

E2483

V4

**Comprehensive treatment of ecologic  
environment around Taihu Lake in Wuxi loan  
project of World Bank**

**Environmental Management Plan**

**Chinese Research Academy of Environmental Sciences**

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# **1 General Remarks**

## **1.1 Project Description**

The Basin of Taihu Lake is located in the hinterland of the Yangtze River Delta, across Jiangsu, Zhejiang, Anhui and Shanghai (3 provinces and 1 city), and is the heart of the Yangtze River Delta region, with the total area of 36,900 km<sup>2</sup>, has always been one of the areas with the greatest density of population, developed industrial and agricultural production, the fastest growth of national economy output and per capita income. Since the 90s of last century, with rapid economic and social development of the Basin, pollutant emissions have increased continually. Although the state and local control of water pollution have been emphasized and achieved some success, the deterioration of water environment has not been effectively controlled.

The Chinese Party Central Committee and the State Council pay great attention to the Wuxi's water supply crisis and Taihu Lake Basin water pollution control. Premier Wen Jiabao made important instructions, requiring that “on the basis of the existing work, strengthen comprehensive control, study and propose specific control programs and measures”. Jiangsu Provincial Party committee and Provincial Government resolutely implement the central major decisions and plans on the Taihu Lake. A series of initiatives including urgent treatment of seaweed, iron-hand pollution control, and scientific water management have been taken. Intensive efforts are being made to win this campaign of Taihu Lake water pollution prevention and control. All cities, counties, including Wuxi, and provincial related departments are earnestly implementing the Provincial Party and Provincial Government's deployment requirements, taking charge of the implementation of each work for the Taihu Lake's control.

May 2008, leading by the National Development and Reform Commission, “The Comprehensive Management Overall Program of Water Environment in Taihu Lake” was prepared and was officially approved by the State Council. Subsequently, “Jiangsu Province Implementation Program of Comprehensive Management of Taihu Lake Basin Water Environment” and “Wuxi City Implementation Program of Comprehensive Management of Taihu Lake Water Environment” were issued. A new round of comprehensive management of water environment of Taihu Basin has been processed completely.

To speed up the implementation of Wuxi Taihu Lake Basin Water Environment Comprehensive Management plan, Wuxi City declared the “Ecological Environment Management Comprehensive Project of Wuxi Taihu Lake” (the “Wuxi World Bank Project”) to the National Development and Reform Commission and the Ministry of Finance. In July 2008, this project was approved by the national State Council into the alternative projects for use of World Bank loans in fiscal year 2009 ~ 2011. The project loan amount is 150 million U.S. dollars. The project content is an important part of Wuxi City Implementation Program of Comprehensive Management of Taihu Lake Water Environment.

Under the commission of Wuxi Municipal Bureau of Finance, the project's environmental impact assessment and design are taken by Chinese Research Academy of Environmental Sciences and the Jiangsu Province Engineering Consulting Centre; social impact assessment and resettlement plan is taken by Hohai University. The Wuxi World Bank project mainly includes the following five components:

Sub-project1 – rehabilitation work of Changguangxi ecological wetlands;

Sub-project2–Hongshan village project of demonstration area of pollution comprehensive control;

Sub-project3 – Wuxi Huishan project of sewage treatment plant stage IV and reclaimed water reuse stage I;

Sub-project4 – Ecological dredging works of Taihu Lake key areas;

Sub-project5 – Taihu Lake environment comprehensive management capacity construction and project implementation support.

#### **The overall objective of this project:**

By ecological restoration of wetlands in Wuxi Taihu lake region, ecological dredging of lake bottom in key areas, comprehensive treatment of the pollution in rural areas, urban sewage centralized treatment and capacity construction of comprehensive management of the ecological environment, to reduce the pollution load of Taihu Lake, restore biodiversity, improve water quality in Taihu Lake, protect drinking water safety of residents along the lake, and improve the quality of life of residents along the lake.

#### **The specific objectives of this project:**

(1) Speed up Wuxi Taihu Lake Ecological Wetland Restoration Project, effectively restore ecological systems, enhance the water environmental carrying capacity, improve Taihu Meiliang Lake water quality, improve water safety of Wuxi East Water Plant, and enhance Wuxi urban water supply support capabilities.

(2) On the premise of strengthening the Taihu Lake pollution control and management of external measures, expedite the implementation of ecological dredging project in key areas in Tihu Meiliang key areas; using harmless sludge processing technology and resources utilization technology, build a sludge collection, transport and disposal system, then reduce pollution in Taihu Lake water quality and opportunity

of algae explosion, effectively enhance the lake's purification ability, and create a good internal condition for improvement of the lake's water quality.

(3) Select the appropriate rural areas to set up demonstration areas of pollution treatment; use efficient, low-pollution plant technology, micro-power rural sewage disposal technology, ecology absorption and transformation technology to establish an effective integrated management system of rural area pollution, and reduce surface source on the surrounding water and the pollution of Taihu Lake; establish low-pollution agricultural technology service center; propaganda, manage and provide technical support for low-pollution agricultural production activities, strengthen residents' environmental awareness; play an exemplary role of demonstration areas, promote the success project experiences to the whole basin.

(4) Improve capacity construction of the Taihu Lake water environment management departments, and enhance the scientific management to meet developmental demands.

## 1.2 Project Content

The project location, scope, content and implementation units are shown in Table 1.2-1 and Figure 1.2-1 ~ 1.2-4.

**Table 1.2-1 Basic information of the project**

SN	Sub-Project Name	Location and Scope	Construction Content	Implementation Unit
1	Rehabilitation work of Changguangxi ecological wetlands	North to Qingyuan Road (south end of stage I of Changguangxi wetland restoration project), south to Hukou Renzi Harbor (entry or exit of Changguangxi), with the length of about 4.9 km, covering an area of about 143.7ha.	Surface flow and subsurface flow constructed wetland project Collation and communication of wetland water works Wetland habitat restoration project Wetland biological restoration projects Ancillary supporting project Immigration Removal	Wuxi Chengkai Investment Development Ltd
2	Hongshan village project of demonstration area of pollution comprehensive control	East area of Hongshan Street in Wuxi New District, including the Wangyu River, Bodu Harbor along the coast to Huanhong East Road. Demonstration area is about 14.7km <sup>2</sup> .	Agricultural source pollution control Solid waste disposal project in rural areas Restoration project of ecology ditches Capacity construction and assessment	Wuxi Wu Culture Exposition Construction Development Co., Ltd.
3	Wuxi Huishan project of sewage treatment plant stage IV and reclaimed water reuse stage I	Hujiadu Village at the north side of Xibei Canal, southwest corner of Huishan District.	Huishan sewage treatment plant stage IV project, with scale of 25 000 m <sup>3</sup> / d Huishan sewage treatment plant reclaimed water reuse project, with scale of 15,000m <sup>3</sup> /d Recycled water pipe network, with pipe length of 2530m, diameter of DN150 ~ DN600	Wuxi Huishan Water Disposal Co., Ltd.
4	Ecological dredging works of Taihu Lake key	Non-dredging lake area in Southwest of Meiliang	Clear the seriously polluted surface sediment deposition within project area	Wuxi Water Conservancy Bureau

SN	Sub-Project Name	Location and Scope	Construction Content	Implementation Unit
areas		Lake, covering an area of about 22.9km <sup>2</sup> .	Set four mud fields (hole bay, white mao 1, 2, 3) and a stabilized soil buffer zone (red bay)	
			Consolidation and disposal of sludge	

