale

The plant covers a total area of 26,525 m^2, including a building coverage area of

6,506.2 m^2, and a total floor area of 8,043.7 m^2. The designed treatment capacity of the plant is 380 t/d. In particular, the designed treatment capacity of domestic waste is 300 t/d, sludge from wastewater treatment plant is 10 t/d, reserved livestock and poultry manure (including biomass waste produced from straws, food markets and slaughterhouses) is 30 t/d, and kitchen waste is 50 t/d.

6. Treatment process

Waste entering the plant will be sorted and then treated by technique of "Combined Anaerobic Fermentation for Urban Organic Waste", and the treatment process is shown in the following figure. After comprehensively disposal of waste under the subproject, sorted bulky disrupting matters (sands, stones and ceramics) will be transported to bricks and tiles plant for making bricks; wooden products, cloth, plastic bags, waste metals and waste glass will be sold and comprehensively used after recycling; digested effluent and digested sludge treated will be used to afforestation and forest nursery; unrecyclable waste will be transported to Jiujiang City Weiliya urban landfill for disposal.

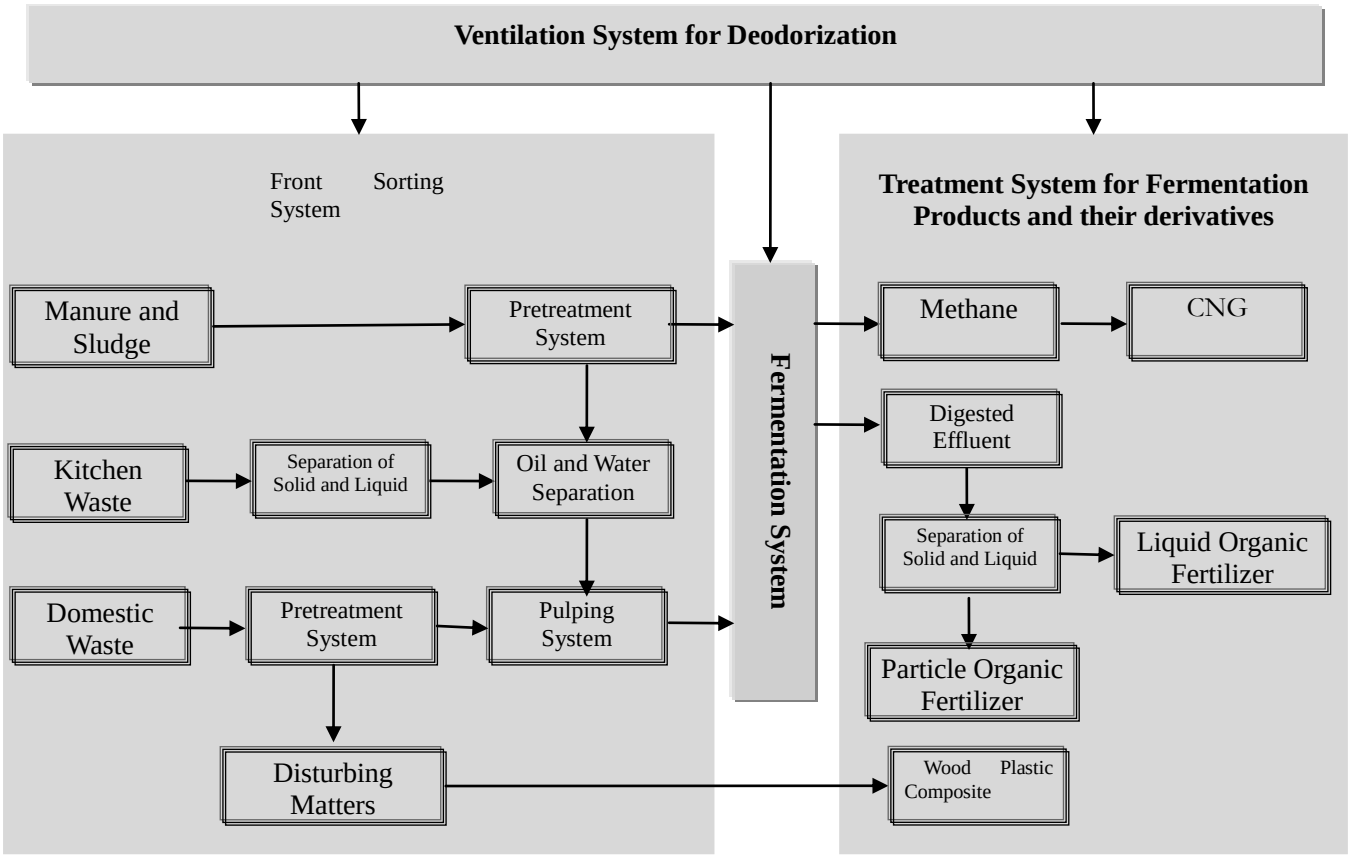


Figure 5-3 Treatment Process of Duchang County Domestic Waste Comprehensive Treatment Plant

The technology is developed by Erdos recycling of solid waste engineering and technology research institute of Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences. Since 2008, the company has constructed Dongsheng domestic waste treatment plant, Jungar Banner waste treatment plant, Wuhai Haibowan waste treatment plant (the second phase), Wushen County waste treatment plant, and Ejin Horo Banner waste treatment plant. Guilin City Recycling domestic waste comprehensive treatment project, waste comprehensive treatment project of Wuchang County, Fuxin City, Huadian domestic waste comprehensive treatment project and Shagezhe Town waste comprehensive treatment plant-the upgrading engineering using anaerobic fermentation are under construction. The technique runs well and is suitable for requirements of Duchang County waste treatment.

7. Main equipment

Main equipment in the factory is shown in the following table, which can meet treatment requirements of the project.

Table 5-17 Main equipment Duchang County Domestic Waste Comprehensive Treatment Plant

No.	Equipment involved	Specification	Unit	Number	Note
One	Pretreatment system				
1	Mixing machine	JLJ/3-9M^3	Set	1	
2	Screening drum 1	GTS2990	Set	1	
	Screening drum 2	GTS31100	Set	1	
3	Magnetic separator	RCYD10	Set	2	
4	Horizontal air separator	FXXT-4/M	Set	2	
5	Flip-flow screen	ZCS7.56	Set	1	
6	gyratory screen	CKZS13-50	Set	1	
7	Manual sorting platform	RGFX-4/M/H	Piece	2	

No.	Equipment involved	Specification	Unit	Number	Note
8	Plastic baler	DBJ1410	Set	2	
9	Solids and liquid separator	CLF	Set	1	
10	Buffer banker	CKHC13-50	Piece	1	
11	Crushing machine	Φ1500*4500	Set	1	
Two	Anaerobic fermentation system				
1	Bailing machine	CKLS13-50	Set	1	
2	Mix tank	160 m^3	Piece	1	
3	Fermentation tank	1700 m^3	Piece	2	
4	Buffer tank	160 m^3	Piece	1	
5	Gas tank	2000 m^3	Piece	1	
6	Lighting torch		Piece	1	
Three	Utilization system for fermentation products and the derivants				
1	Filter with high-pressure separator	XMGZ160-1250	Set	1	
2	Enforced mixer	ϕ1500	Set	1	
3	Pelletizer	KHL-600	Set	1	
4	Drying machine	GZQ15X7.5 3.7x2kw	Set	1	
5	Drying furnace and burners	WM-G20	Set	1	
6	Fertilizer-making extruder	DZJ-15DZJ-22DZJ-30DZJ-45	Set	1	
7	Fertilizer elevator	CKTS13-1000	Set	1	
8	Filter press	B1000	Set	1	
9	Refining methane system	--	Set	1	
10	Dust-free sorting machine	--	Set	1	
11	Modification machine for WPC and PVC	--	Set	2	
12	Hot-melting forming machine for WPC and PVC	SJ-400RDF	Set	1	
13	WPC crushing machine 1	DTS5840	Set	1	
14	WPC crushing machine 2	TS5525	Set	1	
15	Heat-conducting oil boiler	--	Set	1	Electrical Heating
Four	Deodorization system				

No.	Equipment involved	Specification	Unit	Number	Note
1	Negative pressure ventilation system (including draught fans)		Set	4	
2	Biological deodorization tower		Piece	4	
3	Air passage for deodorization	400*500*160	Set	1	
Five	Liquid Fertilizer Production System				
1	Compound acid fermentation tank	D2.8-H3.3	Set	1	
2	Flocculation tank	D2.5-H2.8	Set	1	
3	Superfine emulsion pump	W2L2-130	Set	1	
4	Complexation tank	D1.2-H1.5	Set	1	
5	Composite can	D2.5-H2.8	Set	1	
6	Liquid fertilizer storage system	8000m^3	Piece	1	
Six	Boiler room				
1	Biogas boiler	WNS2-1.0-Y(Q)	Set	1	
2	Water softening system		Set	1	

8. Match analysis of waste treatment capacity

Duchang County domestic waste comprehensive treatment plant started to construct in May, 2015, and started trial operation in May, and it is expected to undertake environmental protection acceptance in September. The service scope covers residents' domestic waste of urban areas, Beishan Township, Wangdun Township and Sanchagang Township, and sludge from Duchang County wastewater treatment plant. The designed treatment capacity of the plant is 380 t/d and domestic waste treatment capacity is 300 t/d. In the stage of trail operation, incoming quantity of domestic waste is 120 t/d with a spare quantity of about 180 t/d. Waste mainly comes from domestic waste of the whole urban area, partial domestic waste of Wangdun Township and Beishan Township. After project completion, average transfer quantity of the three townships for a long term is 36.1 t/d, accounting for 20% of the spare quantity. Permanent population of Sanchagang Township is almost the same with that in Dashu Township, about 29,000 people, it is expected that waste quantity covers 6% of the spare quantity. Therefore, the treatment scale of the treatment plant

can meet the project requirements. The plant agrees to accept domestic waste of Beishan Township, Wangdun Township and Dashu Township under then project. See Annex VI.

9. Running condition

The plant gained EIA approval in 2014, started construction in 2015, now is under trial operation, and undertaking environmental protection acceptance. The plant uses "urban organic waste anaerobic fermentation" technique, comprehensively disposes it after sorting incoming waste, then sorts out bulky disrupting matters (sands, stones and ceramics) to bricks and tiles plant for making bricks; wooden products, cloth, plastic bags, waste metals and waste glass can be sold and comprehensively used; digested effluent and digested sludge treated will be used to afforestation and forest nursery; the unrecyclable waste such as non-fermentable odds and rocks will be transported to Jiujiang City Secondary domestic waste treatment plant for disposal. Now the quantity of the unrecyclable waste in the plant is about 11 t/d. The quantity of the unrecyclable waste in the project now is 3.5t/d, and it will be 14.5 t/d after the project implementation.

Overall, according to the due diligence for Duchang County domestic waste comprehensive treatment plant, it meets the project requirements for treatment capacity and technique. The plant runs well and can properly dispose and utilize recyclable and fermentable waste under the subproject of Duchang County. The unrecyclable waste will be transported from the plant to Jiujiang City Secondary domestic waste treatment plant for disposal. Due diligence is needed for Jiujiang City Secondary domestic waste treatment plant.

5.3.3 Jiujiang City Secondary domestic waste treatment plant

1. Location of waste treatment plant

Chenjialong, Shahe Town, Jiujiang City

2. Construction conditions and scale of the waste treatment plant

Jiujiang City Secondary domestic waste treatment plant started construction in May, 2010, and it was completed and put into use in January 2011. Its built-up storage capacity at present is $124.51X10^4$ m^3, and its average daily treatment quantity is 922.7

t/d. It can dispose unrecyclable waste from Duchang County waste comprehensive treatment plant. Now, the landfill intends to start Phase II Engineering with daily treatment quantity of 1000t/d. Phase II Engineering intends to start construction in 2016 and it will be put into use in 2017.

3. EIA and acceptance

EIA of Jiujiang City Secondary domestic waste treatment plant was approved (JiuHuan Du Zi [2008] No. 50) by Jiujiang City Environmental Protection Bureau in September, 2008. Due to plan adjustment, EIA of supplementary report was approved in 2009 (JiuHuan Du Zi [2009] No. 144). Phase I Engineering has finished environmental protection acceptance in March, 2016 (see Annex VII).

4. Service scope

It mainly covers 14 counties (City, District and Mountain) including Xuyang District, Lushan District, Development District, Balihu New District, Lushan Landscape District in Jiujiang City, Jiujiang County, Xingzi County, De'an County, Gongqingcheng City, Hukou County, Ruichang County, Xiushui County, Wuning County, Pengze County.

5. Treatment process

The treatment plant adopt filling technique of paving layer by layer, rolling back and forth, covering in units day by day.

6. Main equipment

The equipment in landfills can handle daily covering soil work, its capacity can meet waste treatment requirements in the project. See the following table for equipment in landfills.

Table 5-18 main equipment in domestic waste landfills of Duchang County

No.	Name	Specification	Number
1	crawler bulldozer	165 HP	3
2	excavator	1 m^3	3
3	Dump truck	5 t	2
4	loader	1.0 m^3	3
5	Water truck spraying medicine	5 t	1

7. Matching analysis of waste treatment quantity

After the project implementation, domestic waste collected will be transported to Duchang County domestic waste comprehensive treatment plant for disposal. The "urban organic waste anaerobic fermentation" technique is used. Waste will be comprehensively treated after being sorted. Then the unrecyclable waste such as non-fermentable odds and rocks will be transported to Jiujiang City Secondary domestic waste treatment plant for disposal. After the project completion, the production of the unrecyclable waste is about 14.5 t/d, accounting for 1.6% of the present daily treatment quantity in Phase I Engineering of Jiujiang City Secondary domestic waste treatment plant. Phase II Engineering of Jiujiang City Secondary domestic waste treatment plant will be completed in 2017, whose daily treatment quantity is 1000t/d. That is to say, the plant has the capacity to dispose unrecyclable waste from Duchang County domestic waste comprehensive treatment plant.

In line with the due diligence for Jiujiang City Secondary domestic waste treatment plant, the plant now runs well and the completed Phase I Engineering has finished environmental protection acceptance in March, 2016. Therefore, the plant has the capacity to dispose unrecyclable waste in the project.

6 Environmental Risks Analysis and Mitigation Measures

6.1 Identification of Environmental Risks

According to project engineering characteristic pollution impact analysis, main results of environmental risk identification are:

1. Urban Wastewater Pipe Network Improvement Subproject

(1) Since pipe network is buried underground, during the process of pipe transportation of sewage, improper impermeable measures at pipe junction and broken pipe will leak sewage.

(2) The collection scale of sewage pipe network of the subject includes Furongshan Industrial Park. If industrial enterprises in park suffer from unexpected incidents, they may cause accidental release of industrial wastewater;

(3) Health and safety of maintenance workers when pipeline maintenance and repairs.

2. Domestic Waste Collection and Transportation of the Three Suburban Townships Subproject

(1) Emergencies like power outage and equipment failure will cause breakdown of waste treatment facilities with large quantities of wastes stored;

(2) In the process of collection and transportation of leachate and flushing water, there may be leakage or rollover leakage.

6.2 Impact Analysis of Environmental Risks

6.2.1 Urban Wastewater Pipe Network Improvement

1. Pipe leakage

Pipe leakage which will cause sewage to enter into underground will not only pollute surrounding soils and sanitary environment, but also has impacts on groundwater quality. According to the operation condition of present rain and sewage pipe network, there is unlikely broken pipeline expect disrepair, illegal construction and vandalism.

2. Accident discharge of industrial wastewater

If industrial enterprises in Furongshan Industrial Park suffer from failure in

equipment, the untreated sewage may be discharged into urban sewage pipeline. That is to say, accident discharge of wastewater will lead to sudden changes of influent quality and water quantity of wastewater treatment plant. For example, the shock load of inlet wastewater will be too large, pH will exceed the scope of 6～9, and the quantity of refractory organic toxicants will exceed the standards. Consequently, the activity of biochemical bacteria will become low, even biological mutual destruction will cause sludge bulking, and finally effluent quality will worsen and exceed national discharge standard, and the effluent will have great adverse impacts on water environment and ecological system.

3. Health and safety of maintenance workers

When sewage pipe network is blocked or accidents happen in certain structure, these problems must be solved immediately. At that time, maintenance workers shall enter sewage pipeline, collecting wells and sewage tanks to solve these problems. These places easily produce and accumulate high concentration of poisonous gas, such as H_2S, methane, and CO_2. If protection measures are not properly adopted, maintenance workers will breathe in poisonous gas because of poor ventilation. They may have symptoms of dizziness and shortness of breath, and severe symptom may even cause death. The inflammable gas methane produced in pipeline will explode when exposed to open fire, which endangers workers' safety.

6.2.2 Domestic Waste Collection and Transportation of the Three Suburban Townships Subproject

1. Abnormal situation

The quality problem or improper maintenance of treatment equipment and facilities of waste transfer station will cause failure in equipment and facilities. Or some irresistible external causes as power outage and sudden natural disasters will cause breakdown of treatment facilities, so waste in transfer station can not be timely compressed and transported. Then urban domestic wastes storing in collection and transportation station will release smelly odorous gases like NH3 and H2S. Under the condition, odorous gases will not only disturb staff's normal working, but also influence surrounding living environment of residential districts, bringing great

impacts on both residents' physical and mental health.

2. Wastewater leakage

If there is leakage of leachate and flushing water during the process of collection and transportation, not timely treatment will pollute under ground water environment and the odor produced by leachate and flushing water will have negative impacts on ambient air and social sanitary environment.