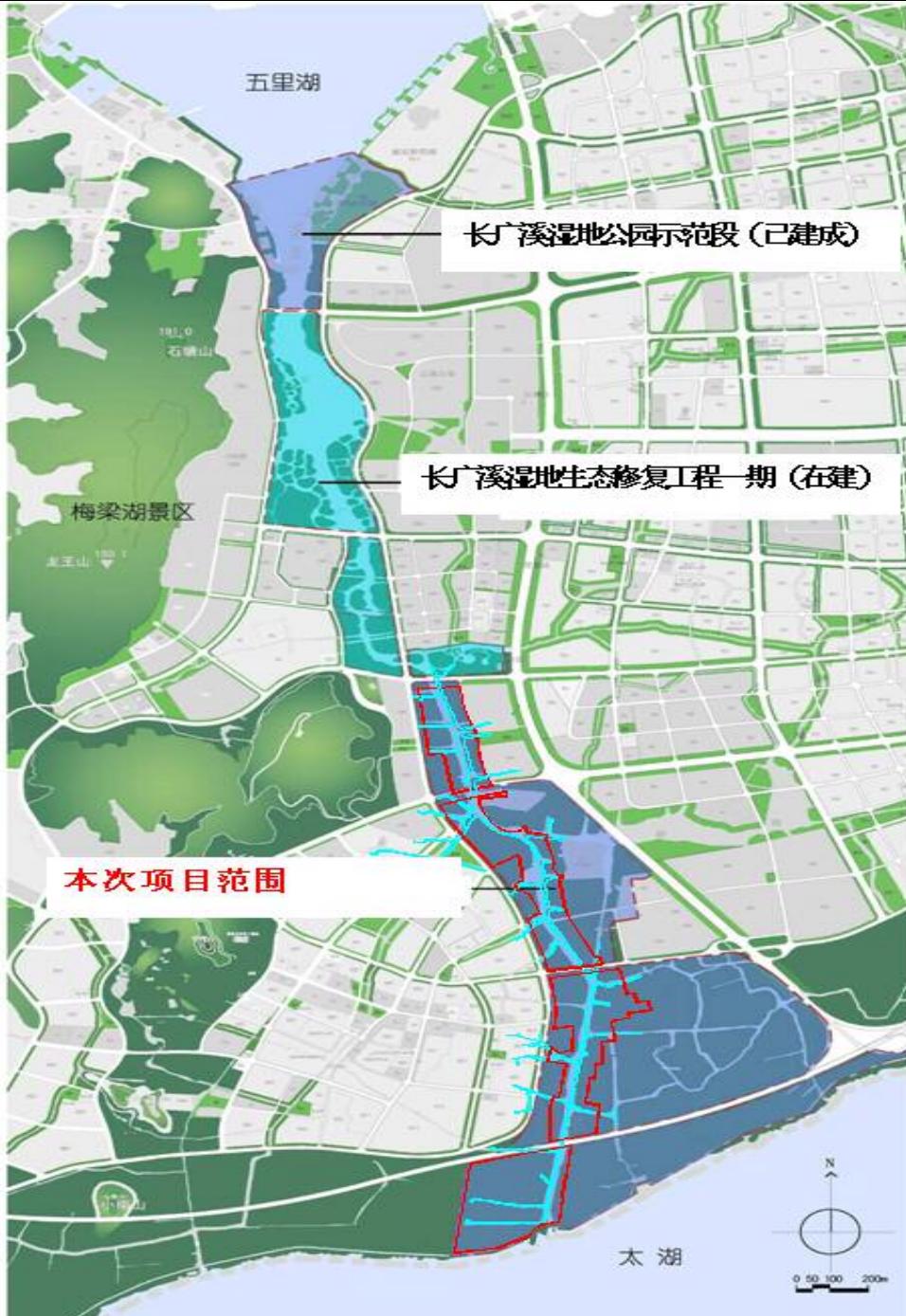
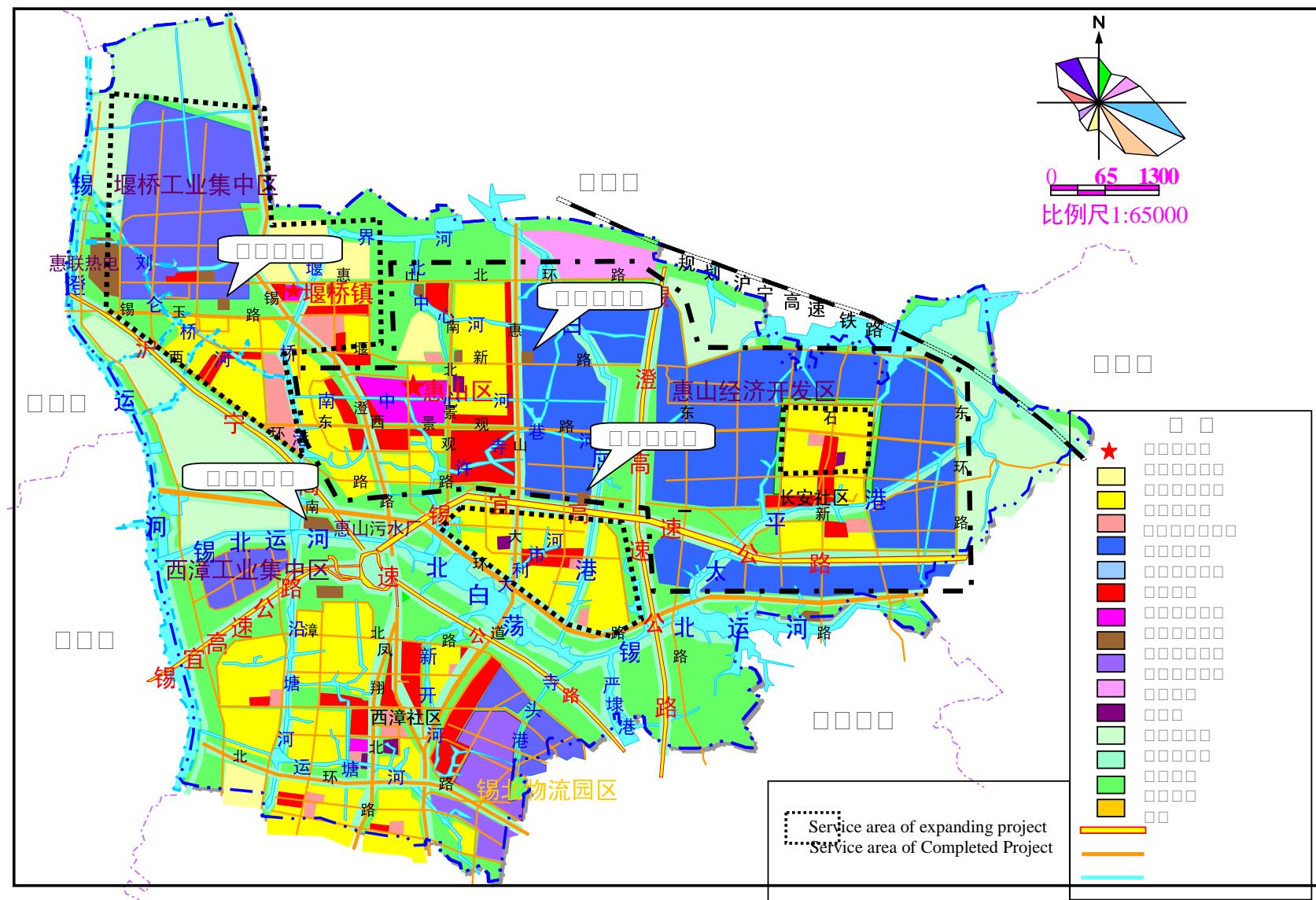


Figure 1.2-1 Rehabilitation Work of Changguangxi Ecological Wetlands



Figure 1.2-2 Hongshan village project of demonstration area of pollution comprehensive control



**Figure1.2-3 Huishan wastewater treatment plant**



**Figure 1.2-4 Ecological dredging works of Taihu Lake key areas**

### 1.3 Project Implementation Plan

The total project progress includes project preparation, engineering survey and design, project implementation, and project completion, not including post-project evaluation stage. The total construction period is 5 years. The overall project scheduling is shown in Table 1.3-1.

**Table 1.3-1 Overall project implementation schedule Unit: six months**

Year	Year 1	Year 2	Year 3	Year 4	Year 5					
Six months	1	2	3	4	5	6	7	8	9	10
Organization review of the feasibility report	***									
Survey on land within the red line		*								
Land acquisition, demolition, resettlement		**								

Year	Year 1		Year 2		Year 3		Year 4		Year 5	
Six months	1	2	3	4	5	6	7	8	9	10
Preliminary design and review		***	***							
Construction of temporary facilities			**							
Ecological dredging works of Meiliang Lake key areas			***	***	***	***	***	***	***	
Rehabilitation works of Changguangxi ecological wetlands		*	***	***	***	***	***	***	***	**
Hongshan village project of demonstration area of pollution comprehensive control		*	***	***	***	***	***	***	***	**
Huishan project of sewage treatment plant stage IV and reclaimed water reuse stage I	***	***	***							
Taihu Lake environment comprehensive management capacity construction and project implementation support			*		*	*		*	*	
Final acceptance										□

## 1.4 Project Investment Estimate

The total investment of each sub-project is shown in Table 1.4-1.

**Table 1.4-1 Construction investment structure form**

SN	Category Name	Amount (million)	Total (10,000 USD)	Ratio (%)
1	Rehabilitation work of Changguangxi ecological wetlands	55410.1	8148.5	26.1
2	Huishan project of sewage treatment plant stage IV and reclaimed water reuse stage I	15307.9	2251.2	7.2
3	Hongshan village project of demonstration area of pollution comprehensive control	81853.0	12037.2	38.6
4	Ecological dredging works of Taihu Lake key areas	51855.9	7625.9	24.5
5	Taihu Lake environment comprehensive management capacity construction plan	7656.0	1125.9	3.6
*	Total	212082.9	31188.7	100.0

Note: The total investment in this table does not include projects of interest and liquidity

## 1.5 Environmental Management Plan Objectives

Development of environmental management plan (referred to as: EMP) is targeted at the inevitable environmental impacts of the project, to develop a technically feasible and financially sustainable, workable environmental measures, specifically on measures and arrangements of the implementation of environmental mitigation, environmental management and institution construction during the construction and operation period by project contractor, supervisors, operators and environmental management units; to the extent possible, eliminate or compensate for

project on social and environmental impact, to reduce it to acceptable levels. The specific objectives include:

1) Make the environmental management obligations of contractor and operator clear

Wuxi Municipal Environmental Protection Bureau, Environmental impact assessment unit and design unit verify and confirm the environmental protection objectives on-site particularly, present effective environmental mitigation measures, which are incorporated into project design as contractual obligations of construction contractors and operators.

2) As the operational guidelines for environmental management

The proposed environmental monitoring program during construction and operation periods in environmental management plan shall ensure the effective implementation of environmental mitigation measures. Environmental management plan will serve as the environmental protection text available to the construction supervision unit, environmental supervision unit and other relevant units during construction and operation periods, to clearly definite responsibilities and tasks of functional departments and regulatory organizations, and to present exchange channels and modes for communication among departments.

3) Ensure funding for environmental management activities

Costs on the mentioned environmental management, environmental supervision and capacity construction in environmental management plan will be estimated, indicating the source of funding to ensure that the environmental management activities will be implemented, among it, administrative expenses include staff salaries, office expenses and transport.

The role of environmental management plan is to avoid and control environmental impact in the course of project implementation and operation, and then to propose the implemented mitigation measures, monitoring measures, legal instruments and regulatory regulations for above measures, which is the key link of mitigation measures and alternative measures described in environmental impact and environmental assessment. For each environmental management measure, the technical content, investment estimate, implementation plan, the functions of government agencies, funding sources, and monitoring programs are determined in environmental management plan. To achieve the reduction targets, the involved

methods in environmental impact assessment report and environmental management plans must be implemented.

## **1.6 Compilation of Environmental Management Plan**

Environmental management plan of “World Bank Loan Project for Wuxi Taihu Lake Region Ecological Environment Comprehensive Control” is prepared by the EIA unit. The entire environmental management plan will be strictly in accordance with national and provincial environmental regulations. At the same time, on the premise of Chinese EIA requirements, the security requirements of ordinance in World Bank are emphasized and referred to the relevant provisions of 4.01.

Final report information sources for environmental management plan are as follows:

- (1) Environmental Impact Assessment Report
- (2) Social Impact Assessment and Resettlement Action Plan
- (3) Feasibility Study Report
- (4) Seminars organized by Project Office and participated by representatives of World Bank.

## **1.7 Environmental Management Plan Design**

For the detailed description of environmental management, environmental supervision and environmental monitoring aspects, compiled environmental management plan shall be the guide documents for environmental management during project implementation. The action plan includes the following three parts:

Environmental impacts and mitigation measures: The major environmental impacts during project construction and operation periods; applied engineering measures and management measures to prevent or mitigate the adverse environmental effects caused by projects.

Environmental management and monitoring plan: Applied environmental monitoring action to ensure simultaneous implementation of environmental protection measures and the project construction.

Environmental monitoring program: Applied environmental monitoring action to eliminate environmental pollution during construction and operation periods, and to

ensure the safe operation of project and improvement of environmental situation within project area.

Training program: Knowledge and skills training for management and environmental supervision personnel, full-time or part-time personnel in project implementation process, to ensure the implementation of environmental management plan.

## **1.8 Technical Details of Compilation**

The project management plan is compiled according to “Environmental Impact Assessment Report for World Bank Loan Project on Wuxi Taihu Lake Region Ecological Environment Comprehensive Control”. As a separate file, the environmental management plan includes the planned implementing environmental management actions during project construction and operation periods, to provide guideline and framework for implementation of adverse impact mitigation measures, environmental supervision, environmental management and environmental monitoring.

## **2 Environmental Impact Assessment**

### **2.1 Evaluation Basis**

#### **2.1.1 Safeguard policies of World Bank**

- (1) *Environmental Impact Assessment* (OP/BP4.01)
- (2) *Natural Habitats* (OP/BP4.04)
- (3) *Involuntary Resettlement* (OP/BP 4.12)
- (4) *Indigenous People* (OD 4.20)
- (5) *Information Disclosure* (BP17.50)

#### **2.1.2 Environmental protection laws and regulations**

- (1) *Environmental Protection Law of the People's Republic of China* (Dec. 26, 1989);
- (2) *Law of the People's Republic of China on Environmental Impact Assessment* (Oct. 28, 2002)
- (3) *Law of the People's Republic of China on Prevention and Control of Water Pollution* (Feb. 28, 2008)
- (4) *Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution* (Apr. 29.2000)
- (5) *Law of the People's Republic of China on the Prevention and Control of Environmental Noise Pollution* (Oct. 29, 1996)
- (6) *Law on the Prevention and Control of Environmental Pollution by Solid Wastes of the People's Republic of China* (Dec. 29, 2004)
- (7) *Water Law of the People's Republic of China* (Aug. 29, 2002)
- (8) *Law of the Peoples Republic of China on Water and Soil Conservation* (Jun. 29, 1991)
- (9) *Law of the People's Republic of China on the Protection of Cultural Relic* (Oct. 28, 2002)
- (10) *Regulations on the Administration of Construction Project Environmental Protection* (Nov. 18, 1998)
- (11) *Temporary Act of Environmental Impact Assessment of Public Participating* (Feb. 22, 2006)
- (12) *Measures on Environmental Information Publicity (on Trial)* (Apr. 21, 2007)

- (13) *Circular on Strengthening EIA Management of Construction Projects Funded by International financial organizations* (Jun. 21, 1993)
- (14) *Provisions on the Grading and Approval for Environmental Impact Assessment Documents of Construction Projects* (Dec. 11, 2008)
- (15) *Circular of General Office of the State Council on Strengthening the Protection Work of Aquatic Environment of Important Lakes* (Jan. 12, 2008)
- (16) *Circular of the People's Government of Jiangsu Province on Printing and Driving Policies and Measures on Environmental Protection* (No. 92 [2006])
- (17) *The 10<sup>th</sup> Five Year Plan on Water Pollution Prevention in Taihu Lake* (Jan. 2002)
- (18) *Regulations of Jiangsu Province on Environmental Protection* (Oct. 31, 2006)
- (19) *Regulations of Jiangsu Province on Agricultural Ecologic Environment* (Doc. 31, 1999)
- (20) *Regulations of Jiangsu Province on Lake Protection* (Mar. 01, 2005)
- (21) *Regulations of Jiangsu Province on Water Pollution Control in Taihu Lake* (Jun. 05, 2008)
- (22) *Measures of Jiangsu Province for Compensation for Land Expropriation and Assurance for Landless Farmers' Basic Living* (Sep. 1, 2005)
- (23) *Regulations of Wuxi City on Aquatic Environment Protection* (Dec. 01, 2008)
- (24) *Action Program of Jiangsu Province on Water Pollution Treatment in Taihu Lake* (Sep. 10, 2007)
- (25) *Measures of Jiangsu Province for Compensation for Land Expropriation and Assurance for Landless Farmers' Basic Living* (Sep. 1, 2005)
- (26) *Measures of Wuxi City for Drinking-water Source Protection* (Jun. 05, 2008)
- (27) *Regulations of Wuxi City on Aquatic Environment* (Dec. 01, 2008)
- (28) *Measures of Wuxi for Compensation for Land Expropriation and Assurance for Landless Farmers' Basic Living* (Jun. 01, 2004)

### **2.1.3 Technical policies on pollution prevention**

- (1) *Technical Policies on Prevention of Urban Domestic Garbage Treatment and Pollution Prevention*

- (2) *Technical Policies on Urban Domestic Sewage Treatment and Pollution Prevention*
- (3) *Technical Policies on Lake and Reservoir Eutrophication Prevention*
- (4) *Technical Policies on the Sludge Disposal and Pollution Prevention in the Sewage Treatment Plants in Cities and Towns (for trial implementation)*
- (5) *Technical Policies on Pollution Prevention of Hazardous Wastes*
- (6) *Opinions on Strengthening the Protection of the Aquatic Environment in Major Lakes*

#### **2.1.4 Technical guidelines and standards for environmental impact assessment**

##### **1. Technical guidelines and specifications for environmental impact assessment**

- (1) *Technical Guidelines for Environmental Impact Assessment (HJ/T2.1-93)*
- (2) *Technical Guidelines for Environmental Impact Assessment, Atmospheric Environment (HJ2.2-2008)*
- (3) *Technical Guidelines for Environmental Impact Assessment, Surface Water Environment (HJ/T2.3-93)*
- (4) *Technical Guidelines for Noise Impact Assessment (HJ2.4-2009)*
- (5) *Technical Guidelines for Environmental Impact Assessment-Ecological Environment of Nature Resources' Development (HJ/T19-1997)*
- (6) *Technical Guidelines for Environmental Risk Assessment of Construction Projects (HJ/T169-2004)*
- (7) *Technical Specifications for Ecologic Environment Assessment (HJ/T192-2006)*
- (8) *Technical Specifications for Comprehensive Treatment of Soil and Water Conservation (GB/T16453.1~6-1996)*
- (9) *Technical Specifications for Scheme on Soil and Water Conservation of Development and Construction Projects (SL204-98)*

##### **2. Environment quality standards**

- (1) *Ambient Air Quality Standard (GB3095-1996)*
- (2) *Environmental Quality Standard for Surface Water (GB3838-2002)*
- (3) *Quality Standard for Ground Water (GB/T14848-93)*
- (4) *Water Quality Standards for Urban Water Supply (CJ/T206-2005)*
- (5) *Sanitary Standard for Drinking Water (GB5749-2006)*

- (6) *Water Quality Standard for Drinking Water Sources* (CJ 3020-93)
- (7) Water Quality Standard for Farmland Irrigation (GB5084-92)
- (8) *Environmental Quality Standard for Soils* (GB15618-1995)
- (9) *Quality Standard for Acoustic Environment* (GB3096-2008)
- (10) *Sanitary Standard for the Design of Industrial Enterprises* (TJ36-79)

(the maximum allowable concentration of the harmful substances in the air in the residential areas)

### **3. Control standards for pollutants discharge**

- (1) *Integrated Emission Standard of Air Pollutants* (GB16297-1996)
- (2) *Emission Standards for Odor Pollutants* (GB14554-93)
- (3) *Integrated Wastewater Discharge Standard* (GB8978-1996)
- (4) *Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant* (GB18918-2002)
- (5) *Noise limits for Construction Site* (GB12523-90)
- (6) *Emission Standard for Industrial Enterprises Noise at Boundary* (GB12348-2008)
- (7) *Standard for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes* (GB18599-2001)
- (8) *Identification Standard for Hazardous Wastes* (GB5085-1996)
- (9) *Control Standards for Urban Wastes for Agricultural Use* (GB8172-87)
- (10) Control Standard for Pollutants in Sludge from Agricultural Use (GB 4284-84)

## **2.2 Environmental Assessment Standards**

### **2.2.1 Environmental Quality Standard**

#### **1. Environmental air**

- (1) Implementation of the “*Environmental Air Quality Standard*” (GB3095-1996) and secondary standards in modified list. The standard values are listed in Table 2.2-1.

**Table 2.2-1 Environmental Air Quality Standard Unit: mg / m<sup>3</sup>**

Pollutant Name	Value Time	Concentration	Standard Source
SO <sub>2</sub>	1 hour average	0.50	“ <i>Environmental Air Quality Standard</i> ” (GB3095-1996) and secondary standards in

	Daily average	0.15	
NO <sub>2</sub>	1 hour average	0.12	
	Daily average	0.08	
TSP	Daily average	0.30	
PM <sub>10</sub>	Daily average	0.15	

(2) For ammonia and hydrogen sulfide, implementation of “Health Standard for Industrial Enterprise Design” (TJ36-79) for maximum allowable concentration of harmful substances in the atmosphere of residential area. The standard values are listed in Table 2.2-2.

**Table 2.2-2 Health Standard for Industrial Enterprise Design Unit: mg/m<sup>3</sup>**

Pollutant Name	Value Time	Maximum Allowable Concentration
Ammonia	Daily average	0.07*
	One time	0.20
Hydrogen sulfide	Daily average	0.003*
	One time	0.01

Note: The daily average concentration is calculated as 1/3 of 1-hour mean concentration.

## 2. Water Environment

### (1) Surface water environment

According to “Letter for Confirmation on Implementation Standards of Environmental Impact Assessment about World Bank Loan Project on Wuxi Taihu Lake Ecological Environment Comprehensive Control”, appropriate category in “Surface Water Environmental Quality Standard” (GB3838-2002) shall be processed for lake area and river way: Taihu Lake body Class II, Meiliang Lake Class III, Wuli Lake Class IV, Gong Lake Class III, Wangyu River Class III, Bodu Harbor Class IV, Changguangxi Class III; those involving the implementation of aquaculture water “Fishery Water Quality Standard” (GB11607- 89) shall be process for cultural water body: Xibei Canal Class IV, Baiqu Harbor Class III. Standard values are shown in Table 2.2-3.

**Table 2.2-3 Surface Water Quality Standard Unit: mg/L, pH excluded**

Water Quality Objectives	Class II standard	Class III standard	Class IV Standard

pH value	6□9		
DO	6	5	3
Permanganate index	4	6	10
Chemical oxygen demand	15	20	30
Five day BOD	3	4	6
Ammonia	0.5	1.0	1.5
TN	0.5	1.0	1.5
TP	0.1	0.2	0.3
Copper	1.0	1.0	1.0
Chromium (VI)	0.05	0.05	0.05
Phenol	0.002	0.005	0.01
Oil	0.05	0.05	0.5
Lead	0.01	0.05	0.05
Class of coliform bacteria (a / L)	2000	10000	20000

## (2) Groundwater environment

Class III water quality standard in “Groundwater Quality Standard”

(GB/T14848-93) shall be processed. Standard limits are listed in Table 2.2-4.