6.3 Environmental Risk Incident Impact Analysis

6.3.1 Drainage Network Improvement Engineering

1. Urban Wastewater Pipe Network Improvement Subproject

(1) As for pipeline design, selecting suitable pipes according to specific conditions and characteristics of the city, and guaranteeing the quality and service time of pipelines. The foundation of pipeline drainage engineering must fulfill designed mechanical requirements, those that can not reach the requirements shall be treated with corresponding measures. Basic construction shall strictly follow width, thickness and strength demanded in designed drawings, and guarantee the quality.

(2) Before getting down to the pipeline, making corresponding inspection. On the one hand, carefully examining pipes which enter construction sites, to prevent pipes with cracks, eyelets and holes being laid into ditches; on the other hand, checking center line and sideline of pipe foundation and size and strength of well foundation against drawing carefully, whether they all meet requirements; finally, check well location, well distance, strength grade of concrete of all parts and mixing of seepage mortar at junction, whether they reach national standards.

(3) When pipelines are installed, making cement mortar needed for the wipe belt according to defined mixture ratio. When installing the junction of two pipes, the junction will have bulged seams because of pressure. In order to guarantee the smoothness of the drainage pipe, bulged seams shall be timely dealt with, to avoid reduction of flowing section, impacts on flowing speeds. Bulged seams will cause debris accumulation in pipelines even pipe blockage if not being timely dealt with.

(4) Backfilling trenches shall be undertaken after pipe concrete and cement

mortar of wipe belt form certain strength, direct shock of sand and gravel materials to the pipe body shall be avoided. There should not be hard substances like large broken rocks and bricks, both sides of pipes shall be backfilled and compressed simultaneously, above the pipe jacking, it shall be backfilled and compressed layer by layer, to make fill earthwork a global force, which diverse pressure at vault to protect the pipe body.

(5) During the operation period of the project, construction unit shall establish a set of improved pipe network monitoring system, in order to timely clean pipe network, replace damaged one to prevent dripping and leakage of sewage, which pollutes surrounding water body and groundwater.

2. Risk prevention measures for industrial wastewater accidental discharge

(1) Sampling and monitoring at discharge outlets in industrial zone on a regular basis.

(2) If abnormality occurs in water quality, causes shall be found in main pollution source of catchment system. Relevant enterprises shall take emergency measures, and emissions of microorganisms and hazardous substances shall be controlled.

3. Risk prevention measures for health and safety of maintenance workers

It is vital to take personal safety guarantee measures for operating personnel to prevent poisonous gas from endangering them. The most effective way to prevent poisoning is to take ventilation measures, letting harmful gas disperse and operation space full of fresh air. If there is no way to fully ventilate, personnel shall avoid entering the dangerous space. Personnel must carry effective protection devices if the entering is a must. Protective equipment includes gas mask and supplied air respirator. Inspection equipment includes gas detection instrument and test paper.

6.3.2 Domestic Waste Collection and Transportation of the Three Suburban Townships Subproject

1. Risk prevention measures of abnormal situation

(1) Multiple sets of standbys shall be adopted for vulnerable equipment, with enough spare parts for repair and replacement. One electromechanical equipment for

use and another for standby shall be adopted for the treatment system at minimum;

(2) Good quality equipment shall be selected. Such equipment as machines, electrical appliances and instruments that feature good quality and low failure rate, meet the design requirements and are applicable for long-term operation and easy for repair and maintenance shall be selected for treatment facilities;

(3) During the operation, operators on duty shall strictly observe the rules and regulations for treatment facilities, conduct frequent patrol inspections for equipment and timely repair and maintenance, in order to reduce the failure rate of equipment;

(4) Electrical equipment shall company with the requirements of the grounding protection specifications and installed with automatic tripping circuits; main equipment shall adopt computer data monitoring for timely warning and recording accident sites, characters of accidents and happening time, convenient for timely rush repair. The installation and protection of all electrical equipment shall comply with relevant safety regulations for electrical equipment.

(5) Two-circuit power supply is adopted to ensure normal operation of power supply facilities and circuits.

(6) Standbys of deodorants and biomass absorption filler are stored in collection and transportation station. When there is no electricity for production, deodorants shall be sprayed on piling waste for temporary deodorization and biomass absorption filler shall be used to absorb odorous gases in the air to reduce odorous gases concentration of accidents.

2. Risk prevention measures for wastewater leakage

(1) Physical strength of sealable plastic barrel must meet certain requirements with good imperviousness;

(2) Waste transport vehicle shall be maintained and inspected on a regular basis to ensure their normal operation conditions;

(3) Once leakage happens to waste transport vehicle, it shall be stopped, and warning signs shall be suspended;

(4) Drivers must work holding relevant certificates, and travel within limited speeds. No fatigue driving.

3. Operation technical management measures of waste transfer station

(1) Establishing the operation management and operation responsibility system for wastewater treatment stations;

(2) Holding training for management and operation personnel and establish technical examination archives, unqualified persons shall not start work;

(3) Engaging experienced professional technicians in charge of technical management of wastewater treatment stations;

(4) Appointing professional personnel to take technical training;

(5) Strengthening maintenance and management of equipment and facilities. Adopting standbys for key equipment to ensure two-way power supply;

(6) Afforesting around the wastewater treatment station with plants featuring high efficiency in smelly substance purification;

(7) Visiting neighboring residents at regular intervals, and listen to their suggestions;

(8) Strengthening management of electricity supply station to ensure normal operation of power supply facilities and circuits.

4. Personal safety guarantee measures for staff

(1) Before operation of waste transfer stations, holding safe education for operation and management personnel, establishing safe operation regulations and management system, strictly following them after operation and often inspecting the implementation.

(2) Protective equipment for working such as masks and gloves shall be provided in plant sites.

(3) The installation and protection of all electrical equipment shall comply with relevant safety regulations for electrical equipment. the grounding protection shall be prepared for high voltage equipment.

(4) Dangerous parts of mechanical equipment must be installed with protection installation.

(5) Management for safe work must be strengthen, and system of personal responsibility shall be established.

(6) Any staff who directly contact with leachate and domestic waste shall have health checks at regular times and be injected relevant vaccines (like HAV and HBV).

6.4 Emergency Institution and Plan

As for the engineering, the emergency treatment of emergency sudden environmental risk accidents are related to many units and departments, including Environmental Protection Bureau, Public Security Department, Sanitation Management Department and Fire Department. If risk accidents happen, emergency plans shall be started according to *Emergency Response Plan for Environmental Emergencies of Jiangxi Province*.

Emergency institutions of the project mainly consist of office under leading group, and their emergency groups. emergency groups are made up of rescue group, liaison group, logistics group and vehicle group. Responsibilities of all groups are as follows, and responsibility institutions are provided in Figure 6-1.

(1) According to situations of environmental risks, leading group shall develop emergency treatment programs and implement them. It shall also take charge of overall commanding work, and coordinate cooperation with external units.

(2) The responsibility of office is to assist leading group to distribute work, supervise and inspect.

(3) Under the central command of leading group, rescue group shall be responsible for specific implementation of disposing risk accidents, and maintaining relevant equipment.

(4) Liaison group shall take charge of coordination of rescue group, logistics group and vehicle group.

(5) Logistics group shall be responsible for assisting to rescue poisoned people, taking corresponding first-aid measures, applying for observation of admission and treatment procedures, nursing poisoned people and assembling relevant rescue items.

(6) Vehicle group shall take charge of deployment of vehicles, for example, carrying poisoned people to hospital for treatment, and transporting rescue items.

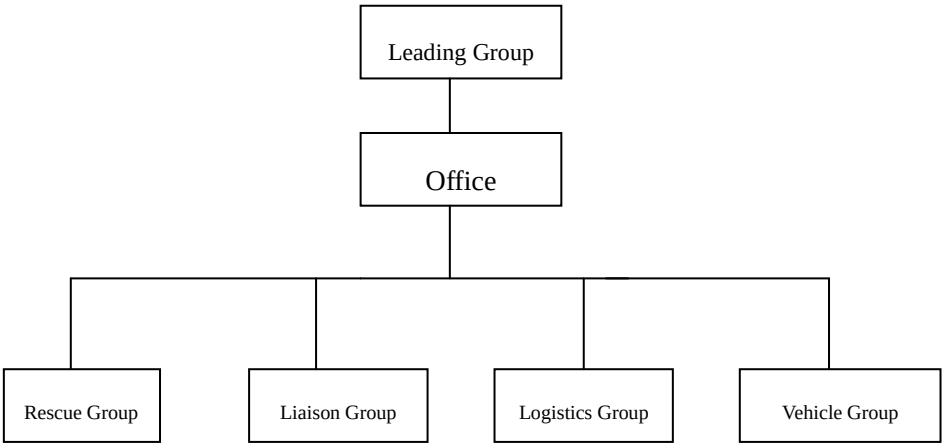


Figure 6-2 Framework of Emergency Institutions of the Project

7 Analysis of Industrial Policy and Location Rationality

7.1 Industry Policy Compliance Analysis

The project belonging to Pipeline Engineering (E4852), Water Pollution Treatment (N7721) and Sanitation Management (N7820) belongs to Category II (II water conservancy: 7 dredging engineering of rivers, lakes and reservoirs; water ecological system and groundwater protection and restoration engineering), Category XXII (XXII urban infrastructure: 9 urban water supply and drainage network engineering, water supplying source and water purification plant engineering), and Category XXXVIII (XXXVIII environmental protection and comprehensive utilization of resource conservation: 20 engineering of reducing, recycling and harmless treatment for urban waste and other solid waste) encouraged in *Catalogue for Guiding Industry Restructuring* (2011 Version) (2013 Amendment), and meets national relevant industrial policies.

7.2 Urban Planning Compliance Analysis

The project will improve urban pipe network in Duchang County, and implements collection and transfer of domestic waste. The project construction conforms to *City overall Plan of Duchang County* (2012-2030), *Drainage Specialized Planning of Duchang County* (2008-2020), *Sanitation Specialized Planning of Duchang County, Jiangxi Province* (2013-2030), *Overall Plan of Wangdun Township in Duchang County* (2012-2030), and *Overall Plan of Dashu Township in Duchang County* (2015-2030).

7.3 Compliance Analysis of Technical Code for Domestic Waste Transfer Station

According to *Technical code for transfer station of municipal solid waste* (GJJ47-2006), compliance of the project waste transfer station is analyzed in Table 7-1.

Table 7-1 Compliance Analysis between Project and *Technical Code for Transfer Station of Municipal Solid Waste* (GJJ47-2006)

No.	*Technical Code for Transfer Station of Municipal Solid Waste* (GJJ47-2006)	Practical situation of the project	Compliance analysis
1	Conforming to *City overall Plan and Sanitation Specialized Planning*	The project construction conforms to regional requirements.	Compliance
2	Comprehensively considering influential factors of service region, transfer capacity, transport distance, pollution control and supporting conditions	The region has proper conditions like landform, engineering geology, electricity supply, water supply and drainage and communication; The project region transportation condition is superior, convenient access for waste trucks and tank truck; exhaust gas will be discharged through deodorization system, leachate and flushing water will be discharged into municipal sewage pipe network; regional supporting conditions are good, and it is suitable for project to construct.	Compliance
3	It shall be arranged in places with convenient traffic and easy for designing cleaning and transporting routes.	The project has convenient traffic. Waste compressed will be directly transported to waste treatment plant for disposal.	Compliance
4	Meeting requirements of water supply, electricity supply and sewage drainage.	Project water and electricity will be supplied by municipal administration, and sewage will be discharged into urban wastewater treatment plant	Compliance
5	Transfer station should not be set in following regions: 1 beside overpass and level-crossing. 2 flourishing region like shopping malls and cinemas with large population. If it must be set in this kind of places, the structure and form of access of transfer station shall be optimized and improved. 3 near people's daily gathering places like schools and restaurants.	Transfer stations under the project are not beside overpass and level-crossing, there are no shopping malls and cinemas around construction sites and keep away from people's daily gathering places like schools and restaurants.	Compliance
6	Small Category V waste transfer station, whose designed transfer quantity is less than or equal to 50 t/d, land area is less than or equal to 1,000 m^2, separation distance with neighboring buildings is more than or equal to 8 m, green belt is more than or equal to 3 m;	Designed waste transfer capacity under the project is 22-29 t/d, transfer stations are all small Category V waste transfer stations, land area is 1000 m^2, separation distance with neighboring buildings is more than 8 m, green belt is more than 3 m.	Compliance

7.4 Location Rationality Analysis

The project conforms to *City overall Plan of Duchang County* (2012-2030), *Drainage Specialized Planning of Duchang County* (2008-2020), *Sanitation Specialized Planning of Duchang County, Jiangxi Province* (2013-2030), *Overall*

Plan of Wangdun Township in Duchang County (2012-2030), and *Overall Plan of Dashu Township in Duchang County* (2015-2030). Waste transfer station conforms to relevant requirements in *Technical code for Transfer Station of Municipal Solid Waste* (GJJ47-2006). After project completion, environmental impacts on surrounding environment will be low through corresponding treatment measures. It is clear that location selected is reasonable.

8 Public Consultation and Information Disclosure

8.1 Purposes and Approaches

During the construction period and operation period, World Bank-financed Duchang Water Environment Management Project will cause environmental impacts on surrounding areas, which is directly related to vital interests of surrounding people. According to *Interim Procedures of Public Participation in Environmental Impact Assessment* (Huan Fa [2006] No. 28), *Circular on Strengthening and Constructing Management Work for EIA Public Participant Supervision by Environmental Protection Department in Jiangxi Province* (Gan Huan Ping Zi [2014] No. 145) and requirements in World Bank Policies (OP4.01), two rounds of public consultation and information disclosure were conducted for the project. The first round was conducted before the formulation of EIA outlines, mainly informing people who will be influenced by the project of an overview and potential environmental impacts of the project and soliciting public opinions. The second round was carried out when the draft EIA was prepared, publicly displaying the full text of the report and conducting public consultation on the main contents and conclusions of the report, in order to gain understanding and support from the public for the project and mitigation measures adopted.

Public consultation and information disclosure are a type of two-way information sharing between the project implementing agency and the public, are an important component of environmental impact assessment and plays a critical role in improving decision-making. The purposes of public consultation and information disclosure are to disclose relevant project information to the project areas and the public who are concerned about the project, keeping the public informed of the project's main contents, its implementation and operation features and significant environmental issues or problems related to the project. The public consultation and information disclosure will also help assessment staff identify issues or problems; confirm all significant environmental issues or problems triggered by the project which have been

analyzed and assessed in the EIA; and confirm the feasibility of environmental protection measures and implementation of optimal measures. Public consultations highlights the importance of linkages and communications between all project-related parties with the public, can directly reflect views of the public and enable decision-makers timely identify potential issues or problems and timely revise and improve design so that concerns of the public can be adequately addressed, thereby contributing to further improvements and stronger rationality of the project's planning, design, environmental monitoring and management, as well as the most optimal coordination between the project's environmental, social and economic benefits.

8.2 Public Consultation

Two rounds of public consultation have been conducted, whose consultation date, participants and approaches are summarized in the following table. Minutes of discussion meeting and relevant documents are provided in Annex VIII.

8.2.1 First Round of Public Consultation

8.2.1.1 First Round of Public Consultation

The situations of the first round of public consultation are shown in the following table.

Table 8-1 Date, Participants and Approaches in the First Round of Public Consultation

Round	Approach	Date	Locality	Participants and Numbers	Contents
First Round	①Site visit; ② Questionnaire survey; ③Discussion meetings	November, 2015, and January, 2016	Duchang County	①Site visit: Dalvwan Village, Zoujiazui Village, Bachuantang Village, Beishan Township, Yanggang Village, Wangdun Township, and Matang Village, Dashu Township; ② Questionnaire survey: Representatives of Duchang County Central Kindergarten, Duchang Experimental Primary School, The Third Primary School in Duchang, County Maternal and Child Care Service Center, Qinjiafan Primary School, Beishan Township Government, Wangdun Township Government, Dashu Township Government, County Water Bureau, County Urban Management Bureau, County	Informing people who will be influenced by the project of an overview and potential environmental impacts of the project and

Round	Approach	Date	Locality	Participants and Numbers	Contents
				Environmental Protection Bureau, County Transportation Bureau, County Wastewater Treatment Plant, Waste Treatment Plant; ③ Discussion meetings: Representatives of residents and units that are influenced.	soliciting public opinions

8.2.1.2 Public Opinions and Feedback

Public opinions and feedback during the first round of public consultation are summarized in the following table.

Table 8-2 Summary Table of Public Opinions and Feedback for First Round of Consultation

Round	Approach	Public concerns or views	Feedback of implementing agency
First round	① Site visit; ② Questionnaire survey; ③ Discussion meetings	1 All expressed support to the project. 2 Roads with poorly drainage will be waterlogging in raining days, which brings inconvenience for residents' traveling and living. The public hope to start early and finish early with one-time construction and no repeated construction. 3 Suggestion to take deodorization and dust removal measures in waste transfer stations, reducing influence of odor pollutants.	Implementing Agency and EIA unit expressed: Thanks for the understanding and support from the public. We will further improve the design of the project, and work for pre-project. We will strive to start early and finish early with one-time construction and no repeated construction; and take deodorization and dust removal measures in waste transfer stations.