**Table 2.2-4 Groundwater Quality Standard Unit□mg/L, pH excluded**

Water Quality Objectives	Class III standard
pH	6.5□8.5
Chemical oxygen demand	-
Five day BOD	-
Nitrate	□20
TN	-
TP	-
Ammonia	□0.2
Copper	□1.0
Zinc	□1.0
Chromium (VI)	□0.05
Total coliforms (a / L)	□3.0

## 3. Acoustic environment

The assessment area of rehabilitation work of Changguangxi ecological wetlands is mainly rural residential area, which shall process class 1 standard in “Acoustic Environment Quality Standard” (GB3096-2008). As for 45 meters area on both sides of traffic trunk, class 4a standard shall be processed.

The assessment area of Hongshan Village pollution control demonstration zone is mainly rural residential area, which shall process class 1 standard in “Acoustic Environment Quality Standard” (GB3096-2008).

The assessment area of Taihu lake ecological dredging project is mainly rural residential area, which shall process class 1 standard in “Acoustic Environment Quality Standard” (GB3096-2008).

The assessment area of Wuxi Huishan sewage disposal plants stage IV and reclaimed water reuse stage I shall process class 2 standard in “Acoustic Environment Quality Standard” (GB3096-2008). The standard values are listed in Table 2.2-5.

**Table 2.2-5 Acoustic Environment Quality Standard**

Class	Equivalent sound level [dB (A)]	
	Daytime	Night
Class 1	55	45
Class 2	60	50
Class 3	65	55
Class 4a	70	55

#### **4. Terrestrial soils and rivers, lake sediment**

“Control standards for Pollutants in Agricultural Sludges” (GB4284-84) shall be processed. Specific standard values are listed in Table 2.2-6.

**Table 2.2-6 Control standards for pollutants in agricultural sludges mg/kg dry sludge**

Items	Maximum allowed content	
	Acid soil (pH <6.5)	Neutral and alkaline soils (pH ≥ 6.5)
Cadmium and its compounds (Cd)	5	20
Mercury and its compounds (Hg total)	5	15
Lead and its compounds (Pb)	300	1000
Chromium and its compounds (Cr total) *	600	1000
Arsenic and its compounds (As)	75	75
Boron and its compounds (in total soluble B) □	150	150
Mineral oil	3000	3000
Benzo (a) pyrene	3	3
Copper and its compounds (Cu dollars) **	250	500
Zinc and its compounds	500	1000

(Zn dollars) **		
Nickel and its compounds (Ni dollars) **	100	200

\* Control standard of chromium is suitable for agricultural sludges with very little contents of hexavalent chromium, and is not applied for industrial wastes or some chemical sediments with a large number of hexavalent chromium.

\*\* Temporarily reference.

## 2.2.2 Pollutant Emission Standards

### 1. Atmospheric pollutants

Class 2 standard in “Integrated emission standard of atmospheric pollutants” (GB16297-1996) shall be processed for conventional air pollutants. New revised Class 2 standard in Table 1 “standard of odor pollutants at boundary value” of “emission standards for odor pollutants” (GB14554-93) shall be processed for emissions of H<sub>2</sub>S, NH<sub>3</sub> and other malodorous gas. The corresponding emission standard values are listed in Table 2.2 -7.

**Table 2.2-7 Integrated emission standard of atmospheric pollutants Unit: mg/m<sup>3</sup>**

Pollutants	Maximum allowable emission concentration
Particles	150
Ammonia	1.5
Hydrogen sulfide	0.06

“Cooking Fume Emission Standards” (GB18483-2001) shall be processed for cooking fume, with the maximum allowable emission concentration of 2.0mg/m<sup>3</sup>.

### 2. Waste water pollutants

Class 1 standard in “Integrated Wastewater Discharge Standard” (GB8978-1996) shall be processed for various types of sewage, and Class 4 standard for access to the sewage disposal plant. Standard limits are listed in Table 2.2-8.

**Table 2.2-8 Integrated Wastewater Discharge Standard Unit: mg/L**

Pollutants	Standard limits	
	Class 1	Class 3
pH	6~9	
Color (dilution factor)	50	-
SS	70	400
Five day BOD	30	300
Chemical oxygen demand	100	500
Oil	10	30
Phenol	0.5	2.0
Ammonia	15	-

Class 1 A standard in “Pollutant Emission Standards of Municipal Wastewater Disposal Plant” (GB18918-2002) shall be processed for sewage disposal plant. Standard limits are listed in Table 2.2-9.

**Table 2.2-9 Pollutant Emission Standards of Municipal Wastewater Disposal Plant**

**Unit: mg/L**

Basic control items	Class 1 A standard
Chemical oxygen demand	50
Biochemical oxygen demand	10
SS	10
Animal and vegetable oils	1
Oil	1
Anionic surfactant	0.5
TN	15
Ammonia	5□8□
TP	0.5
Chroma	30
pH	6-9
Fecal coliform (a / L)	10 <sup>3</sup>

\* Value outside the parentheses means the control standard with water temperature > 12 °C; value outside the parentheses means the control standard with water temperature □ 12 °C.

### 3. Noise

There is no noise emission basically during project operation period. The impact on area acoustic environment is focused on construction period. “Noise limits for construction site” (GB12523-90) shall be processed during construction period. The standard values are listed in Table 2.2-10.

**Table 2.2-10 Noise limits for construction site Unit: dB(A)**

Construction Phase	Main noise source	Noise limits	
		Daytime	Night
Earthwork	Bulldozers, excavators, loaders, etc.	75	55
Piling	A variety of hammers	85	Prohibit construction
Structure	Concrete mixer, vibration bar, electric saws, etc.	70	55
Decoration	Crane, lift, etc.	65	55

### 4. Solid waste

Dredging sediment for agricultural rehabilitation and afforestation shall meet with the requirements of “Standards for pollutants in agricultural sludges” (GB4284-84), and landfill disposal shall meet with the requirements of “Storage and disposal site pollution control standards for general industrial solid waste”(GB18599-2001).

### **3 Environmental Management Plan**

Although the project is an environmentally public welfare project, there are dust and noise and other environmental problems in the construction period as well as pollutant emissions in the operation period, which are the potential impact on the local environment. In addition to the “three simultaneous” administration of national and local environmental protection authorities on the implementation of this project, it is necessary to strengthen the environmental management of this project and work out the specific environment management plan in order to ensure the implementation of this environment protection measure of this Project.

Environmental management of the project refers to that the construction unit, design unit and construction unit must observe the related environmental protection regulations, policies and standards of State, Jiangsu and Wuxi with regard to the project's feasibility study, preliminary design, construction period and operation period, fulfill the mitigation measure proposed in the environment impact assessment report and ensure the normal operation of environmental protection facilities. Environmental management plan shall contain the institutional construction capacity, implementation duties of various control measures, implementation progress, monitoring content and reporting procedures, as well as capital investment and sources. They shall be subject to the supervision and guide of environmental protection authorities of Wuxi City and Jiangsu Province during the construction period and operation period of the project and they shall assist the environment protection authorities to complete the “three simultaneous” review of the project construction.

#### **3.1 Environmental Management Objectives**

It is to carry out the environment protection laws and regulations and correctly deal with the relationship between the production and environment protection, minimize the environment impact of the project and meet the standard of pollutant emission, control the environment quality of construction areas, ensure the realization of the unification of social, economic and environmental benefits of the project through the powerful environment management of project's feasibility study, design, construction and operation.

### **3.2 Environmental Management Agencies and Their Responsibilities**

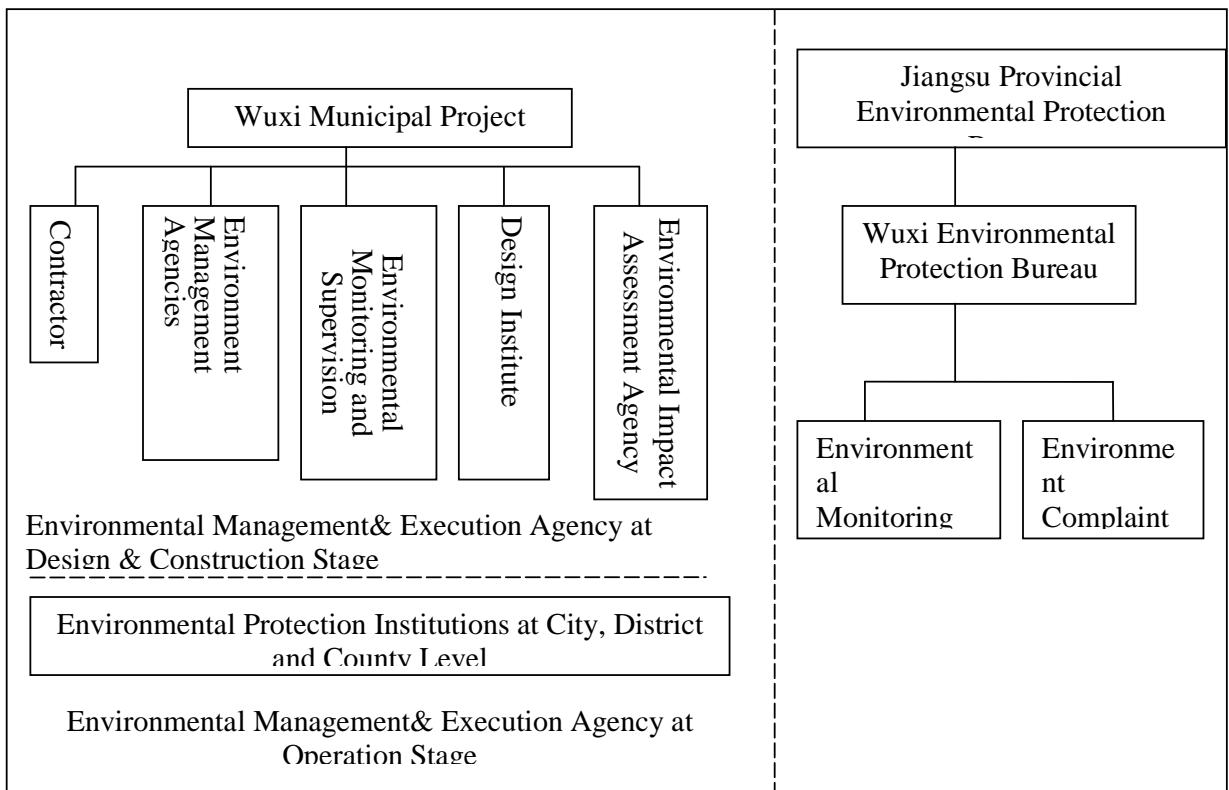
#### **3.2.1 Environmental Management Agencies**

According to the administrative authorities set forth in “*Environmental Protection Law of The People’s Republic of China*” and “*Regulations on Environmental Protection Management for Construction Projects*”, the environmental impact assessment report of this project shall be approved by the Jiangsu Provincial Environmental Protection Agency, which is the environment management authorities of this Project and whose duty is to put forward the environmental protection requirement as per the report of environment impact assessment and organize the “three simultaneous” acceptance work of the environment protection facilities. Under the overall administrative framework of this project, Wuxi Taihu Comprehensive Control Project Management Office for World’s Bank Loan (hereinafter called “the PMO”) controls the implementation of the Project, and under the leadership of the PMO, project owners carry out their own subprojects respectively. In order to ensure the project's smooth implementation of environmental management actions, a large number of full-time or part-time environmental managers are designated among the PMO, project owner, contractors and operators to specifically carry out the environmental management plans.