8.2.2 Second Round of Public Consultation

8.2.2.1 Second Round of Public Consultation

Situations in the second round of public consultation are shown in the following table

.Table 8-3 Dates, Participants and Approaches in the Second Round of Public Consultation

Round	Approach	Date	Locality	Participants and numbers	Contents
Second	①Site visit; ②	May, 2016	Duchang	① Site visit: Bachuantang Village, Beishan Township,	(1) Notifying the public that draft EIA has been

Round	Approach	Date	Locality	Participants and numbers	Contents
round	Questionnaire;		County	Yang Village, Wangdun Township, and Matang Village, Dashu Township; ② Questionnaire survey: representatives of Duchang County Central Kindergarten, Duchang Experimental Primary School, The Third Primary School in Duchang, County Maternal and Child Care Service Center, Qinjiafan Primary School, Beishan Township Government, Wangdun Township Government, and Dashu Township Government	completed; (2) Keeping the public informed of potential environmental impacts of project; (3) Mitigation measures proposed in the EIA for adverse environmental impacts; (4) Collecting public views and suggestions about environmental protection measures proposed in the EIA.

8.2.2.2 Public Opinions and Feedback

Public opinions and feedback during the second round of public consultation are summarized in the following table

Table 8-4 Summary Table of Public Opinions and Feedback for Second Round of Consultation

Round	Approach	Public concerns or views	Feedback of implementing agency
Second round	①Site visit; ②Questionnaire;	All expressed support to the project and recognized the proposed environmental protection measures.	Construction units and EIA unit expressed: Thanks for the understanding and support from the public, and we will strictly implement each environmental protection measure in EMP.

8.3 Information Disclosure

8.3.1 First Round of Information Disclosure

Dates, venues and approaches of the project are presented in following table.

Table 8-5 Dates, Venues and Approaches of Information Disclosure for the First Round

Round	Approach	Date	Venue	Content

Round	Approach	Date	Venue	Content
First round	On-site disclosure	January, 2016	Bulletin boards in Beishan Township, Dashu Township, Wangdun Township, and Bulletin boards in Furongshan Industrial Park	Mainly project contents and potential environmental impacts

Figure 8-1 Pictures of On-site Disclosure and Discussion meetings

8.3.2 Second Round of Information Disclosure

Dates, venues and approaches of second round of information disclosure are presented in the following table.

Table 8-6 Dates, Venues and Approaches of Information Disclosure for the Second Round

Round	Approach	Date	Venue	Content
Second round	Full report disclosure	May, 2016	Construction office in Poyang Lake Ecological Economic Zone, Duchang County (on the third floor, No. 2 of Guangyuan Road in the urban area of Duchang County)	Full draft of EIA
	On-site disclosure	May, 2016	Bulletin boards in Beishan Township, Dashu Township, and Wangdun Township, and Furongshan Industrial Park	(1) Project overview; (2) Proposed environmental protection measures; (3) Conclusions of EIA draft; (4) Venues and approaches of consulting full report

9 Resettlement Plan and Social Assessment

The content below is a part of *Resettlement Plan for the World-Bank-Financed Jiangxi Poyang Lake Basin Water Environment Management Project* and *Social Assessment Report for World-Bank-Financed Jiangxi Poyang Lake Basin Water Environment Management Project* both of which are prepared by Hohai University.

9.1 Resettlement Plan

9.1.1 Impacts of Land Occupation

The demolition of the project will affect 4 townships of Duchang County, Jiujiang City. The impacts of immigration under the project will be brought by permanent land acquisition and the temporary land occupation. There is no demolition. The scale of land acquisition does not include ethnic minorities' communities. The project impacts are illustrated in Table 9-1.

Table 9-1 Summary of the Project Impacts on Migrants

County	Project Name	Township and Town (in number)	Village (in number)	Acquired Collective Land (mu)		Acquired State-owned Land (mu)	Temporary Land Occupation (mu)		Directly Affected Population		Indirectly Affected Farmer and Shop	
				Total	Paddy Field/ Arid Land Included		Collective Land	State-owned Land	Household (by household)	People (by number of person)	Number (by household)	People (by number of person)
Duchang County	Urban Sewage Pipe Network Improvement Subproject	1						146.27			53	1,178
	Zoujiazui Lake Water System Ecological Restoration and Protection Subproject					402.3	1				3	13
	Domestic Waste	3	3	4.5	1.5				13	50		

County	Project Name	Township and Town (in number)	Village (in number)	Acquired Collective Land (mu)		Acquired State-owned Land (mu)	Temporary Land Occupation (mu)		Directly Affected Population		Indirectly Affected Farmer and Shop	
				Total	Paddy Field/ Arid Land Included		Collective Land	State-owned Land	Household (by household)	People (by number of person)	Number (by household)	People (by number of person)
	Collection and Transportation of the Three Suburban Townships Subproject											
	Water Environment Monitoring System					3						
Total		4	3	4.5	1.5	405.3	1	146.27	13	50	56	1,191

9.1.2 Measures to Reduce Impacts

In the planning and design stage, in order to reduce the impact of project construction on the local socio-economic and people's life, the design agency and owner of the Project had adopted several effective measures:

(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.

(3) The design was optimized to occupy wasteland and state-owned land and reduce the occupancy of arable land.

In the Resettlement and the implementation stage, when the land acquisition and resettlement are unavoidable, in order to reduce the impact of construction projects, the following measures will be taken:

(1) The collection of basic material shall be strengthened and thorough analysis shall be conducted concerning the current situation of local socioeconomic and future

development. Practical resettlement action plan shall be established according to local situation. The people affected by the project shall be prevented from suffering loss for project construction.

(2) The public participation shall be actively encouraged and information disclosure shall be strengthened and surveillance by the masses shall be accepted.

(3) Internal and external monitoring shall be reinforced and effective and unblocked feedback mechanism and channels shall be established. The information processing cycle shall be minimized to ensure the various problems in project implementing process be settled in time.

(4) Project sites are 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.

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.

9.2 Social Assessment

9.2.1 Social Assessment

On the basis of observation and assessment for sewage collection pipe network construction, waste treatment subproject and lake treatment subproject, the social assessment are as follows:

(1) Generally, the project is of high economic and social benefit, consistent with medium or long-term development plan for representative counties of each sub-project. Meanwhile, it will have positive impacts on improving regional environment and boosting regional economic and social development.

(2) Most farmers/residents will benefit directly from the project, since the project has extensive covering rate and inclusive beneficiaries.

(3) Disadvantaged groups will be direct beneficiaries of the project. Generally, the project has few adverse impact on their livelihood, and can create some jobs for them to live a better life.

(4) Because the project is in line with the region’s customs, culture and religion, there is no relevant risks.

(5) Project management system of high enforcement capability provides institutional guarantee for the project’s smooth operation and implementation.

The project will alleviate pollution in Poyang Lake Basin and improve living, ecological and social environment for residents in the project area. Purposes of the project are in line with China's plan of utilizing foreign investment and pollution control. Local governments of various levels and beneficiary groups are all supportive to the project.

Sewage treatment and ecological restoration projects have been spreading in China's provinces for years. The technology is relatively mature. Moreover, the project areas have conducted similar pollution control projects and formed full-time technological teams, boasting a good working foundation. And staffs of project offices of all levels are experienced in project management. All of these are favorable for successfully completing the project .

Implementation of the project will bring favorable social benefits, including: improving people's living environment and their livelihood; creating more jobs for vulnerable groups and farmers; decreasing incidence of disease and improving people's health conditions, promoting rural urbanization and transforming farmers into urban residents, and facilitating industrial restructuring and green economic development.

Any project may encounter risks in the implementation. This project will face risks in the construction, difficult land acquisition and subsequent maintenance. Therefor, the project has to pay attention to the development of beneficiary groups and also attend to social equity. Undoubtedly, a more integral project design and high-quality project management will reduce potential social risks and prevent negative social impacts in the area.

9.2.2 Suggestions

Due to differences and complexity of project contents in various cities or towns and distinct economic and social development, we have to face potential risks brought by project construction. Those risks can be avoided through two methods. Firstly, optimize engineering design on the basis of no extra quantity. Secondly, owners should consult with stakeholders before, during and after the project construction to know their needs and desires, and communicate with different departments. To this end, the social assessment group proposes the following suggestions:

1. General Advice

(1) Optimizing the design

Project owners and feasibility study agencies should minimize the scale of land acquisition and demolition in design, and adopt advanced measures of environmental protection to avoid secondary pollution brought by environmental projects;

(2) Conducting participatory activities

Major stakeholders should be involved in the design, implementation, management and supervision of the project. Project owners, the PMO/PPMO and social assessment group formulate outline for beneficiary participation and initiate monitoring and evaluation to ensure that major stakeholders join in the whole process of the project, including the preparation, design, implementation, monitoring and supervision, and equip them with the awareness of environmental protection;

(3) Carrying out training on environmental knowledge and public health education

Relevant government departments should organize public training on national and regional laws and regulations on environmental protection as well as environment indicators under the assistance of the publicity department, Bureau of Education, Environmental Protection Bureau, Bureau of Radio and Television, newspaper offices, and sub-district/town/township/village level residents' committees; launch training on water conservation, treatment of sewage and waste, control of point pollution, prevention of water-mediated diseases and recycle of waste; and publicize life-styles that may affect surrounding environment and help residents in the project area to realize that their way of living may have impacts on surrounding environment;

(4) Formulating a reasonable resettlement action plan

On the basis of public consultation, the PMO/PPMO, resettlement plan group and project owners should ensure that migrants' livelihood will not deteriorate due to the project construction;

(5) Creating jobs opportunities

The PMO/PPMO, project owners, construction agency with the assistance of the Bureau of Civil Affairs and the Social Security Bureau will provide jobs opportunities for migrants, poverty-stricken families and women in cities and rural areas to involve them in the project construction;

(6) Formulating and implement preferential charging policy for impoverished groups

The PMO/PPMO, project owners and the Price Bureau should establish local charging policy for impoverished groups on the basis of public hearing;

(7) Safety and convenience maintenance during the construction

The project owners and construction agencies should schedule the construction progress by taking residents' need and habits into consideration;

(8) Institutional capacity building

The project managers and constructors should launch training on World Bank social and safeguard policies to better implement the project;

(9) Mechanism of follow-up project management

Residents should be involved in the follow-up management. It is proposed to establish a community team of follow-up project management based on the management group during the construction. Members of follow-up management team (women included) will be elected by villagers. Environmental institutions should strengthen the legislation and law enforcement on environmental protection and enhance environmental education for residents in the project area for sustainability of the project effects.

2. Suggestions on sub-projects

(1) Sewage pipelines sub-project

①Construction of sewage treatment engineering will affect residents rest, shop business and industry operation on the two sides of roads. Therefore, pipe laying should shorten construction duration as much as possible to reduce unfavorable impacts. If possible, offer certain compensation to affected residents and shop owners; ②since the drainage system in project region is mostly combined sewer and separate sewer, and the collection collection is not high. Therefore, the pipe network shall be connected with sewage of households within the construction and residential area from the source; ③ Since the project area enjoys developed water system and abundant water, drainage project should be in line with local conditions to ensure construction quality and life time.

(2) Waste treatment subproject

① It is proposed that residents' intension 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.

②Due 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.

③Technology plays a crucial role in improving the efficiency of waste treatment. Scientific 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.

(3) Suggestion on lake pollution control

①Fall of surface water level results in the reclamation of vegetable fields or farmland from wetlands, blocking exchange of water in the lake. Meanwhile, fertilizer in farmland will contaminate water bodies. Therefore, consultation with residents occupying wetlands is advised as a way to turn field into lake and to improve ecological system of wetland; ②Carry out non-engineering measures to control lake pollution, and issue regulations on economic activities within lake area to strengthen lawmaking on lake pollution control and enhance green administrative ability to reduce emission; ③Integrate technology to promote synchronized development of ecological protection and economic growth in the lake area.

10 Environmental Management Plan

See independent Environmental Management Plan (EMP) of World Bank-financed Duchang Water Environment Management Project for details.

11 Analysis of Economic Cost-Benefit of Environmental Impact

11.1 Cost Estimate for Environmental Protection

Total investment of the project is RMB 174,073,600 yuan Environmental protection investment is estimated in Table 11-1. Environmental protection investment is RMB 2,983,200 yuan, which mainly covers costs for environmental protection measures, monitoring and training. Environmental protection investment accounts for 1.7% of the total investment of engineering dynamics

Table 11-1 Detailed Estimated Investments in Environmental Protection

Costs for environment management	Costs for environmental monitoring		Costs for training (10,000 yuan)	Costs for EMP implementation (10,000 yuan)
	Construction period	operation period		
265	11.1	14.22	8	298.32

11.2 Analysis of Economic Cost-Benefit of Environmental Impact

11.2.1 Environmental Benefits

This is Water Environment Management Project, in which environmental benefits are main including pollutant load reduction, water quality improvement benefits and environmental management capacity improvement benefits.

(1) Reducing pollutant load

In a short term of the project completion, collection rate of urban sewage reaches 80%, and newly increasing treated sewage amount reaches 8,000 m^3/d, forming sewage treatment scale of 30,000 m^3/d. Every year reduced pollutants discharged into Poyang Lake are COD of 239.4 tons, TN of 17.5 tons and TP of 4.4 tons. The amount of reduced waste which flows into Poyang Lake is 17,000 t/y.

(2) Improving water quality

The implementation of the project will not only control river pollution source, but also purify water quality and preserve water. It will greatly reduce pollutants discharged into Zoujiazui Lake water system so as to reduce the impacts of pollutants on Poyang Lake. It will also improve water quality in basins, fundamentally protect water in basins, and dramatically improve Duchang County environment.

(3) Enhancing efficiency by environmental management capacity

The implementation of environmental monitoring, management capacity construction provides local environmental protection with powerful technology and monitoring approaches, enhancing the healthy development of environmental protection works, effectively prevent environmental accidents, reduce environmental risk, take measures from management and technology, reduce regional pollution to surface water to great extend, improve regional environment situation.

(4) Providing regional social and economic development with good environmental conditions

The implementation of the project will accelerate the construction of municipal infrastructure in project areas, establish and improve environmental infrastructure network system, further ease contradictions between basin and regional city development and environmental constraints, enhance environment quality of basins in project areas, raise water environment functions and city functions, create suitable environmental conditions for rapid and sound development of regional and provincial economy and society.

11.3 Social Benefits

(1) Promoting residents' health levels, improving basin people's living quality

The implementation of the project will effectively solve the problem of poor environmental infrastructure in project areas. It will on the one hand purify the water body, on the other hand reduce breeding environment for transmission medium of mosquitoes and other disease, protect and improve residents' living environment, decrease incidence of diseases, boost health of all people, further elevate people's living quality.

(2) Increasing residents' job opportunities

The gradual unfolding of the engineering will offer job opportunities. First of all, during the construction period, some temporary and scattered job opportunities will be offered; secondly, when it comes into operation period, long term and stable job opportunities will be offered, including technical and managerial personnel who

directly participate in the engineering; next, the implementation of the project will also substantially improve the investment environment, attract funds, accelerate the development of industry and agriculture, meanwhile driving the prosperity of the tertiary industry so that it can provide more job opportunities.

(3) Strengthening resident's environmental awareness

The project implementation process is also a profound an lively process of environmental dissemination. By specific actions for environmental protection, people can well realize the significance of environmental protection, know the severe consequences brought by environmental damage, including economic loss, health loss and resource loss. Compared with pure propaganda, this action can be accepted more easily. Meanwhile, it can open into the environmental science education demonstration base, for people to accept environmental protection education, which is beneficial for strengthening people's environmental awareness.

(4) Providing basic data for regional pollution control

The implementation of environmental monitoring, management capacity construction can meet increasingly environmental monitoring demands, and better serve regional economic construction. Simultaneously, it can provide basic data for further analyzing pollution source, scientific proof for comprehensive control decision of regional pollution, evidence for exactly evaluating effects of regional pollution control engineering, and effective methods for functional government departments to supervise the operation of pollution control facilities according to laws.

11.4 Economic Benefits

This is the water environment management project, and it belongs to public welfare project with no evident direct investment benefits. There are mostly indirect economic benefits, including following aspects:

(1) Economic benefits of pollution control

Mainly reducing the economic loss caused by pollutants in sewage, forms of expression are as follows:

Industrial enterprises: it can reduce increased investment and operation and

management fees generated by scattered sewage treatment of each industrial enterprise, so that lighten the burden on enterprises;

Agriculture, animal husbandry and fishery: water pollution may cause the decline of production and quality of grain crops, animal products and aquatic products;

Health: water pollution will cause increase of disease incidence, so that health expenditure increases and labor productivity decreases. After completing the project, people's living environment will improve and relevant health expenditure will decrease.

(2) Benefits of income enhancement

With the improvement of urban infrastructure and environment, land value in city will increase.

11.5 Summary

This project is part of staged programs of improving Duchang County environment and promoting management of water environment in Poyang Lake basin. Through engineering measure and non-engineering measure construction, the project will have great influence on urban infrastructure construction and ecological environmental protection within project areas, even on national economic and social development.

The implementation of the project will ① benefit strengthening environmental treatment results within project areas and promoting local environment quality; ② benefit improving local residents' production and living conditions and enhancing people's living quality and health level; ③ by bringing in and using domestic and foreign advanced technology and management experience for reference, benefit promoting Duchang County infrastructure construction and marketization of management, realizing positive self-development of urban infrastructure construction; ④ Benefit promoting security construction of water environment in Poyang Lake basin, environmental sustainability guarantees sustainable development of economy and society, creating positive conditions for realizing sustainable development

strategy and ecological civilization in Poyang Lake ecological economic zone, has good environmental, social and economic benefits.

12 Conclusion

Through EIA of the project, it can be concluded that:

(1) The project will improve water environment of Zoujiazui Lake basin and infrastructure. The project construction will change the current situation that wastewater untreated in Duchang County is discharged into neighboring surface water body, and dispose domestic waste, so that protect water quality of Poyang Lake. It can improve environment conditions of Duchang County to some extend, significantly improve residents' living conditions, protect neighboring water source, beautify the surrounding environment, construct a more comfortable and better living environment, and promoting living quality.

(2) The project construction complies with national laws and regulations and comprehensive planning and environmental protection planning of the city in project areas, which makes the implementation have basis of policies and regulations.

(3) The implementation of the project will influence some environmental protection targets (sensitive spots) such as residential areas, schools and hospitals. In the EIA, adopting mitigation measures, formulating and implementing EMP, public participants and other methods can further reduce and remove adverse impacts on environmental protection targets (sensitive spots), and make possible impacts comply with provisions of national environmental laws and regulations and standard specifications.

(4) The implementation of the project will bring adverse impacts on surrounding environment in both construction period and operation period.

1) Adverse impacts in construction period: impacts of construction dust on ambient air quality, impacts of noise produced by construction vehicles and machinery on surrounding environment, impacts of construction domestic sewage, soil erosion caused by soil fetching, spoil, excavation, filling and piling up of earthwork, impacts of sewage pipe network laying on transportation, and damage to vegetation.

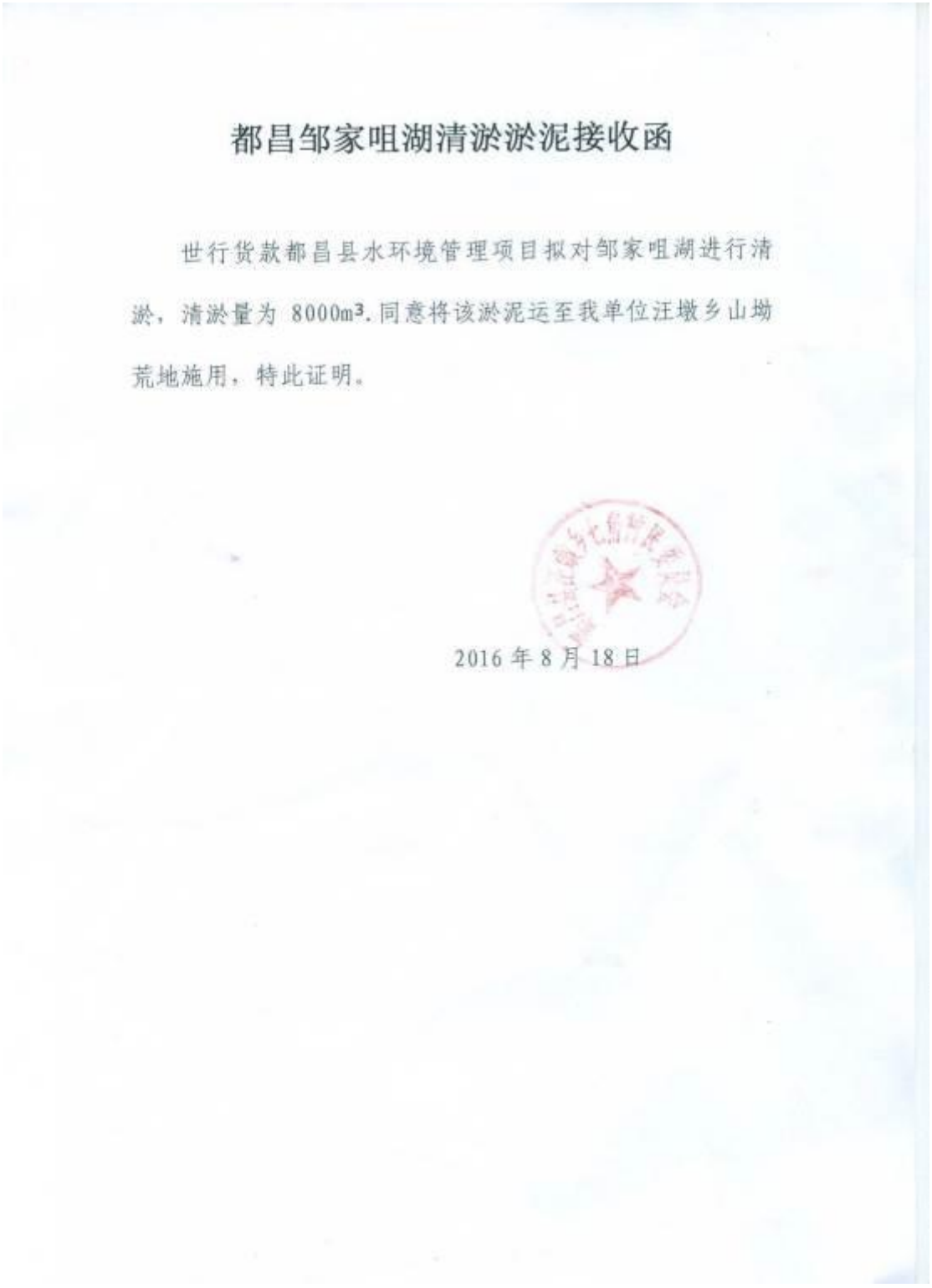
2) Mainly adverse impacts in operation period: impacts of odor in waste transfer

station on ambient air, equipment noise, impacts on surrounding environment during waste collection and transportation.

The influence degree and scale of possible adverse impacts of the project will be controlled within national laws and regulations and standard specifications through mitigation measures, implementation of EMP, and public participants and consultation.

In conclusion, after adopting countermeasures like mitigation measures, implementation of EMP, and public participants and consultation, the project implementation is environmentally feasible.

Annex I Sludge Acceptance Letter of Duchang County

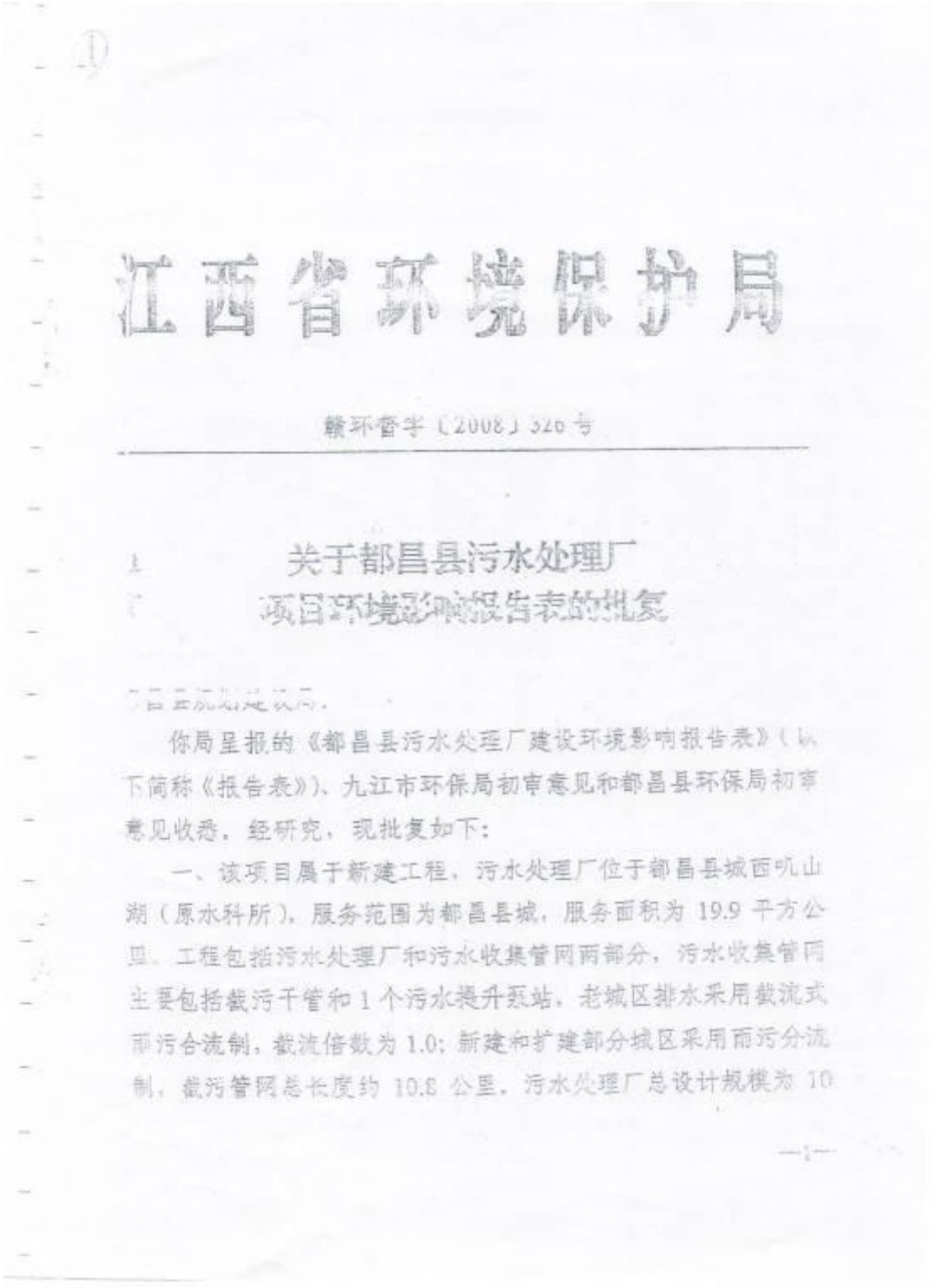


都昌邹家咀湖清淤淤泥接收函

世行贷款都昌县水环境管理项目拟对邹家咀湖进行清淤，清淤量为 8000m³. 同意将该淤泥运至我单位汪墩乡山坳荒地施用，特此证明。

2016 年 8 月 18 日

Annex II Reply to the EIA Report of Duchang County Wastewater Treatment Plant



江西省环境保护局

赣环督字〔2008〕320号

关于都昌县污水处理厂
项目环境影响报告表的批复

都昌县环境建设局：

你局呈报的《都昌县污水处理厂建设环境影响报告表》（以下简称《报告表》）、九江市环保局初审意见和都昌县环保局初审意见收悉，经研究，现批复如下：

一、该项目属于新建工程，污水处理厂位于都昌县城西吼山湖（原水科所），服务范围为都昌县城，服务面积为 19.9 平方公里。工程包括污水处理厂和污水收集管网两部分，污水收集管网主要包括截污干管和 1 个污水提升泵站，老城区排水采用截流式雨污合流制，截流倍数为 1.0；新建和扩建部分城区采用雨污分流制，截污管网总长度约 10.8 公里，污水处理厂总设计规模为 10

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万吨/日，分二期建设，本期规模2万吨/日，处理工艺为氧化沟，排水去向为鄱阳湖。

根据《报告表》结论以及九江市、都昌县环保局的初审意见，同意你局按《报告表》所列建设项目的性质、规模、地点和环境保护对策措施进行建设。

二、项目建设必须严格执行[illegible]环境保护设施与主体工程同时设计、同时施工、同时投入使用”的环境保护“三同时”制度，环保投资必须落实，并专款专用。项目建成试运行前须向九江市环保局书面报告(抄报我局)，并经市环保局现场检查同意。项目按照分期验收，竣工3个月内必须向我局申请办理竣工环境保护验收手续，验收合格后，项目方能投入正式生产。

三、项目建设和运行应重点做好以下工作：

（一）在设计和建设中落实环保有关要求。

1、优化厂区平面布置。产生恶臭污染物和高噪声设施应尽量远离周边环境敏感点，采取封闭系统、绿化等措施控制恶臭的产生和扩散；严格控制污水处理厂周边规划，污水处理厂卫生防护距离（200米）内不得新建医药等环境要求较高的企业和居民住宅等建筑物。

2、落实在线监测装置。与主体工程同步设计和建设污水处理厂入水水质自动在线监控系统及排放口污水水量自动计量装置、自动比例采样装置和主要水质指标在线监测装置。根据国家和省排污口规范化整治的要求规范设置各类排污口，污水在线监测装置应和环保部门联网，进行时时监控。

4、污泥的最终处置。污水处理厂的污泥应进行稳定化和脱水处理，污泥稳定化应满足《城镇污水处理厂污染物排放标准》（GB18918-2002）"污泥稳定化控制指标"要求，脱水后的污泥含水率应小于80%，采用卫生填埋方式处置。污泥临时堆场和卫生填埋场的选址建设须满足《生活垃圾填埋污染控制标准》（GB16889-1997）要求，并与污水处理工程同步建设，同步投入使用，确保污泥得到妥善处理，防止产生二次污染。

5、实施施工期环境监理。按照《报告表》的要求，制定并实施施工期环境监理计划，施工招标文件、施工合同和工程监理文件中应明确环保条款和责任，落实施工期污染防治措施，并定期向我局和当地环保局报告。施工期间，场界噪声应满足《建筑施工场界噪声限值》（GB12523-90），废气排放应满足《大气污染物综合排放标准》（GB16297-1996）二级标准无组织排放监控浓度限值，废水排放应满足《污水综合排放标准》（GB8978-1996）表4中一级标准。

（二）强化运行期间环境管理。

1、有条件接纳工业废水。为保证污水设施的正常运行，必须按照《报告表》中提出的接纳工业废水限制措施要求对工业废水进行有条件接纳，禁止含有《污水综合排放标准》（GB8978-1996）表1中第一类污染物的工业废水排入污水管网，严格限制排水量大于2000吨/日的工业废水排入污水管网，严格控制含有重金属、持久性有机污染物、病源体和有毒有害

物质的工业废水排入污水管网，各类工业废水预处理达到入水管网要求方能送污水处理厂进行集中处理。

2、坚决杜绝事故性排放。污水处理厂事故排放时，尾水排放口以下将出现较长的超标污染带，因此污水处理厂要加强运营管理，同时建立事故时的应急预案和措施，将环境影响降低至最小程度。

3、加强化学危险品环境风险防范。消毒剂液氯属有毒有害物品，事故泄漏时对环境会产生较严重的危害，氯库及加氯间应安装氯气检测仪、泄氯报警器，并制定风险防范措施和事故应急预案，防范使用中的环境风险。

（二）运行期间，外排污染物必须达到以下要求：

1、生排厂水必须达到《城镇污水处理厂污染物排放标准》（GB18918-2002）一级B标准后方可排入鲤鱼湖。

2、外排废气必须达到《城镇污水处理厂污染物排放标准》（GB18918-2002）二级标准，污水处理厂周围应同期建设绿化带。

3、选用低噪声设备，并对设备采取隔声减震、密闭等措施，降低噪声的影响。工程建成后，污水处理厂和污水提升泵站厂界噪声必须达到《工业企业厂界噪声标准》（GB12523-90）Ⅱ类标准。

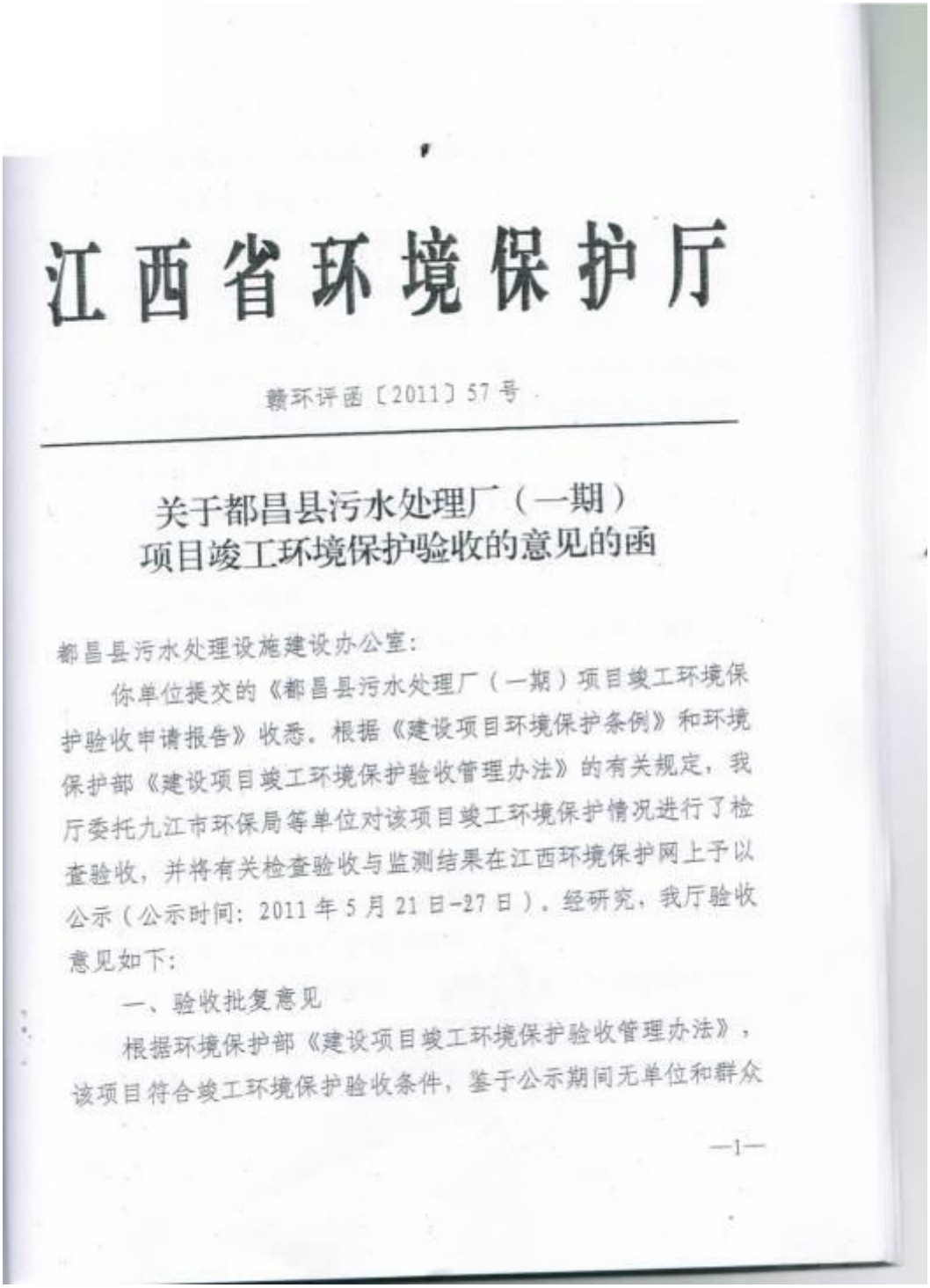
四、以上批复仅限于《报告表》确定的建设内容，若建设地点、项目内容、规模、工艺、性质、拟采用的防治污染措施等发生变化或自批准之日起超过5年方开工建设必须重新向我局申请