The PMO is responsible for organizing the implementation of project planning and design and carrying out the supervision and management of the project's environment protection procedures and organizing the skill training of environmental managers of the sub-projects; Responsibilities of the PMO and Wuxi Environmental Protection Agency also include the execution of the project implementation programs and various technical standards of the project, and the routine supervision of the project's environment management; Wuxi Environmental Monitoring Center is responsible for monitoring the environment quality of the project area during the construction and operation periods upon the authorization of the project owner. The environment supervisor entrusted by the project owner is responsible for the environment supervision during the construction period. Project owner proposes to set up the special environment managers to take charge of the environment management of the project at various stages, fulfill the implementation of environment protection laws and regulations and plans, check the execution condition of environment

protection measures, generalize and apply the advanced environment protection technology and experience, and organize the environment protection skill training for relevant subproject personnel to enhance their quality.

Because there is a bigger difference of environment management contents during the construction period and operation period of the project and there is a time distinction of temporary and long-term work, the operators and contractors shall set up the organizations according to the different stages and carry out the responsibility system as per the stages. After the end of the construction period, the corresponding management agencies shall be annulled and they shall begin to work during the operation period. A certain time cross is allowed according to the specific condition. The organization chart is shown in Fig. 3.2-1.



**Fig. 3.2-1 Organization Chart**

### 3.2.2 Environment Management Organizations

According to the specific content and scale of the project, it is suggested to distribute the working staff of environment management agencies as shown in Fig. 3.3-2.

**Administration Office of Comprehensive Control of Wuxi Taihu  
Lake Region's Ecological Environment World Bank Loan  
Project**

- ⌚ 1 Environment Expert
- ⌚ 1 Environment Superintending Engineer
- ⌚ 1 Environment Manager

<b>Rehabilitation Project of Changguangxi Ecological Wetland Contractor:</b>	<b>Phase IV of Huishan Sewage Treatment Plant and Phase I of Recycling of Reclaimed Water</b> Contractor: <ul style="list-style-type: none"> <li>⌚ 1 Environmental Management Coordinate</li> <li>⌚ 1 Environment Supervision Engineer</li> <li>⌚ 1 Environmental Managerial Personnel Operator□</li> <li>⌚ 1 Environmental Managerial</li> </ul>	<b>Ecological Desilting Project of Key Areas of Taihu Lake</b> Contractor: <ul style="list-style-type: none"> <li>⌚ 1 Environmental Management Coordinate</li> <li>⌚ 1 Environment Supervision Engineer</li> <li>⌚ 1 Environmental Managerial Personnel Operator□</li> <li>⌚ 1 Environmental Managerial Personnel</li> <li>⌚ 1 Emergency</li> </ul>	<b>Pollution Control Demonstration Area Hongshan Village</b> Contractor: <ul style="list-style-type: none"> <li>⌚ 1 Environmental Management Coordinate</li> <li>⌚ 1 Environment Supervision Engineer</li> <li>⌚ 1 Environmental Managerial Personnel Operator□</li> <li>⌚ 1 Environmental Managerial</li> </ul>
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**Fig. 3.2-2 Staffing of Environmental Management Agency**

Construction and operation of personnel positions and duties:

### **1. Construction Period**

#### **(1) Technical Environmental Expert**

Technical environment expert is the technical support of the PMO. In the first six months of the project, he will track the whole process, and the will offer the regular services (two weeks per quarter) in 4 years after the project is carried out. Technical environmental expert is to ensure that all necessary requirements at the beginning of the project will be met and ensure that the environmental management system is fully and effectively implemented under the requirement of environmental laws and regulations and security protection regulations of the World's Bank. Specific responsibilities are as follows:

- offer the necessary training to the PMO environmental managers and environmental supervision engineers and the contractors and operators;
- Provide the expert consulting to the PMO, project owner, contractors and operators;
- Help the environmental management personnel to organize monitoring activities.

#### **(2) The PMO(The project management Office):**

##### **1) Environmental managers and environmental supervision engineers**

The PMO shall have an environmental manager and an environmental supervision engineer to take charge of reports to the World's Bank so as to monitor project environmental experts and local project supervision; Environmental Manager will assist the land management agency and relocation agency not to hinder the implementation of the project by the aforesaid agencies, and specific responsibilities are as follows:

- Environmental Supervision engineer: monitor the operation of the sub-project environmental protection measures;
- Environmental Manager: work out the monitoring plan under the help of the assistant;

Make the communications with the subproject environmental management personnel and construction workers as follows:

- Provide regular monthly monitoring reports to the PMO and the World's Bank;
  - Provide the special discrepancy report in case of the second case and the third case;
  - Conduct the oral communication with construction staff and operation staff to realize the solution in case of a discovery of the solution;
  - Jointly put forward the corrective measures with the environment supervision engineer and environment management personnel of various subprojects in case of any discrepancy.
- Joint meetings to be participated in by environmental supervision engineers, environmental management and construction unit and operation unit;
- Coordination of the communications and reports of environmental management experts with the World's Bank.

#### **(2) Project Owner:**

##### **1) Environmental Management Coordinator (EMC)**

Project owner shall have an EMC to take charge of environmental monitoring and reporting the environment protection execution condition of construction unit and operation unit to the PMO and government agencies. EMC's detailed responsibilities are as follows:

- To work out the environment protection detailed rules of construction unit and operation unit, monitoring detailed rules and environment protection procedures of construction unit and operation unit at the initial stage of the project, prepare the outline of project management designers;
- Commission the projects to be monitored by special equipment;
- Provide the monthly monitoring of the project, the implementation condition of the feasibility study and the remedy measures to the PMO, convene the monthly meetings with the PMO to report the project monitoring condition and discuss the compliance of the project;
- Select the experts and consultants from universities and institutions to carry out the consulting of training methodology and technology according to the needs;
- Organize the special studies and public investigations requiring special construction requirements or changes according to the actual condition of the project;
- Report the solution measure and emergency disposal measure of compliance with the feasibility study reports to the PMO environmental manager and environmental supervision engineer;
- Disclose the information to the public via meetings and local media.

## 2) Environmental Supervision Engineer

He is responsible for the building activities of the Supervisor, and other related activities, such as: land occupation, relocation, to ensure that these activities comply with environmental requirements, environmental investment, environmental objectives; he is responsible for coordinating the relationship between land management department, relocation department, and environmental monitoring &control department, and the main responsibilities of environmental supervision engineer are as follows:

- Ensure that all project permits and requirements and environmental management plans are implemented before the commencement of the project;
- Verify that all employees of construction unit and operation unit implement the environmental protection measures in accordance with the contract;
- prepare the monthly reports according to the monthly salary of construction unit and operation unit upon their effort and contributions to the environment protection activities of the project;
- Assembly files of environmental monitoring;
- Identify the condition requiring the special studies and special activities and meanwhile communicate with the EMC, regularly and effectively carry out the special measures;
- Communicate with construction staff for purpose of helping explain the on-site environmental requirements; provide the suggestions for remedial measures and provide the remedial measure to solve the original intention of the discrepancy project; issue the special official guidebooks to the construction and operation units as per the requirements;
- Communicate with construction unit and operation unit and construction consultant for purpose of strengthening the communication; obtain some other views on specific issues for purpose of feeding back the problems encountered during the implementation to construction management engineer to facilitate the solution of the problems; if the project results in the potential damage to sensitive objectives or the project has involved in serious discrepancy, the suspension shall be applied;
- Communicate with construction supervision engineer and construction workers; prepare the routine monitoring weekly; prepare the discrepancy record; In case of any discrepancy with the project design, and if necessary, propose the remedial measures to the project designer.

## 2. Operation Period

Various subproject operators shall establish the special environmental management agencies to take charge of the implementation of environmental management plans during the operation period. Detailed responsibilities of environmental management agency are as follows:

- (1) Manage the implementation of the project environmental protection measures;
- (2) Coordinate the environment issues with the environmental supervision and management departments and surrounding residents;
- (3) Commission the qualified stations to carry out the routine monitors to the three wastes discharged or emitted by the project facilities and area environment quality;
- (4) Take charge of environmental risk emergency disposal in case of any environmental accident;
- (5) Take charge of reporting timely the information of environmental management of enterprises to Wuxi Environmental Protection Agency and the PMO;
- (6) Record and sort out the corporate environmental management files.

### **3.2.2 Environmental Supervision Agencies**

Environmental supervision agencies of this project mainly include Jiangsu Provincial Department of Environment Protection and Wuxi Municipal Environment Protection Agency. The environment supervision agencies shall carry out their duties by stages:

(1) Feasibility Study Stage: it is in the charge of Jiangsu Department of Environmental Protection and Wuxi Environment Protection Agency.

Jiangsu Department of Environmental Protection is responsible for the environmental management of the project and the examination and approval of the environmental impact report, and for guiding Wuxi Environmental Protection Agency (EPA) to execute various laws and regulations and organizing the final acceptance of environment protection facilities.

Wuxi EPA is responsible for the supervision and management of the implementation of the project environmental protection, the organization and coordination of relevant institutions to serve the project environmental protection, the supervision of the implementation of environmental action plans; for the final acceptance of project environmental protection facilities and for guiding the district and county EPAs where the sub-projects are located to monitor the environment protection of the project during the construction period and operation period;

(2) Design Stage: The monitoring or supervision of the project is in the charge of environmental protection department of the PMO.