环境影响评价行政许可。

五、你局应在接到本批复后20个工作日内，将批准后的自然影响报告表分别送九江市环保局和都昌县环保局，并按规定接受各级环境保护行政主管部门的监督检查。请省环境监察局加强对项目实施过程中的环境监察。

二〇〇八年七月十四日

Annex III Environmental Completion Acceptance of Duchang County Wastewater Treatment Plant's Phase I Project (the first stage)



江西省环境保护厅

赣环评函〔2011〕57号

关于都昌县污水处理厂（一期）
项目竣工环境保护验收的意见的函

都昌县污水处理设施建设办公室：

你单位提交的《都昌县污水处理厂（一期）项目竣工环境保护验收申请报告》收悉。根据《建设项目环境保护条例》和环境保护部《建设项目竣工环境保护验收管理办法》的有关规定，我厅委托九江市环保局等单位对该项目竣工环境保护情况进行了检查验收，并将有关检查验收与监测结果在江西环境保护网上予以公示（公示时间：2011年5月21日-27日），经研究，我厅验收意见如下：

一、验收批复意见

根据环境保护部《建设项目竣工环境保护验收管理办法》，该项目符合竣工环境保护验收条件，鉴于公示期间无单位和群众

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提出异议，同意该项目通过竣工环境保护验收。

二、项目基本情况

都昌县污水处理厂位于都昌县矶山湖畔，设计规模为 2 万 m^3/d，一期建设规模 $1m^3/d$，处理工艺为氧化沟工艺。项目实际总投资 6500 万元，其中环境保护投资 6500 万元，占总投资的 100%。

项目于 2008 年 7 月委托由江西省环境保护科学研究院完成建设项目环境影响评价工作，同年 7 月原江西省环保局以赣环督字[2008]326 号文予以批复，项目于 2008 年 11 月开工建设，于 2010 年 7 月建成并申请试生产，2010 年 12 月省环境监测中心站提交了项目竣工环保验收监测报告。

三、验收监测结果

以下结果来源于省环境监测中心站提供的《监测报告》。

1、废水

项目外排废水满足《城镇污水处理厂污染物排放标准》（GB18918-2002）一级 B 标准要求。

2、噪声

厂界昼夜监测结果均满足《工业企业厂界环境噪声排放标准》（GB12348-2008）中 3 类标准要求。

四、对项目今后运行管理的要求

（一）加强环境保护管理。严格禁止含有《污染物综合排放标准》（GB8978-1996）表 1 中第一类污染物的工业废水排入污水管网，严格控制含有重金属、持久性有机污染物、病原体和有毒

有害物质的工业废水排入污水管网。

（二）强化环境应急管理。进一步完善环境风险防范应急预案，避免发生环境污染事故。强化应急措施，做到达标排放，防止对环境造成影响。

（三）加强废水在线监控设备及系统的建设和管理，今年7月底前必须与省、市环保部门在线监控系统联网运行。

（四）都昌县人民政府应严格控制污水处理厂周边规划，卫生防护距离（200米）内不得规划和新建食品等环境要求较高的企业及居民住宅等建筑物。

五、项目运行的排放标准要求

（一）废水：外排废水必须满足《城镇污水处理厂污染物排放标准》（GB18918-2002）一级B标准要求。

（二）废气：外排废气应满足《城镇污水处理厂污染物排放标准》（GB18918-2002）二级标准要求。

（三）噪声：项目厂界噪声必须满足《工业企业厂界环境噪声排放标准》（GB12348-2008）中3类标准要求。

（四）固废：污泥稳定化应满足《城镇污水处理厂污染物排放标准》（GB18918-2002）中“污泥稳定化控制指标”要求。

六、环保监管要求

请省环监局加强项目日常运行中的环境监察，请九江市环保局监督企业认真落实上述要求，并加强对该项目的日常监督管理，督促企业正常运行环保治理设施，严禁偷排、直排，发现问题必

须及时依法处理，并向我厅报告。

二〇一一年六月二十四日

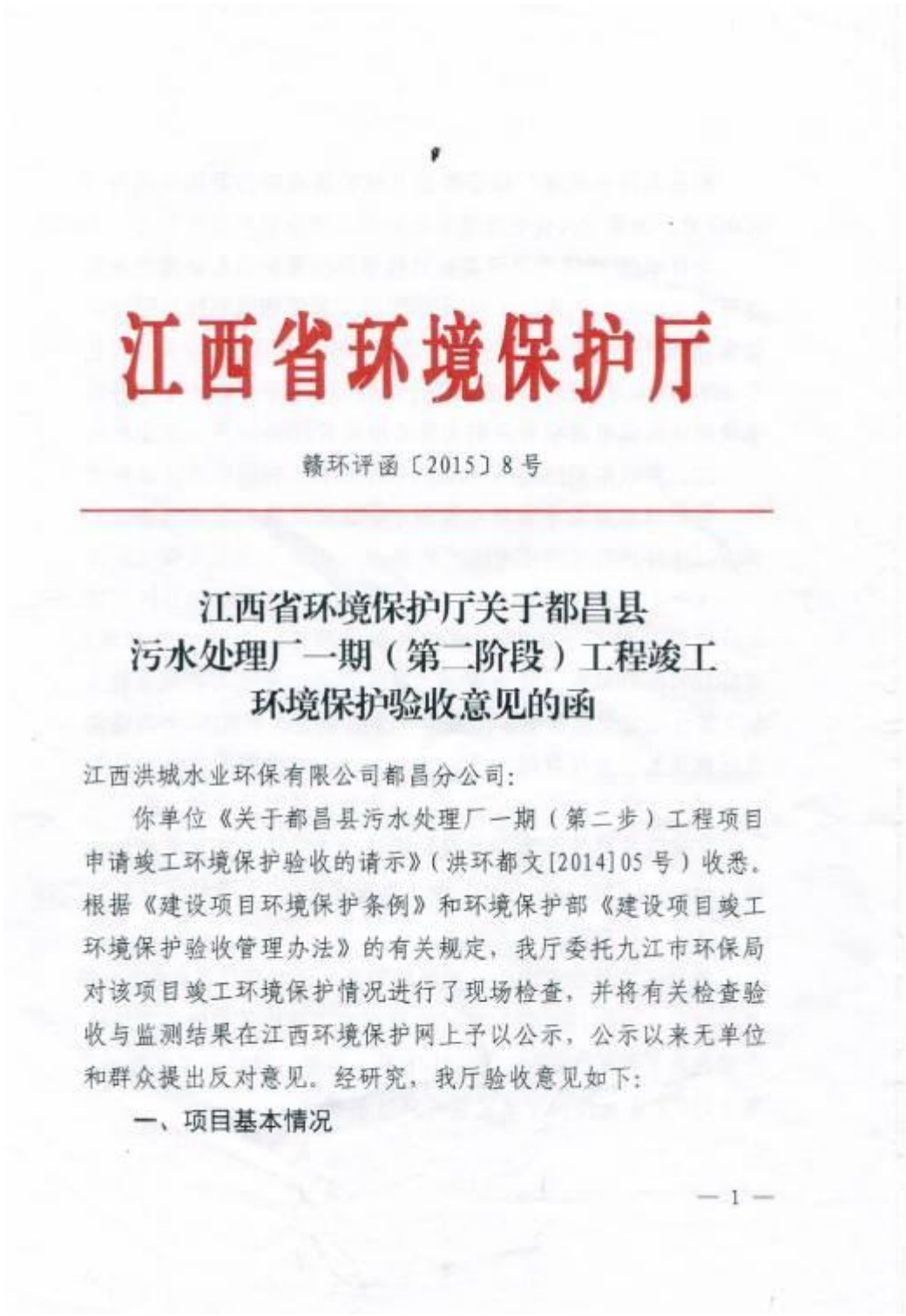
主题词：环保　公共设施　竣工验收　意见

抄送：省发改委，九江市环保局，都昌县政府及县环保局，厅有关处室，省环境监察局，省环境监测中心站。

江西省环境保护厅办公室　　2011年6月29日印发

—4—

Annex IV Environmental Completion Acceptance of Duchang County Wastewater Treatment Plant's Phase I Project (the second stage)



江西省环境保护厅

赣环评函〔2015〕8号

江西省环境保护厅关于都昌县污水处理厂一期（第二阶段）工程竣工环境保护验收意见的函

江西洪城水业环保有限公司都昌分公司：

你单位《关于都昌县污水处理厂一期（第二步）工程项目申请竣工环境保护验收的请示》（洪环都文[2014]05号）收悉。根据《建设项目环境保护条例》和环境保护部《建设项目竣工环境保护验收管理办法》的有关规定，我厅委托九江市环保局对该项目竣工环境保护情况进行了现场检查，并将有关检查验收与监测结果在江西环境保护网上予以公示，公示以来无单位和群众提出反对意见。经研究，我厅验收意见如下：

一、项目基本情况

— 1 —

都昌县污水处理厂位于都昌县城矶山湖畔，设计规模为 2 万吨/天，为氧化沟处理工艺。

项目单位 2008 年 5 月委托江西省环境保护科学研究院完成建设项目环境影响评价工作，同年 7 月原江西省环保局以赣环督字[2008]326 号文予以批复。项目一期先期 1 万吨/天工程已于 2011 年 6 月通过江西省环保厅验收（赣环评函[2011]57 号），本次验收内容为该项目一期（第二阶段）1 万吨/天。

二、验收监测结果

以下结果来源于省环境监测中心站提交的《监测报告表》和九江市环保局现场检查情况的汇报。

（一）废水

项目外排废水满足《城镇污水处理厂污染物排放标准》（GB18918-2002）一级 B 标准要求，总排口安装有在线监控系统（监控项目包括流量、pH 值、化学需氧量、氨氮），并与省环保厅在线监控系统联网运行。

（二）噪声

厂界昼夜噪声值监测结果均满足《工业企业厂界环境噪声排放标准》（GB12348-2008）中 2 类标准要求。

（三）防护距离情况

根据省环境监测中心站现场踏勘及九江市环保局《关于对都昌县城污水处理厂二期 1 万 m^3/d 项目竣工环境保护验收现场检查情况的汇报》（九环文[2014]76 号）结论，该项目卫生防护距离（200 米）范围内无居民区等环境敏感点。

三、验收批复意见

该项目基本符合竣工环境保护验收条件，公示期间无单位和群众提出异议，同意该项目通过竣工环境保护验收。

四、对项目今后运行管理的要求

（一）加强环境保护管理。严格禁止含有《污染物综合排放标准》（GB8978-1996）表1中第一类污染物的工业废水排入污水管网，严格控制含有重金属、持久性有机污染物、病原体和有毒有害物质的工业废水排入污水管网。

（二）强化环境应急管理。进一步完善环境风险防范应急预案，避免发生环境污染事故。强化应急措施，做到达标排放，防止对环境造成影响。

（三）卫生防护距离控制要求。请都昌县环保局向都昌县人民政府专题报告，应严格控制污水处理厂周边规划，卫生防护距离（200米）内不得规划和新建食品等环境要求较高的企业及居民住宅等建筑物。

五、日常环境监管要求

请省环境监察局、九江市环保局、都昌县环保局加强该项目运行期日常环境监管。

江西省环境保护厅

2015年1月20日

（此件主动公开）

抄送：省发改委，省住建厅，九江市环保局，都昌县人民政府及县环保局，厅有关处室，省环境监察局，省环境监测中心站。

江西省环境保护厅办公室　　2015年1月21日印发

Annex V Reply to the EIA of Duchang County Domestic Waste Comprehensive Treatment Plant

九江市环境保护局文件

九环评字〔2014〕48号

九江市环保局关于都昌县源生环保科技有限公司都昌县生活垃圾综合处理厂建设项目环境影响报告书的批复

都昌县源生环保科技有限公司：

你公司报送的《都昌县源生环保科技有限公司都昌县生活垃圾综合处理厂建设项目环境影响报告书》（以下简称《报告书》）、九江市环境工程评估中心《都昌县源生环保科技有限公司都昌县生活垃圾综合处理厂建设项目环境影响报告书评估意见》（以下简称《评估意见》）、都昌县环保局《关于都昌县源生环保科技有限公司都昌县生活垃圾综合处理厂建设项目环境影响报告书初审意见》（都环评〔2014〕75号，以下简称《初审意见》）收悉。经研究，现批复如下：

一、项目基本情况及项目批复要求

（一）项目基本情况

项目建设地点位于都昌县西郊顺风路北侧，都昌县污水处理厂西侧（地理坐标为东经 116° 10′ 03.63″，北纬 29° 16′ 12.76″），属新建项目。项目总占地面积 26525m²，建筑占地面积为 6506.2m²，总建筑面积为 8043.7 m²。项目总投资为 7800 万元，环保投资 810 万元，占总投资的 10.4%。服务范围：都昌镇、北山乡、汪墩镇、三叉港镇的居民生活垃圾，都昌县污水处理厂产生的污泥，设计处理规模 380t/d，其中建设生活垃圾 300t/d，都昌县污水处理厂浓缩污泥 10t/d，预留畜禽粪便 20t/d 以及餐厨垃圾 50t/d（包括秸秆、菜市场和屠宰场等地产生的生物质废物）处理规模，垃圾分选后采用“城市有机废弃物联合厌氧发酵”工艺，严禁工业废物及危险废物进入垃圾综合处理厂。

（二）工程建设内容

主体工程：集料间、前分选车间、沼液处理及造肥车间、木塑车间、污泥处理车间；公用辅助工程：罐区、SBR 池、废弃物堆场、供电、供汽、锅炉房、给排水、办公及生活设施等；环保工程：废气处理设施、事故应急池、危废暂存等。

（三）项目批复意见

都昌县发改委以（都发改字〔2013〕228 号）文同意项目开展前期工作，都昌县规划局以（选字第 360428201400072 号）出具了项目选址意见书，同意项目选址。根据各相关部门对项目建设

的批复、都昌县环保局《初审意见》、《报告书》结论、九江市环境工程评估中心“报告书编制较规范，专题设置合理，环保防治对策总体可行，基本符合环评技术导则规范要求”的《评估意见》结论，在认真落实《报告书》提出的各项污染防治措施，事故预防与应急措施达到本批复要求的前提下，我局原则同意你公司按照《报告书》中的建设项目内容、规模、地址及环境保护对策措施等进行建设。

二、项目试生产和竣工验收的环保要求

（一）项目试生产要求

项目建设必须认真执行“配套的环境保护设施与主体工程同时设计、同时施工、同时投入使用”的环境保护“三同时”制度，全面落实《报告书》中提出的各项污染防治措施，确保外排各类污染物全面稳定达标排放。

（二）竣工验收要求

项目建成投入试生产前须书面向我局提出申请，经我局现场检查确认各项污染防治措施到位后方可进行试生产，试生产期内（3 个月）必须按规定程序向我局申请办理项目竣工环保验收手续，未经验收或验收不合格不得投入生产。

三、项目施工期的污染防治

加强施工期环境保护管理。按报告书要求落实相应环保措施，防止施工扬尘和噪声污染。

四、项目建设的污染防治措施及要求

该《报告书》可作为本项目工程设计和环境管理的依据，项目在工程设计、建设和环境管理中，你公司必须认真予以落实，并注重做好以下各项工作：

（一）废水污染防治

严格按照“雨污分流、清污分流”的原则建设给排水系统。项目垃圾收集产生的渗滤液送至发酵罐、垃圾收集槽清洗废液回收至调节罐内，均不得外排；废气处理洗涤废水循环使用；生产设备外表及地面冲洗废水、纯水制备废水，与生活污水一并经预处理后达到都昌县污水处理厂进水水质标准，进入都昌县污水处理厂处理，排放标准执行《城镇污水处理厂污染物排放标准》（GB18918-2002）一级B标准，否则项目不得投入生产。

（二）废气污染防治

严格落实《报告书》提出的无组织废气及各废气排放源的污染防治措施，有效控制生产过程中产生的各类废气，确保无组织废气排放浓度满足《大气污染物综合排放标准标准》（GB16297-1996）要求。项目集料车间、前分选车间、污泥处理车间、制肥车间、木塑车间等工序应采用密闭措施，垃圾收集槽、分选平台、密封输送带上部设置集气罩，各车间均采用负压系统，恶臭气体经收集后均采用生物除臭系统进行除臭，其中，集料车间、前分选车间共用一套生物除臭装置，污泥处理车间、制肥车间、木塑车间各分设生物除臭装置，各排气筒高度均不得低于15米，基料造粒中产生的粉尘采用旋风除尘器除尘后由不低于15米高排气筒