(3) Construction Stage: it is in the charge of Wuxi Environmental Protection Agency. District or county EPAs where the subprojects are located shall accept the work guide of Wuxi Environmental Protection Agency to supervise the construction unit to implement the environmental action plans, carry out environmental management laws, and standards; coordinate the environment protection work among various department; they are responsible for the construction and final acceptance and operation inspection, supervision and management of environment protection facilities.

(4) Operation Stage: it is in the charge of Wuxi Environmental Protection Agency, district and county EPAs where the subprojects are located and engineering competent departments where the subprojects are located. The engineering competent departments are responsible for fulfilling the environmental protection laws, regulations and standards, working out the environment protection regulations and rules and

supervising their implementation, understanding the project environment situation, working out environment quality control goals, proposing the governance measures and reporting them to senior environmental protection sectors and industry authorities, organizing environmental staff to participate in the skill training and assessment, and carrying out environmental protection technical and scientific research.

(5) Environment monitoring during the construction and operation period shall be executed by Wuxi Environmental Monitoring Station. After the completion of each subproject, the environmental management agencies will be set up, respectively, and a full-time staff is designated to take charge of the environmental protection work of the Project.

**Table 3.2-1 Environmental Protection & Supervision Plan of the Project**

Stage	Agency	Supervision Content	Monitoring Purposes
Feasibility study stage	Jiangsu Department of Environment Protection, Wuxi Environment Protection Agency	1. Verify environmental impact statement(EIS) 2. Verify EAP	1. Ensure that the EIA is comprehensive and feature is properly focused  2. Ensure that any significant or potential problem of the project has been reflected  3. Ensure that environmental impact mitigation measures are of the feasible implementation plan
Design and construction phase	Jiangsu Department of Environmental Protection, Wuxi Environmental Protection Agency	1. Set the preliminary design and environmental protection and EAP 2. Check the restoration of temporary construction area, vegetation reduction and environmental rehabilitation; 3. Check dust and noise pollution control measures, decide the construction time; 4. Check the emission of air pollutants; 5. Check discharge and treatment of sewage &waste lubricating oil on the construction sites; 6. Restoration and	1. Strict implementation of the “three simultaneous” 2. Ensure that these establishments meet the requirement of environment protection; 3. Reduce the impact of construction on the surrounding environment, carry out relevant environmental regulations and standards; 4. Ensure the landscape and land resources are not seriously damaged so as to avoid the soil erosion; 5. Ensure proper disposal of sludge

		disposal of waste banks; 7. Check the disposal of sludge	
Operation stage	Wuxi Environmental Protection Agency, District& County Environmental Protection Agency, Wuxi Fire Police Department	<p>1. check the implementation of EAP during operation;</p> <p>2. check the implementation of monitoring plan;</p> <p>3. check the sensitive points necessary to take further environmental protection measures (which may appear environmental problems not estimated)</p> <p>4. Check the environmental quality of environmentally sensitive points is to meet their own quality standards</p> <p>5. Strengthen the supervision to prevent incidents, pre-establish the emergency plan so as to eliminate any danger in time in case of accident risk</p>	<p>1. Implementation of EAP;</p> <p>2. Implementation of the monitoring plan</p> <p>3. Effective protection of the environment</p> <p>4. Strengthen environmental management, and effective protection of human health</p> <p>5. Ensure that pollutant emission meets the emission standards</p>

### 3.2.3 Environmental Implementation Agencies

The specific implementation agencies of environmental management plan of the project are contractors and the Owner. The Owner is mainly responsible for:

- Accepting the environment protection supervision of World's Bank and various environmental protection departments at all levels;
- Carrying out the environmental laws and regulations and environmental protection measures of the EIA report as well as the environmental protection plan;
- Ensuring the normal operation of environmental protection facilities, the self inspection of the environmental departments and establishment of environmental protection records and the report to the environmental management department;

- Signing the contract with the environmental monitoring department to fulfill the environmental management schemes;
- Providing the funds for the inspection or sampling of environmental protection.

During the construction stage, the environmental protection is contractor's responsibility. Article 19.1 of Regulations on Civil Engineering Evaluation Contract of the International Federation of Consulting Engineers (FIDIC) provides for that "during the construction, completion and repair of other defects, the contractor shall take all reasonable steps to protect the site and its surrounding environment in order to avoid the personal or financial injury or prejudice by the pollution and noise caused by the construction, or other consequences caused to the public." Specific environmental protection operation specifications of the contractor during construction" is shown in Table 3.2-2.

**Table 3.2-2 Specific Environmental Protection Operation Specifications of the Contractor during the Construction**

Item	Operation Specifications to be performed
Construction Management	During the construction, the contractor shall communicate or negotiate with the local masses of the project, set up bulletin board in each construction unit to inform the public of specific construction activities and construction time, and meanwhile provide a contact name and phone number so that the public can make complaints and propose the suggestions to the construction activities.
Water pollution control	<ol style="list-style-type: none"> <li>1. The contractors and other operation units must put the environment protection and efficient use of water resources into the work plan and fulfill the sewage treatment measures;</li> <li>2. The Contractor shall carry out the appropriate sewage discharge standards in accordance with waters function defined by local environmental protection department and shall not impede the use of existing function features of the waters;</li> <li>3. Wastewater discharge in the region shall comply with the class-I standard of "<i>Integrated Wastewater Discharge Standard</i>" (GB8978-1996), and the access to the sewage treatment plant shall comply with the class-III standard; the sewage treatment plant shall comply with class-A standard of the "<i>Discharge Standard of Main Water Pollutants for Municipal Wastewater</i>" (GB18918-2002);</li> <li>4. The contractors and other operation units shall monitor the wastewater discharged by their units as per the assessment requirement and establish the corresponding archives;</li> <li>5. Excessive discharge of sewage or wastewater that cause the substantial impact to the water function of the receiving water body , the wastewater discharge unit must take the necessary corrective measures;</li> <li>6. Before the construction team is stationed, the contractors shall</li> </ol>

	<p>comprehensively test the drinking water sources of the construction site, mainly including</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> water sampling: The clean glass or plastic bottle with a volume of 600ml or more is used to sample the water in the construction region after it is washed by the water of this region for three times, and the bottle is sealed immediately and labeled outside, affixed with the name of the construction site;</li> <li><input type="checkbox"/> Registration: water samples collected shall be sent to water quality monitoring room as soon as possible, and they shall be registered by the registration staff, to record the testing time;</li> <li><input type="checkbox"/> testing: it is necessary to test the temperature of the water, pH, phosphorus, potassium permanganate index , dissolved oxygen, fluoride, volatile phenol, petroleum, fecal coliform, ammonia and other indicators, and the water quality monitoring reports shall be issued within five work days;</li> <li><input type="checkbox"/> re-examination for excessive standard: if it fails upon the water quality testing, the testing agency will issue the “notice of disposal opinion for water quality excessive-standard” and the inspected unit shall take effective measures, and re-send the re-treated water samples to the laboratory.</li> </ul>
Air pollution control	<ol style="list-style-type: none"> <li>1. ambient environment quality of the construction sites and other non-construction areas shall comply with the class-II standard of national “<i>Ambient Air Quality Standard</i>” (GB3095-1996) and its revision sheet;</li> <li>2. Mixing processes of the aggregate must take the dust removal measures to reach the appropriate environmental and labor protection requirements so as to prevent environmental pollution or endanger the health of workers;</li> <li>3. it is prohibited to burn any substance that may produce the toxic or malodorous gases in the construction areas, and if necessary, the preventive measure must be taken and the substance shall be burn under the supervision of Supervision Engineer;</li> <li>4. The contractors and other operation units shall monitor the ambient environment quality of construction sites in accordance with the EIA requirements, and establish the appropriate files.</li> </ol>
Noise Pollution control	<ol style="list-style-type: none"> <li>1. For any construction area that may produce strong construction noise and vibration nuisance, the contractor must take noise/vibration reduction measures or use the low noise and low vibration equipment and processes, and the mufflers may be installed on the fixed noise source system. The operators for mobile noise sources shall be equipped with earplugs and other devices;</li> <li>2. Contractors shall reasonably arrange the operation time to reduce or avoid noise nuisance, and properly solve environmental disputes arising from the noise nuisance and bear any responsibility;</li> <li>3. The contractors and other operation units shall monitor the noise within the responsible region as per the EIA requirements; if necessary, environmental supervision engineer may require the contractor to monitor the noise at other time or site;</li> <li>4. Noise pollution control shall comply with the “<i>Noise Limits for Construction Site</i>” (GB12523-90) during the construction.</li> </ol>
Waste and solid waste disposal	<ol style="list-style-type: none"> <li>1. Construction waste residue and solid waste must be sent to the designated location as per the requirement of the Contract based on the “<i>Law of the People’s Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste</i>”, not free piling up. Any place for the storage of solid wastes and waste residues must be protected as per the design requirement to prevent the loss of slope instability and residue erosion;</li> <li>2. The contractors and other operation units shall set up a temporary waste</li> </ol>

	<p>storage facilities to prevent the erosion loss, and regularly send them to the designated rubbish dump or burial point;</p> <p>3. It is prohibited to at random dump the dredged sediment or directly bury it into the ground, and the dredged sediment must be disposed under the guidance of supervision engineer;</p> <p>4. The dredged sediment for agricultural rehabilitation or afforestation shall meet the requirement of “<i>Control Standards for Pollutants in Sludges from Agricultural Use</i>” (GB4284-84), landfill disposal shall meet the requirements of “<i>Standard for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes</i>” (GB18599-2001) .</p>
Population health	<p>1. The contractors and other business units should implement at least one physical examination on their employees every year, and establish personal hygiene files. Food practitioners should obtain qualification certificates according to Food Sanitation Law, then they can take their position; the contractors and other business units should watch on infectious diseases closely. If any disease is found, it must be immediately reported to the local health and epidemic prevention departments.</p> <p>2. Owners, contractors and subcontractors and other business units should make good management of drinking water to prevent waterborne diseases. Drinking water should be implemented according to “<i>Drinking Water Health Supervision and Management Measures</i>” and “<i>Drinking Water Health Standards</i>” (GB5749- 2006); the drinking water quality supervision should be carried out according to the EIA requirements. If there is any problem, it should be timely treated under the guidance of environment supervision engineer and reported to the Office of Environmental Management.</p>
Ecological Protection	<p>1. Units in the construction and operation activities must pay attention to protect animal and plant resources, to create a new conductive eco-environment with virtuous cycle on the premise of minimizing damage of existing environment.</p> <p>2. The contractors and other business units should strengthen publicity and education on the protection of wild flora and fauna, improve environmental awareness of the protection of wild flora and fauna. If any rare plants and animals and their habitats are found or suspected, protective measures should be taken immediately and the situation should be reported to environmental supervision engineers for disposal.</p>
Land use, soil conservation and afforestation	<p>1. Units should save the land use according to design and contract documents. Surface soil of working layer shall be kept well for the temporary soil rehabilitation as the covering earth.</p> <p>2. The contractors and other business units must guarantee to take measures to prevent from soil erosion and damages on vegetation and other environmental resources according to contract requirements during construction period.</p> <p>3. Temporary measures should be taken during construction period according to soil conservation requirements, and plant measures should be taken timely when construction completion to prevent from soil erosion.</p> <p>4. The contractors shall not block the riverway in construction area by waste slag to deteriorate soil erosion.</p>

### **3.3.4 Environmental Complaints Center**

The center responsibility of the environment complaint center or agency is to deal with the environmental complaints arising during the construction and the operation after the completion of the project, and its working procedures include: □ Accepting: the complaints center will receive or accept the complaints via complaint telephones, complaint letter, complaint reception, visits, etc.; □ Classification: pieces of complaints shall be registered and recorded by persons designated specially and classified as per the time requirement, handling department, and problem nature, etc.; □ Investigation: the general complaint cases are transferred from the center to the related departments or units for investigation and verification; the Center will be responsible for the direct investigation of the more important pieces of complaints. The investigation work must be attended by at least two staff members, the investigation results shall be reported in writing. A written report consists of four parts: fact process, cause analysis, consequences and treatment suggestion; □ treatment: general complaints are transferred from the Center to the relevant departments and units for disposal or treatment; the treatment opinion of the Center is delivered to the related departments, units or individuals in the form of "Letter of Advice for Treatment". Major complaints and major treatment suggestions of the departments, units or individuals must be disposed or handled according to the administrative Subordination and management authorization of the units and cadre staff members upon the consent of the responsible units.

## **3.3 Environmental Management Plan**

The project exerts an environmental impact during the construction and operation. In view of the characteristics of environmental impacts during the construction and operation, the corresponding measures of environment protection are taken to minimize various impacts. In order to ensure that environmental measures can be effective, the environmental measures monitoring procedures are worked out and the Owner needs to sign the contract with the qualified environmental monitoring unit.

PMO will track and report the monitoring condition of environmental measures on the basis of performing its management function. This chapter introduces the general environmental measures and duties of the relevant units. The PMO is responsible for the implementation condition of the environmental monitoring measures. The institutions for the implementation of environmental measures are as follows:

- a. Municipal Finance Bureau
- b. The Owner
- c. Municipal Environmental Protection Agency
- d. Management / Environmental Engineer
- e. Contractor

### **1. Feasibility Study Stage**

The main environmental protection work at the feasibility study stage is the EIA of the construction project; in order to implement the environmental protection measures proposed in the environmental impact report and prevent and mitigate the potential adverse environmental impact, the environment management plan is worked out upon the joint discussion of the environmental assessment units and design units and construction units.

### **2. Design Stage**

- A. The design unit is responsible for working out the disposal option of sediment, surplus water and soil produced during construction and take effective pollution control measures so as to minimize the environmental impact of stockpiling and disposal of sediment, surplus water and soil disposal;
- B. Earthwork and stonework shall be well balanced; it is necessary to reasonably consider the choice of building materials, the location of borrow pits and waste banks, pay attention to the soil and water conservation of material yard and its impact on the environment; in particular, careful survey shall be made to the stone quarry and it is necessary to purchase the stone materials from the approved quarry to avoid the random stone mining;
- C. The design unit shall choose the appropriate aquatic plants for a wetland;
- D. The river course adjustment shall be designed as per the surrounding environment and it shall try the best to minimize the demolition and occupation of cultivated land.
- E. The landscape and green layout shall be well designed.
- F. The spillway design shall be fully guaranteed.
- G. The necessary anti-noise, odor, waste water and sediment pollution facilities shall be designed according to the EIA results of the project.

### **3. Construction Period**

Environment management plans of various subprojects and their implementation units during the construction period are shown in Table 3.3-1.

#### 4. Operation Period

Environment management plans of various subprojects and their implementation units during the operation period are shown in Table 3.3-2.

**Table3.3-1 The environmental protection measures during the construction**

SN	Environment factors	The environmental protection measures
1	Water environment	<p>(1)The pollution control measures of the waste water discharge in the disposal area</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The optimization of the hydraulic filling program The hydraulic filling adapts use the principles of in reverse chronological. At the initial using period of the disposal area, there is a large number of precipitations and deeper volume of surplus water depth which may play a role in retention, to promote the purpose of settlement. At the later using period of disposal area, when the hydraulic filling is done, the discharge outlet should be far away from the recession nozzle, thus can extend the flow of the remained water, increase the settling time, and decrease the pollution of the remained water.</li> <li><input type="checkbox"/> To increase the transverse septum and raise the flow of spillway at the discharge outlet In order to reduce the ss density of the remained water in the disposal area, we can increase the transverse septum in the middle of the disposal area so as to the precipitation of water and accelerate of the mud sedimentation in the water; in order to extend the staying time of the water with mud in the disposal area, in necessity, under the premise of meeting the design requirements, we can heighten the elevation of discharge outlet spillway.</li> <li><input type="checkbox"/> The contingency dosage measures should be considered (coagulation) to treat the remained water. When the settling velocity of the dredging mud is too low to meet the requirements of recession, we need to put the coagulant dosage at the recession outlet or the inlet of the later precipitation pond, increase the particle settling velocity, to ensure that the mud water in the disposal area can be discharged up to standard. The proposed coagulant pharmaceutical is PAC, the usage of the drug is less, the role is fast, if it is supplied in liquid, the operation and adding are simple and can remove SS, TN, TP in the remained water. The main components of the products is aluminum salt, but the production tests showed that the use of this agent does not cause aluminum pollution, and can remove the aluminum and other heavy metals in the mud, it is used for the water treatment and the price is low.</li> <li><input type="checkbox"/> To strengthen the quality monitoring and management of the sedimentation tank outlet, make monitoring systems and do good records; Conduct dredging regularly to the later settling ponds to ensure the settling has adequate and effective sedimentation volume and ensure the sedimentation effect of the remained water.</li> <li><input type="checkbox"/> In the respects of preventing pollution discharge of the construction ships, to require the ships be installed the oil-water</li> </ul>

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	<p>separator to treat the oil wastewater in the bilge, and the wastewater with oil is prohibited to discharge.</p> <p>□ In order to avoid the occurs of the soil pipe leak in the delivery to the disposal area after dredging ,we should do a strict control in the respects of pipe selection, pipe laying flat and so on; the soil pipe flange should be watertight ,flanged joints, mud tube leakage is prohibited; in the transmission process of the pipe, the daily maintenance and inspections should be strengthened ,we should timely handle the potential leak, try to avoid the effects caused by pipeline breaks or leaks on the water quality of Tai Lake.</p> <p>□ In the hydraulic filling process on the stock dump, the special personnel should conduct inspection tours, and discovers and handle timely the possible collapse and leakage of the dam, and avoid due to the sludge spill into the water or farmland to cause secondary pollution.</p> <p>□ Around the stock dump, there should be set obvious warning signs to prevent the artificial destruction of the dam or cause danger due to the passers going into the stock dump.</p> <p>(2)For river treatment and wetland construction projects: the construction should be selected in the dry season, and the construction period should be tried to shorten to avoid an impact on river discharge.</p> <p>(3)Sewage</p> <p>The project has a wide construction range, and the staff is decentralized, the sewage is more difficult to be collected, the construction workers should try to use the existing facilities living near the construction, if there is no health facilities nearby, in the construction area where the staff are concentrated, the mobile toilets should be set for unified collection; if the temporary canteen is set on the construction site, which should be equipped with grease traps, at the same time, the closed swill bucket should be set. The sewage on the construction site should be unified pumping regularly by the municipal department, site emissions are prohibited.</p> <p>(4)The cleaning wastewater</p> <p>At the cleaning place of the construction machinery and transport vehicles ,there should be set with sedimentation tanks, the waste water may not be directly discharged into municipal sewage pipeline network, it should be cycle used or used for water spray dust after the secondary sedimentation.</p> <p>(5)Others</p> <p>□ The construction materials should be stayed away from the surface and set at the place where the runoff is not easy to wash, the powdery material yard should be equipped with a straw bag tarpaulin and other shelters, and dug ditch around, in order to prevent runoff erosion.</p> <p>□ The construction materials such as oil, chemicals should not be stacked near the water in the river, they should be far away from the rivers, and equipped with the temporary shelters, to prevent wind or storm erosion and storm into the water;</p> <p>□ To strengthen the environmental management, avoid oil spills of the construction machinery or the dumping of waste oil into the water causing pollution of water, it is recommended to take receiving leakage way to receive construction machinery and other oil spills.</p>
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		<p><input type="checkbox"/> To prevent soil erosion caused by rainwater runoff, the lawn can be planted or the fixed sub-soil filter should be installed.</p>
2	Sound environment	<p>(1) First of all, in the respect of the equipment selection, we should try to select the equipment with low-noise , such as using the hydraulic machinery instead of fuel oil machinery, the vibrators adapts high frequency vibrators and so on. Fixed the machinery and equipment and excavators and transport machinery, such as excavators, bulldozers, etc., we can also through the methods of using vent-pipe muffler and isolation engine vibration parts to reduce noise.</p> <p>Because the loose parts vibration of the machinery and the damage of the muffler, the sound level in operation increase, therefore, we should strengthen the inspection, care and maintenance of the power machinery ,keep it lubricate, fasten all the components and reduce operating vibration noise.</p> <p>The idle equipment should be immediately closed; the transport vehicles into the field should slow down and reduce noise.</p> <p>(2) Develop a scientific plan for construction, as far as possible to avoid using a large number of high-noise devices simultaneously, in addition, the construction time of high noise devices is as far as possible during the day to avoid night (22:00 ~ 6.00) Construction.</p> <p>For the region with environmental sensitive points, where is 100m far from the construction site, there should be no equipments with high noise and high vibration work at noon or at night. If the continuous operation is really necessary at night, it should be reported to local environmental protection department for approve before construction and noticed the residents in order to achieve understanding, and focus on time as far as possible to reduce the construction period.</p> <p>(3) The construction place should be arranged reasonably,the high-noise operation area should be far away from the noise sensitive points,for the individual construction site,which has the serious impact ,the temporary noise envelope should be taken,we can also bulid a temporary house on the side near the sensitive points to replace the sound insulation walls,for the earth works,there should be many devices arranged at the same time,to reduce the effect time.Concentrate relativly the fixed vibration sources to reduce the vibration interference range.</p> <p>The whistle, bell and flute etc. should not be used possibly, and we should use the modern equipment.</p> <p>(4) As in the construction, the transportation has greater impact on the environment, so we should reduce the transportation at night possibly, and limit the speed of the large trucks, when they are driven into the neighborhood, the speed should be limited, the transported vehicles should be maintenance and cared regularly, to reduce or eliminate the whistle and arrange the transportation routes reasonably.</p> <p>(5) The construction unit and the developed unit should negotiate with the surrounding residents, and announce the construction period, and build good community relations along the surrounding units and residents, before the construction, the affected units and residents should be notified, we should report the construction progress at any time, and tell them the measures taken for reducing the noise, to seek a common understanding. In addition, during the construction period, the telephone hotline complaint should be set; we should treat the complaints actively.</p> <p>(6) In the construction, we should pay attention to the protection of the construction workers, for the personnel who work near the high-noise equipment; they should use earplugs, earphones and other noise proofing equipments.</p>