排放，锅炉须以本项目产生的沼气为燃料，燃烧尾气由不低于 8 米高排气烟筒排放。项目恶臭污染物排放执行《恶臭污染物排放标准》（GB14554-93）中二级新扩改建标准，大气污染物排放执行《大气污染综合排放标准》（GB16297-1996）表 2 中二级标准，燃气锅炉烟气排放执行《锅炉大气污染物排放标准》（GB 13271-2001）二类区Ⅱ时段标准。

上述废气排气筒高度应符合国家标准规定要求，并设置永久性采样、监测孔和采样监测用平台。

（三）噪声污染防治

通过设备选型和合理布局，对均料机、滚筒筛、磁选机、风选机、除尘风机类等设备采取隔声、消音、减振等噪声治理措施，确保厂界噪声达标排放，排放标准执行《工业企业厂界环境噪声排放标准》（GB12348-2008）2 类区标准。

（四）固体废物处置

加强固体废物管理，落实固体废物的处理、处置措施。垃圾分拣的大件干扰物（砂、石、陶瓷类等）按合同要求进行利用；木制品、布、塑料袋、废金属、废玻璃等综合利用；经加工处理的沼液、沼渣按协议仅用于除绿化、林场苗圃以外的农业项目；废灯管、废电池等属于危险废物，在项目试生产前与有资质的危废处置单位签订处置协议；不可利用的废物送九江市威力亚城市垃圾填埋厂处理，不得随意乱扔，防止二次污染。

（五）项目总量指标

项目总量控制指标在都昌县减排项目中调剂，并应满足九江市环保局核实确认的总量控制指标要求，即：项目总排放量 $SO_2 \leqslant 0.01t/a$、$NOx \leqslant 3.02t/a$，污水处理厂接管考核量 $CODcr \leqslant 0.19t/a$、$NH_3\text{-}N \leqslant 0.026t/a$。

（六）运行管理要求

加强各生产环节管理、选择工艺成熟、效果稳定，经济技术可行的废气工艺，污染治理装置须与对应的生产工艺设备同步运转。

（七）风险防范

你公司应认真落实各项环保措施，科学组织生产，加强环境教育与管理，杜绝发生污染事故。加强非正常工况污染物排放和污染事故防范，设置足够容量的沼液处理池及事故应急池，按规范要求制定详实的环境事故应急预案，落实责任部门，降低环境污染风险水平。在垃圾处理系统发生故障且沼液得不到及时利用时，你公司应无条件停产。沼气储存区应设置安全警示标志，加强对输气系统日常管理，防范气体泄漏。

（八）规范整治排污口

按国家和我省排污口规范化整治要求设置各类排污口和标识，并建立档案，严禁生产废水混入清下水管网外排，厂区内不得设置废水排放口。

（九）环境监理

项目配套的环保设施必须委托有环保工程设计资质的单位设计，严禁无证设计或超范围设计。

（十）工程设计

项目开工建设之前须委托具有环境保护监理资质的监理单位进行环境保护监理，有关监理计划报我局备案。工程结束后，环保监理报告将作为工程竣工环保验收的依据。

五、地下水污染防治

建设单位应认真落实本报告书提出地下水的防护措施，对于厂区各污染防治区的防渗结构应根据环评报告要求进行设计和建设，确保各污染防治区的防渗能力满足要求，按《报告书》中提出的要求建设地下水监测井，同时确保产生的固体废物得到综合利用或妥善处理，防止废水下渗污染地下水。一旦发现地下水污染事故，立即启动应急预案、采取应急措施控制地下水污染。

六、建全制度和加强管理

按规定设置专门的环保管理机构，健全环保规章制度，制定严格的环境保护岗位责任制，责任到人，措施到位，并加强环保设施的运行维护管理，严禁擅自闲置，停用环保治理设施。当污染防治措施发生故障时，应立即停产整改，严防污染物事故排放和超标排放。

七、其他环保要求

（一）厂界周边规划控制要求

项目卫生防护距离以集料间和前分车间边界至外 300 米、卫

生防护距离的渔民临时住宅和水科所办公楼在项目试生产前必须予以搬迁。在卫生防护距离（300米）范围内不得建设居民住宅、学校、医院、食品加工等环境敏感建筑。

（二）项目变更要求

本批复自下达之日起5年内有效，项目的性质、规模、地点、采用的生产工艺、使用的原辅材料或防治污染措施发生重大变动或超过5年开工建设，必须重新报我局办理环保审批手续。

（三）违法追究

对已批复的各项环境保护事项必须认真执行，如有违反将依法追究法律责任。

（四）日常环保监管

你公司应在接到本批复后10个工作日内，将批准后的《报告书》及批复送到都昌县环保局，都昌县环保局要配合我局认真做好项目建设的日常环境监督管理工作，市环境监察支队要加强对项目实施过程中的环境稽查。

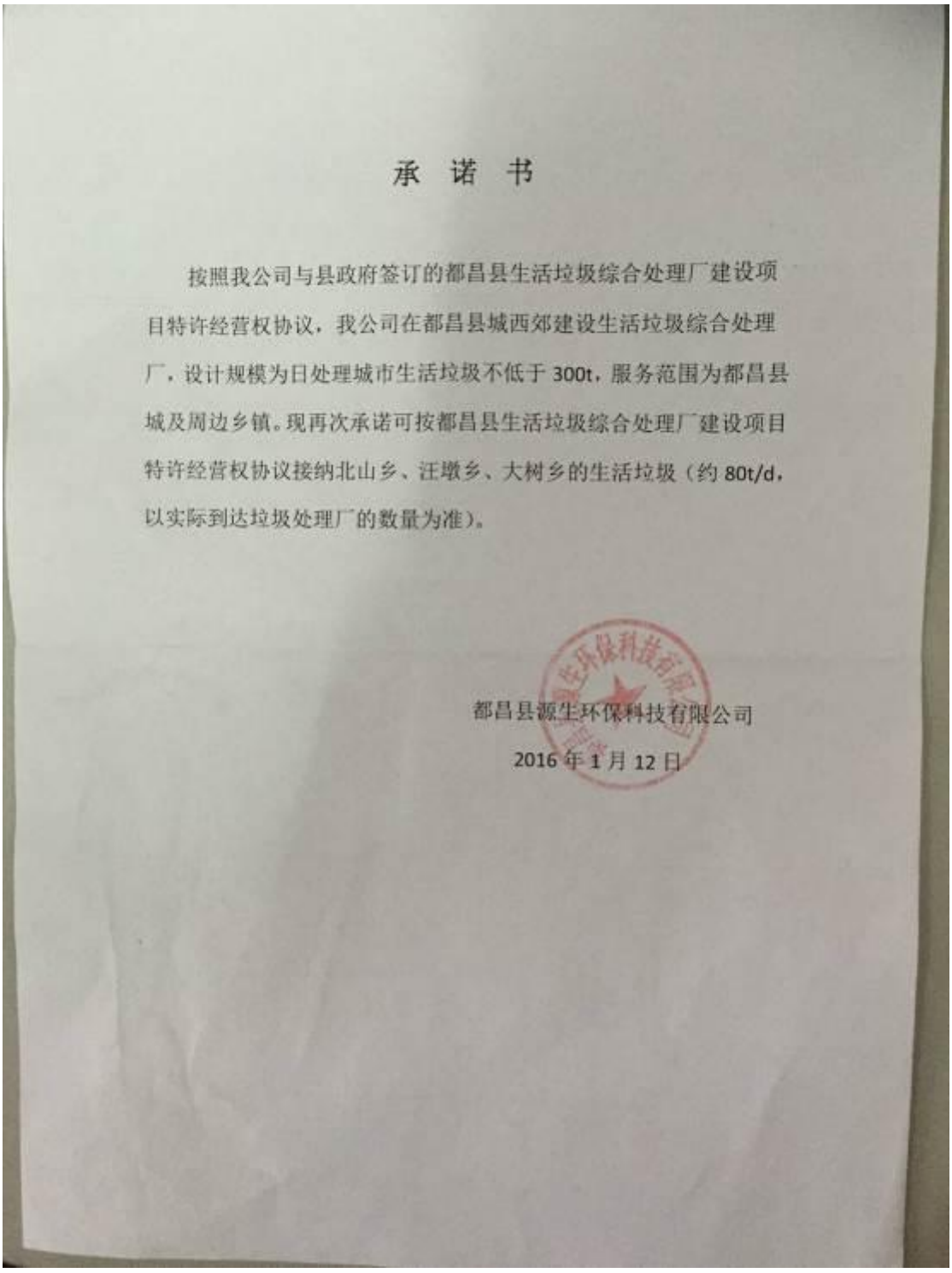
九江市环境保护局

2014年4月17日

抄送：都昌县人民政府，都昌县发改委，市局污防科，市环境监察支队，都昌县规划局，都昌县环保局，都昌县城市管理局，九江市环境科学研究所。

九江市环境保护局办公室　　2014年4月17日印发

Annex VI Agreement on Duchang County Domestic Waste Comprehensive Treatment Plant Taking over Waste of the three Townships under the Subproject



承 诺 书

按照我公司与县政府签订的都昌县生活垃圾综合处理厂建设项目特许经营权协议，我公司在都昌县城西郊建设生活垃圾综合处理厂，设计规模为日处理城市生活垃圾不低于300t，服务范围为都昌县城及周边乡镇。现再次承诺可按都昌县生活垃圾综合处理厂建设项目特许经营权协议接纳北山乡、汪墩乡、大树乡的生活垃圾（约80t/d，以实际到达垃圾处理厂的数量为准）。

都昌县源生环保科技有限公司

2016年1月12日

Annex VII Approval for EIA Report on Jiujiang City Secondary domestic waste treatment plant

关于九江市第二生活垃圾处理场（原九江市生活垃圾处理工程）一期工程竣工环境保护验收的批复

九江威立雅环境服务有限公司：

你单位提交的《九江市第二生活垃圾处理场（原九江市生活垃圾处理工程）一期工程竣工环境保护验收申请报告》收悉。根据《建设项目环境保护条例》和环境保护部《建设项目竣工环境保护验收管理办法》的有关规定，我局组织市环境监察支队、九江县环保局等部门单位对该项目竣工环境保护情况进行了检查验收，并将有关检查验收与监测结果在九江市环境保护网上予以公示。经研究，我局验收意见如下：

一、项目基本情况

九江市第二生活垃圾处理场(原九江市生活垃圾处理工程)建设地点位于九江县沙河镇陈家垅，项目设计总填埋库容1350×10^4m^3，填埋库区占地49.7×10^4m^2，起始处理规模600吨/天(每年6%递增)，服务年限29年。本次验收针对一期工程，占地350.593亩，总投资17344.7万元，填埋库容量124.51×10^4m^3，厌氧卫生填埋，采用分层摊铺、往返碾压、分单元逐日覆盖的填埋工艺；渗滤液处理站处理能力300吨/天。

按照环境影响评价制度规定，建设单位于2008年6月委托萍乡市环境科学研究所编制完成《九江市城市垃圾处理工程建设项

目环境影响报告书》，2008 年 6 月 20 日，我局对该项目环评报告书进行了批复（九环督字[2008]50 号）。因填埋库区的建设方案发生变化，填埋库区南缘扩展 300m（将原有九江县简易垃圾填埋场包含在内），并将填埋方案调整为先南后北，按规定建设单位于 2009 年 10 月委托九江市环境科学研究所编制完成《九江市第二生活垃圾处理场（原九江市生活垃圾处理工程）环境影响评价补充报告》，2009 年 10 月 28 日，我局对该项目环评补充报告书进行了批复（九环督字[2009]144 号）。项目于 2010 年 5 月开工建设，2011 年 1 月开始接收垃圾进场处理。

二、环保执行情况

九江市环境监测站编制的《九江市第二生活垃圾处理场（原九江市生活垃圾处理工程）一期工程竣工环境保护验收监测报告》表明：

（一）废水治理：项目废水主要是渗滤液废水和生活废水。渗滤液废水经场内污水处理站（处理工艺为“MBR（两级硝化+两级反硝化+超滤）+纳滤”，设计规模 300 吨/天）处理后，与经化粪池处理后的生活污水，一并通过市政管网排入九江县生活污水处理厂处理后排放。监测结果显示，渗滤液污水处理站出口化学需氧量、生化需氧量、氨氮、总磷、六价铬、悬浮物、汞、铅、锌、镉、色度、粪大肠菌群均满足《生活垃圾填埋污染控制标准》（GB16889-2008）表 2 中生活垃圾渗滤液排放标准。

（二）废气治理：项目垃圾填埋沼气收集后燃烧；无组织废气

通过落实卫生防护距离，开展场区绿化，减少对周围环境的影响。监测结果显示，厂界及周边环境敏感点的氨和硫化氢均满足《恶臭污染物排放标准》（GB14554-1993）表1中二级新扩改建标准，粉尘满足《大气污染物综合排放标准》（GB16297-1996）表2中无组织排放监控浓度限值。

（三）噪声治理：采取优化总平面布置，合理布置高噪声设备，选用低噪声设备，对噪声源进行隔声、降噪等措施，确保厂界噪声满足相应标准要求。监测结果显示，项目厂界昼、夜噪声等效声级均满足《工业企业厂界环境噪声排放标准》（GB12348-2008）2类标准。

（四）地下水污染防治：对垃圾填埋场进行了防渗处理，设置了地下水监测井。监测结果显示，地表水pH、化学需氧量、生化需氧量、氨氮、总磷、六价铬、铜、汞、铅、锌、镉、粪大肠菌群均满足《地表水环境质量标准》（GB3838-2002）III类标准；地下水亚硝酸盐、铜、铅、锌、镉、粪大肠菌群均满足《地下水环境质量标准》（GB/T14848-93）III类标准。

（五）总量控制指标：九江市环保局下达的项目总量控制指标为COD 10.95t/a，NH_3-N 2.74t/a，经核算一期主要污染物年排放量在总量控制指标范围内。

（六）排污口规范化：废水排放口安装了在线监测仪器，并与九江市环境监控平台联网。

（七）卫生防护距离：根据测绘结果，项目卫生防护距离内无

居民住宅等环境敏感点。

（八）环境风险防范：建设单位制定了环境风险应急预案。

（九）公众意见调查：验收监测报告中公众意见调查结果表明，大部分被调查者对该项目的环保工作表示满意或较满意。

三、验收批复意见

根据环境保护部《建设项目竣工环境保护验收管理办法》和验收组验收意见，以及九江县环保局关于该项目初步验收意见，该项目基本符合竣工环境保护验收条件，公示以来无单位和群众提出异议，我局原则同意该项目通过竣工环境保护验收。

四、项目运行后应做好以下工作

（一）加强环保设施的运行管理和维护，保证环保设施正常运转，做好日常运行台账记录，确保污染物稳定达标排放。

（二）做好在线监测仪器仪表的运行维护，确保在线监测数据真实有效、稳定上传。

（三）加强环境管理，防止跑、冒、滴、漏，禁止渗滤液不按规定处理处置；强化垃圾运输、填埋过程管理，减少废气对周边环境的影响。

（四）按照《生活垃圾填埋场污染控制标准》(GB16889-2008)，制定环境监测计划，加强项目废水及周边地下水水质监测，做好环境信息公开。

（五）提高企业应急事故处置能力，不断完善环境风险应急预案，按要求落实各项风险防范措施并配备足量的应急物资，定

期演练，确保环境安全。

五、其它环保要求

（一）请九江市环境监察支队和九江县环保局监督该单位认真落实各项环境保护要求，并加强对该项目的日常监督管理，发现问题必须及时依法处理，并向我局报告。

（二）若项目建设内容、地点、规模、工艺、采取的环境保护措施等发生重大变化，必须按照相关规定重新申请办理环保相关手续。

九江市环境保护局

2016 年 3 月 17 日

Annex VIII Minutes of Discussion Meeting

(1) Time: 9:30am, September 9, 2015

(2) Venue: Villager Committees in Shaojiafan Village, Beishan Township, Duchang County

(3) Content: Public consultation and information disclosure discussion meeting of EIA of World Bank-financed Duchang Water Environment Management Project

(4) Attendees: Worker Qiu from Project Office of Duchang County, resident representatives from Beishan Township, Worker Yang from design unit, and 12 people including Zhao Kai and Yang yang from environmental assessment organization unit.

(5) Moderator: Worker Qiu (Duchang County PMO)

(6) Minutes of Meeting

The meeting conducted the first round of public consultation on Duchang County Water Environment Management Project, consulted with affected people on the project overview and potential environment problems, and a consensus was reached. Minutes of the meeting are provided below:

①Moderator introduced participants and disseminated questionnaires.

②EIA unit introduced purposes of public consultation of the project:

Pursuant to national environmental laws and regulations and requirements in World Bank Policies (OP4.01), two rounds of public consultation and information disclosure were conducted for the project. The first round was conducted before the formulation of EIA outlines, mainly informing people who will be influenced by the project of an overview and potential environmental problems of the project. The second round was carried out when the draft EIA was prepared, communicating on environmental problems people concerned in the the first round of public participation and their mitigation measures, in order to gain understanding and support from the public for the project and mitigation measures adopted.

The purposes of public consultation and information disclosure are to disclose relevant project information to the project areas and the public who are concerned about the project,

keeping the public informed of the project's main contents, its implementation and operation features and significant environmental issues or problems related to the project; help assessment staff identify issues or problems, confirm all significant environmental issues or problems triggered by the project have been analyzed and assessed in the EIA; confirm the feasibility of environmental protection measures and implementation of optimal measures. This is the first round of public consultation.

③ Environmental assessment unit introduced general situations of the project and potential environmental problems:

Proposed project will reduce pollutants discharged into Poyang Lake basin through urban pipe network improvement engineering, waste transfer engineering, Zoujiazui Lake water ecological restoration and other non-engineering measures. Main impacts of the project on environment are during the construction period and operation period. Temporary impacts on environment and sensitive spots during the construction period are construction wastewater, dust and construction noise. Impacts during the operation period are odor in waste transfer station and dust.

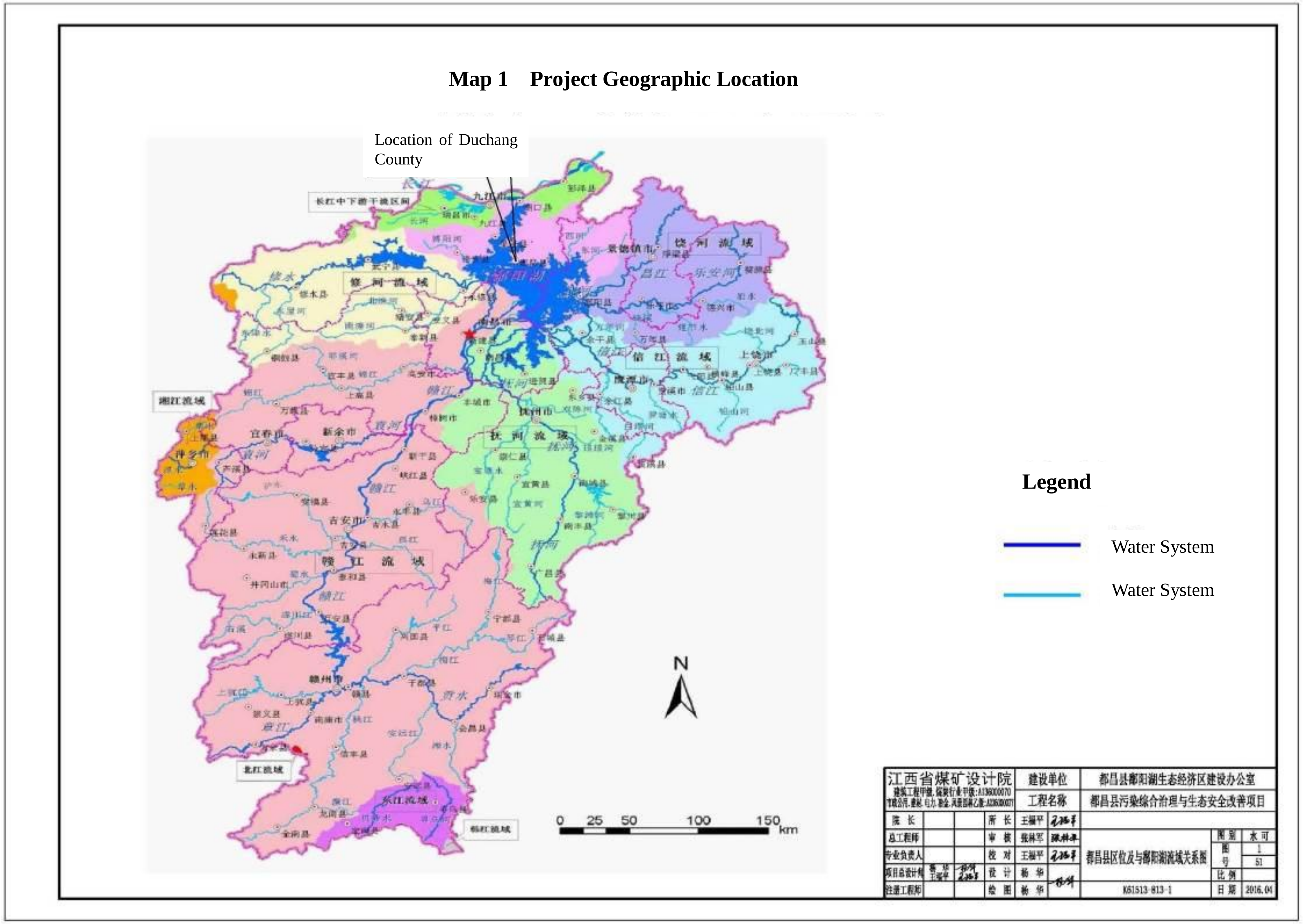
④Statements of attendees: They all expressed support to the project. Roads with poorly drainage will be waterlogging in raining days, which brings inconvenience for traveling and living. Therefore the mass hoped to start early and finish early with a single time construction and no repeated construction. They also suggested to arrange deodorization and dust removal measures in waste transfer station of Wangdun Township and Dashu Township, reducing influence of odor pollutants.

⑤Statements of implementing agency and environmental assessment unit: Thanks for the understanding and support from the public, the project will further improve the design and work for pre-project. We will strive to start early and finish early with a single time construction and no repeated construction; and take deodorization and dust removal measures in waste transfer station of Wangdun Township and Dashu Township.

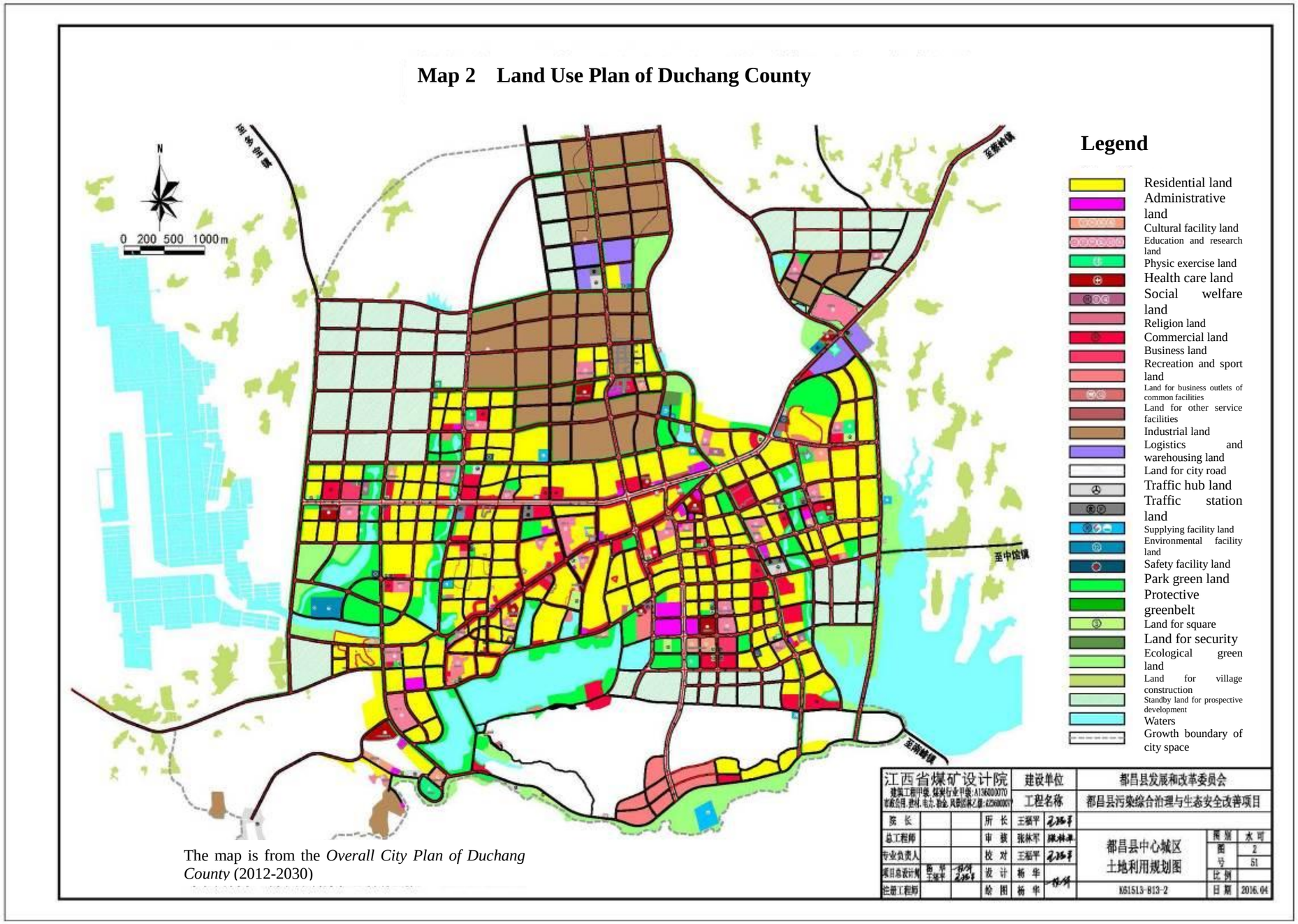
⑥Moderator made a conclusion and the meeting came to an end.

Figure 1 Pictures of Duchang County Discussion Meetings

Map 1 Project Geographic Location



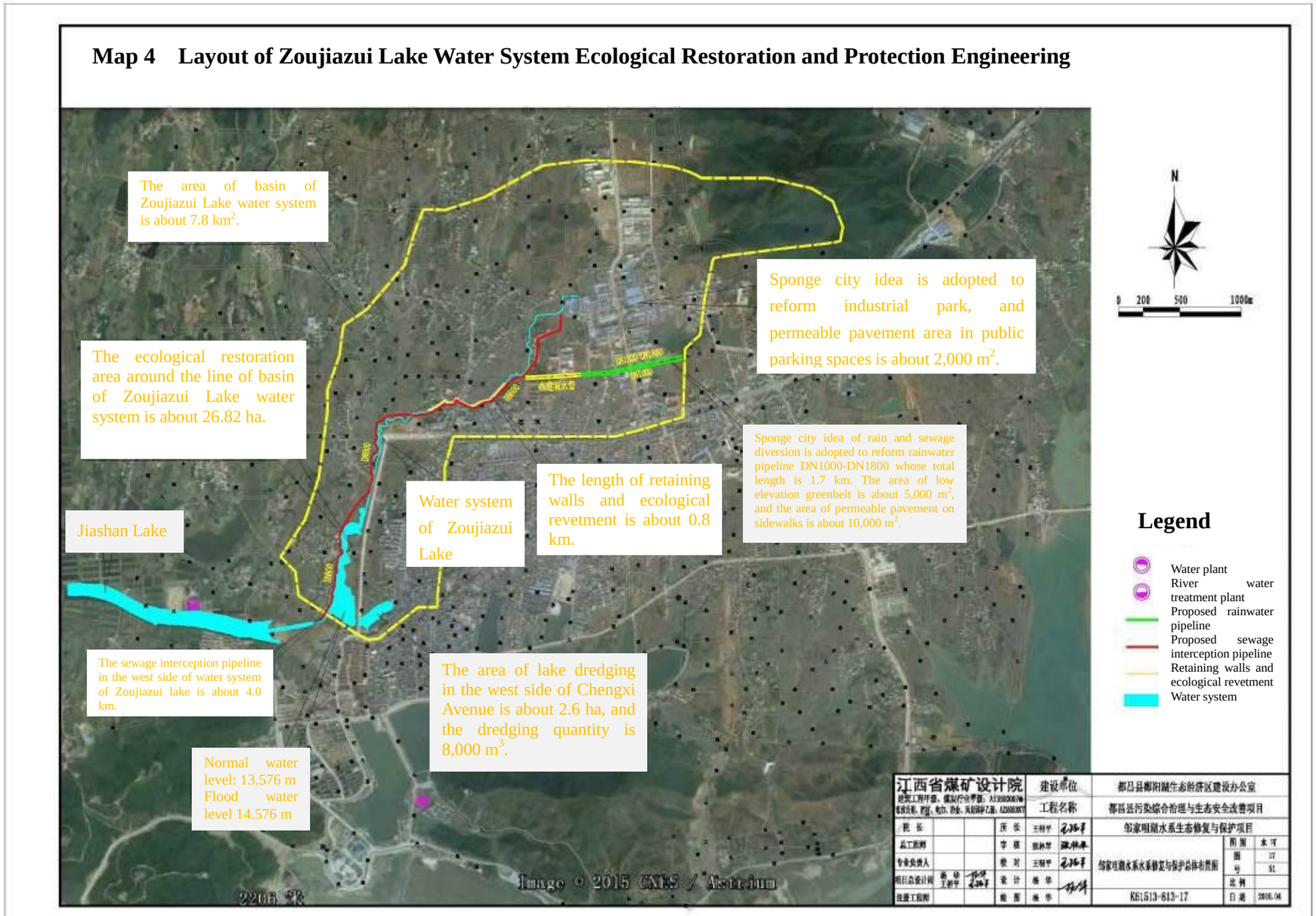
Map 2　Land Use Plan of Duchang County



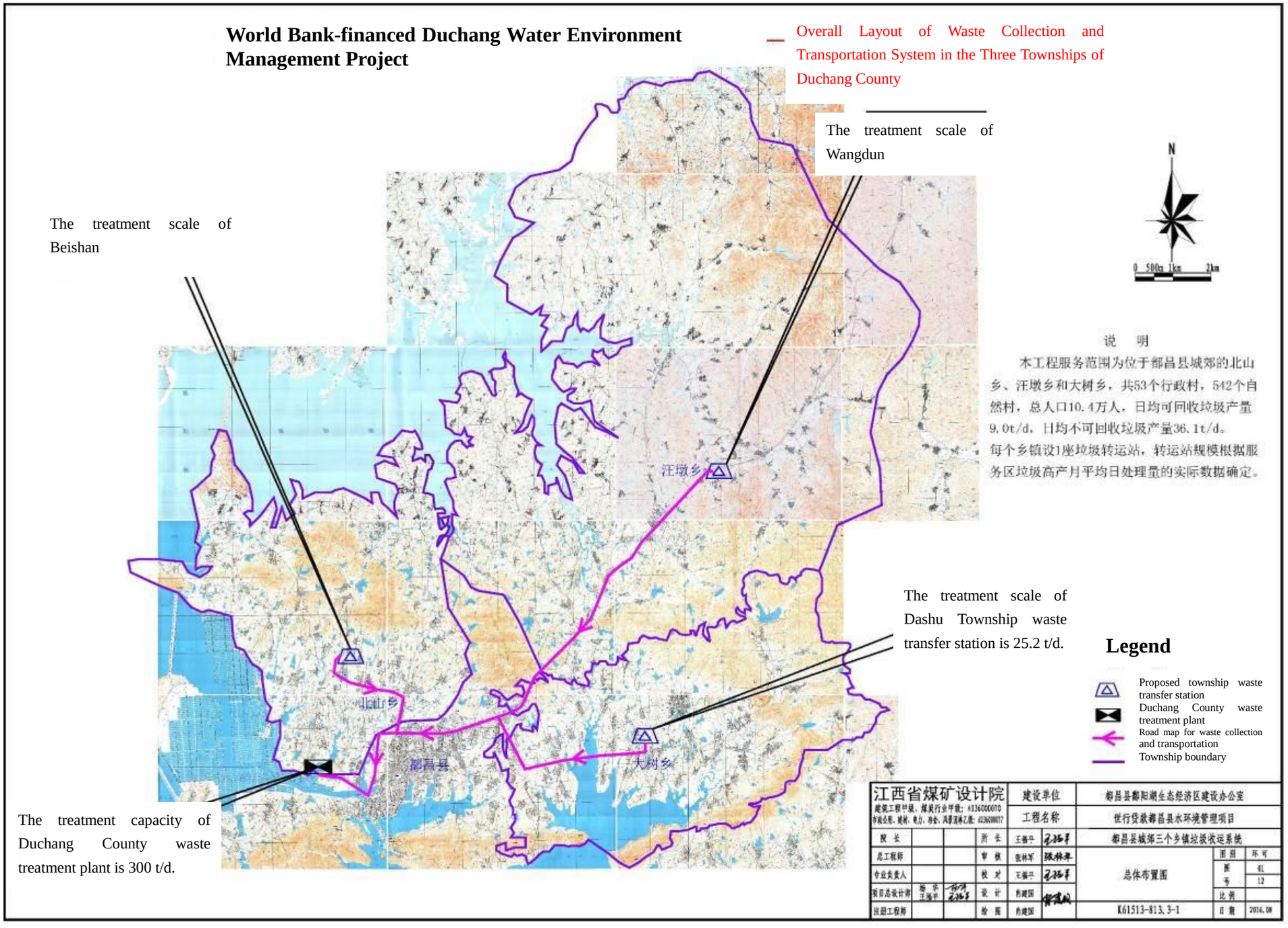
The map is from the *Overall City Plan of Duchang County* (2012-2030)

Map 3　Layout of Sewage Pipe Network

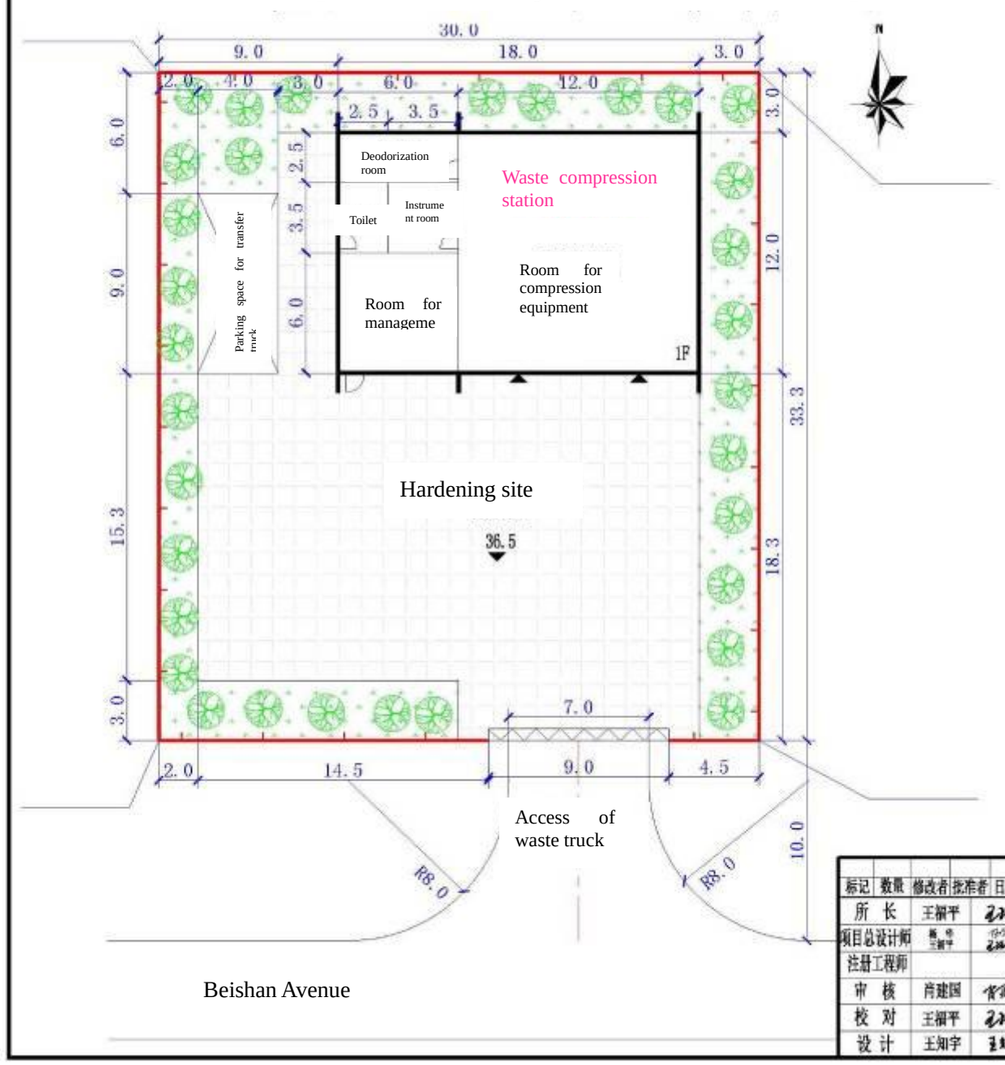
Map 4　Layout of Zoujiazui Lake Water System Ecological Restoration and Protection Engineering



Map 5 Layout of Waste Transfer System



Map 6 General Layout of Beishan Township Waste Transfer Station



Main economic and technical indexes

No.	Item	Index
1	Total area	999 m^2
2	Building area	216 m^2
3	Transfer station area	216 m^2
(1)	Room for compression equipment	144 m^2
(2)	Room for management	36 m^2
(3)	Instrument room	12.25 m^2
(4)	Deodorization room	15 m^2
(5)	Toilet	8.75 m^2
4	Green area	292.5 m^2
5	Area of hardening site	490.5 m^2
6	Building density	21.6%
7	Volume rate	0.22
8	Greening rate	29.3%
9	Parking space for transfer truck	1

说明：

1、垃圾转运站围墙与相邻建筑间隔应大于等于10m。

2、图中坐标系采用1980西安坐标系，高程采用1985黄海高程。

标记	数量	修改者	批准者	日 期
所 长		王福平		
项目总设计师				
注册工程师				
审 核		肖建国		
校 对		王福平		
设 计		王知宇		

都昌县鄱阳湖生态经济区建设办公室

都昌县三个乡镇垃圾收运系统

都昌县北山乡垃圾转运站

总平面布置图

K61513-813-44

都昌县污染综合治理与生态安全改善项目

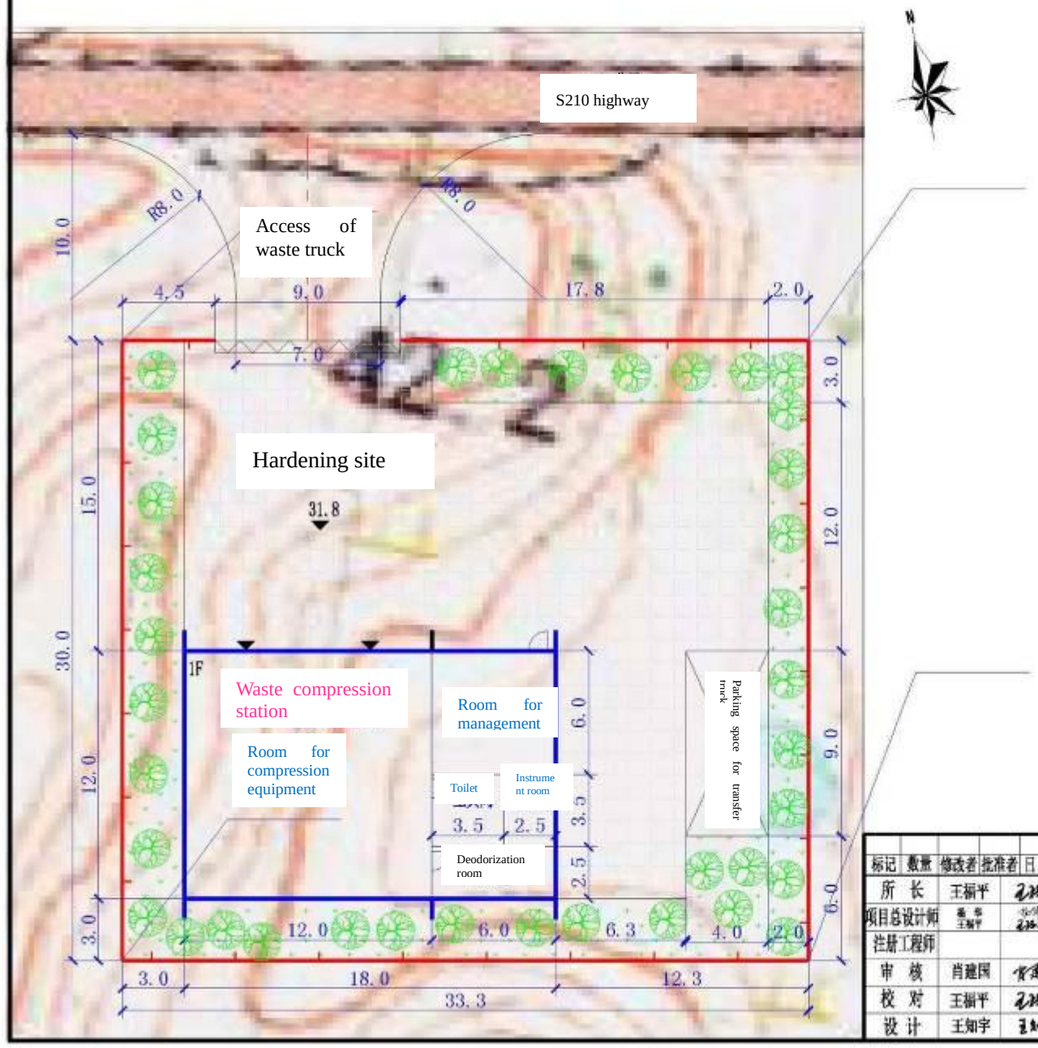
图 别	水 可	图 号	44
比 例	1:200		51
日 期	2016.04		

江西省煤矿设计院

建筑、煤炭、市政公用工程咨询甲级：11720070018

Map 7 General Layout of Wangdun Township Waste Transfer Station

Map 7 General Layout of Wangdun Township Waste Transfer Station



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说明：

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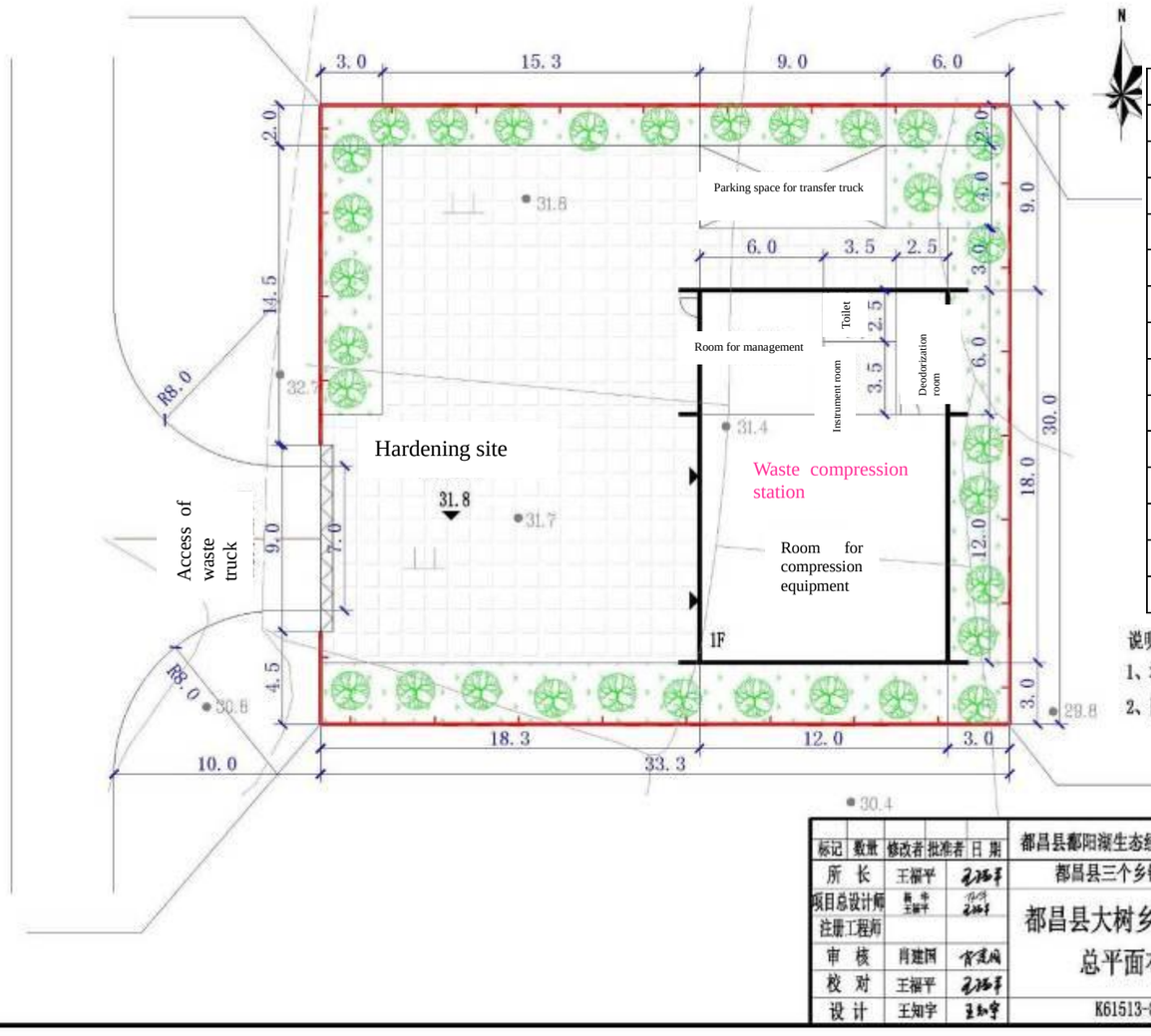
2、图中坐标系采用1980西安坐标系，高程采用1985黄海高程。

标记	数量	修改者	批准者	日 期	都昌县鄱阳湖生态经济区建设办公室	都昌县污染综合治理与生态安全改善项目			
所 长		王福平			都昌县三个乡镇垃圾收运系统	图 别	水 可	图 号	45
项目总设计师					都昌县汪墩乡垃圾转运站总平面布置图	比 例	1:200		51
注册工程师						日 期	2016.04		
审 核		肖建国				江西省煤矿设计院			
校 对		王福平				建筑、煤炭、市政公用工程咨询甲级:11720070018			
设 计		王知宇			K61513-813-45				

Map 8 General Layout of Dashu Township Waste Transfer Station

Map 8 General Layout of Dashu Township Waste Transfer Station



Main economic and technical indexes

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3	Transfer station area	216 m^2
(1)	Room for compression equipment	144 m^2
(2)	Room for management	36 m^2
(3)	Instrument room	12.25 m^2
(4)	Deodorization room	15 m^2
(5)	Toilet	8.75 m^2
4	Green area	292.5 m^2
5	Area of hardening site	490.5 m^2
6	Building density	21.6%
7	Volume rate	0.22
8	Greening rate	29.3%
9	Parking space for transfer truck	1

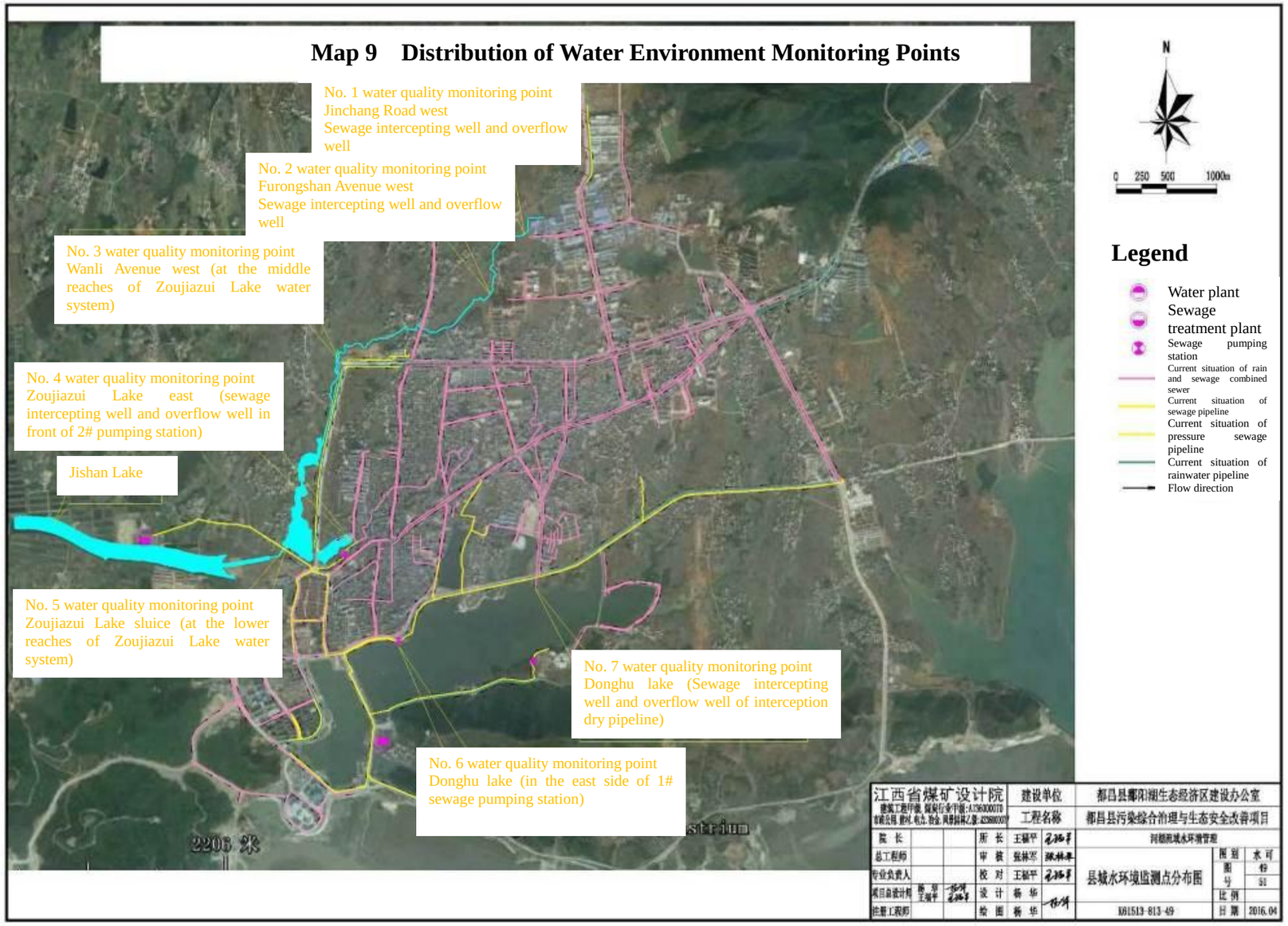
说明：

1、驳转运站围墙与相邻建筑间隔应大于等于10m。

2、图中坐标系采用1980西安坐标系，高程采用1985黄海高程。

标记	数量	修改者	批准者	日 期	都昌县鄱阳湖生态经济区建设办公室	都昌县污染综合治理与生态安全改善项目			
所 长		王福平			都昌县三个乡镇垃圾收运系统	图 别	水 可	图 号	46
项目总设计师					都昌县大树乡垃圾转运站总平面布置图	比 例	1:200		51
注册工程师						日 期	2016.04		
审 核		肖建国				江西省煤矿设计院			
校 对		王福平				建筑、煤炭、市政公用工程咨询甲级:11720070018			
设 计		王知宇			K61513-813-46				

Map 9 Distribution of Water Environment Monitoring Points



Map 10 Location of Sensitive Points