		<p>(1) Cacosmia pollution control measures</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The river treatment construction is carried out in the dry season, segmented construction, the cleared out sediment and garbage should be timely transported to the locations designated by the relevant departments for harmless treatment, they should not be thrown away;</li> <li><input type="checkbox"/> The river treatment adapts artificial dredging ,the dredged sediment by the workers should be put into straw bags, and transported timely out, if it can not be shipped out timely, the straw with sediment should be put into the metal container or concrete ponds to prevent seepage leakage, and reduce dust and odor distribution.</li> <li><input type="checkbox"/> The sediment and rural waste should be transported with the closed tanker, in order to prevent scattered along the way, distributed odor;</li> <li><input type="checkbox"/> The dredging season should not be the summer, it is better the season with less wind, the smell does not easily disseminate;</li> <li><input type="checkbox"/> When the hydraulic filling is constructed in the disposal area, the spoil disposal outlet should be set reasonably; it should be as far as possible from the residential areas, to reduce the effects of the cacosmia on the surrounding residents.</li> <li><input type="checkbox"/> Do well the personal protection of the construction workers, issue the protection articles to them, and pay attention to inspection and ambulance at any time.</li> </ul> <p>(2) The control measures for dust pollution</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> This project involves a lot of demolition works, the main demolition site should be set with fence not less than 1.8m,when the demolition of the houses are done, we should keep watering to reduce dust pollution, the brick rubbish should be cleared and transported within three days after completion of the construction.</li> <li><input type="checkbox"/> The transportation of the earth, dirt and construction waste must use closed transport vehicle. There should be set with vehicle washing facilities at the entrance of the constructions site, when the vehicles go out, they must be cleaned, and the sediment can not be taken out of the site.</li> <li><input type="checkbox"/> The main construction road must be hardened; the construction site should be conducted covering, curing, green, sprinkling and other effective measures. The construction site and road dust must be treated with water spray and cleaning measures to control, each of the sub-project construction sites must be equipped with one sprinkler.</li> <li><input type="checkbox"/> In the process of the sewage treatment plant construction, the concrete and other particles of building materials should be closed store, the lime, sand etc, the mixing of dust and inorganic material should adapt premixing, the machine shed where the blender is set should be closed in the construction site, and equipped with the effective dust-proof and dust-fall device .</li> <li><input type="checkbox"/> The construction fence should be arranged at the construction site of the recycled water pipeline network project, the construction spoil should be filled back timely, the waste that can not be used should be transported out timely.</li> <li><input type="checkbox"/> After construction, the temporary sites should be restored immediately with vegetation and prevent soil erosion.</li> <li><input type="checkbox"/> The garbage should be transported timely to landfills, reduce the storage time on the site. In the process of the garbage clearance and transportation, we should set a good shelter, to prevent leakage and falling along.</li> <li><input type="checkbox"/> When the mud solidification is conducted, the putting in of the solidification agent should be gentle, the wind board should be set on the up wind to reduce the impact of dust on the surrounding environment; In the process of piling of the dredged curing mud, it should be compacted timely, and plant vegetation, restore the ecology, to prevent the dried dust cause secondary</li> </ul>
3	Air environment	

		<p>pollution.</p> <p>(3)Others</p> <p><input type="checkbox"/> We should try to use the low power consumption and low pollution emissions of the construction machinery and vehicles, the vehicles with excessive emissions should be installed with exhaust gas purification equipment ; We should strengthen the management and maintenance of the machinery and vehicle and reduce the air pollution caused by the bad status of the machinery and vehicles .</p> <p><input type="checkbox"/> In the construction process, to use the waste materials as fuel for combustion is strictly prohibited ,in the construction site canteen, the liquefied petroleum gas or the electric cookers should be used, the fuel cookers can not be used.</p>
4	solid waste	<p>(1)Sludge solidified soil</p> <p>The solidified soil formed after the dredging sludge of lakes should be backfilled strictly to the backfilling points and backfilling use agreement should be signed with authorities of backfilling usage. The place should be timely leveled, hardened or greened after the backfilling.</p> <p>(2)Building wastes</p> <p>The building wastes should be reclaimed recycling part such as reinforcing steel bar, plastics, and non-recycling part should be in accordance with the requirements of municipal authorities and planning authorities, the construction unit must arrange procedures of discharge of building wastes accordingly, landfill building waste at designated places with approval and well manage percolate processing facilities to ensure that the discharge complies with standards.</p> <p>(3)Wastes of rearing farms</p> <p>Livestock and poultry excrements and pond sediments should not be thrown away optionally. Pond sediment containing large amounts of organic material can be used as needed to cover soil planted near villages, and livestock and poultry excrements shall be subject to harmless treatment to achieve "Emission standards for livestock and poultry breeding industry "(GB18596-2001) Table 6 livestock and poultry waste residue environmental standards, around the project area as farmland, forest to field with soil.</p> <p>(4)Treatment of soils discarded on the land where the factories have been removed</p> <p>Take different treatment measures subject to the monitoring results of the obligated lands after relocation.</p> <p>①The soils with heavy metals exceeding limits or polluted by oils should be removed according to depth of pollution and the polluted soils should be removed and uniformly delivered to Xiao Ying Wuxi Environmental Technology Co., Ltd. for safe treatment.</p> <p>②Those soils not exceeding limits should be greened within the scope of the project to recover the lands or level lands in bottomlands and some discarded soils of no utility should be land filled according to the requirements for building waste treatment.</p> <p>(5)Domestic waste of construction site</p> <p>①Temporary waste dumping sites shall be established on the construction site, the domestic waste produced by builders should be uniformly concentrated, collected and timely shipped to Wuxi Taohua Mountain waste backfill field for sanitary backfill and not allowed to be dumped into environments without authorities.</p>

		<p>②Mobile toilets arranged in the construction camps should be sterilized regularly and cleaned out regularly by the environment and health department. Solid residue with water content less than 60% after treatment should be delivered to Wuxi Taohua Mountain waste backfill field for sanitary backfill.</p> <p>③Strictly manage construction mechanics and vehicles and strictly prohibit leakage of oils and dumping of waste oils without authorities so as to avoid pollution of soil and water. The waste engine oils and its containers are classified as “waste mineral oils” under category of dangerous waste. If any, they shall not be dumped without any authorities and should be stored in special containers. Qualified unit (Zhiyun waste oil processing plant in Wuxi) should be consigned for harmless disposal of such waste oils.</p> <p>④Prior to the construction of dredging and renovation of river beds, barriers in river beds and flood land within construction scope should be cleaned up and domestic waste dumped along the ditch should be transported to Wuxi Taohua Mountain waste backfill field for treatment.</p> <p>(6)Construction wastes</p> <p>①Sand and stones, building materials, steel materials and package materials discarded on the construction site shall be reclaimed by designated persons so as to save resources. The construction site shall be cleaned up timely upon completion of the construction and it's strictly prohibited stacking and dumping building waste materials on the spot so as to avoid negatively influence the appearance of a city and environmental sanitation.</p> <p>②Some building wastes, such as bricks and tiles, etc., shall be disposed generally, such as stacking and storage, etc.. However, such building wastes must be finally delivered to the designated building waste dumping site.</p> <p>③The construction shall be accomplished in a fully enclosed environment so as to control the pollution and influence within the construction site during the construction period and reduce influences on the environments as much as possible. Any wastes that may produce flying dusts shall be stacked and stored within barriers.</p> <p>(7)Others</p> <p>①With respect to the temporary dumping site or material site, the slopes shall be reinforced, drainage ditches are arranged and effective anti-dust measures are taken, for example, cover the site, so as to prevent rain wash and reduce losses of water and soils.</p> <p>②When bulk materials and waste materials are transported by vehicles, the transportation vehicles must be loaded properly and covered with drop cloth or enclosed vehicles shall be used; wash the transportation vehicles prior to departure from the construction site and prevent materials dropping on the way to influence appearances and sanitation; it must as much as possible to avoid traffic peak period to transport materials with construction vehicles and travel along the designated route while take proper prevention measures to reduce loads of transportation of materials and leakage of materials as well as secondary-time flying dusts.</p> <p>③It is strictly prohibited dumping engineering materials around river and lakes, such as sand, stones and cements, etc., and discarded engineering slag and domestic waste dumping site should be far away from rivers and lakes; slurries dropped on the construction site and construction service rods shall be removed timely to avoid influencing the cleaning of the plant area and road surfaces when slurries are hardened and frozen; various kinds of wastes on the construction site shall be timely cleaned and transported.</p>
5	Ecological environment	(1)Strictly control the construction operation area, fully take use of the existing roads, strengthen propaganda and education of environment protection awareness to the builders and prohibit builders destroying other vegetation outside the designated lands. The vegetation having to be destroyed within the engineering construction land must be planned, prohibit destroying vegetation

	<p>within the construction area without authorities and recover such vegetation as much as possible after completion of the construction. Meanwhile, take drainage measures during the construction so as to avoid losses of water and soils caused by flood.</p> <p>(2)The engineering construction shall be carried out by stages and areas and not fully expanded so as to shorten the time limit of single item, especially wetland construction, water course regularization and reclaimed water pipeline network laying engineering. Take prevention measures to the exposed excavated surfaces and shorten exposure time as much as possible so as to reduce losses of water and soils.</p> <p>(3)With respect to the river side, prevention of greens to water and soil losses shall be fully considered, especially slope protection engineering. Dust proof net shall cover two sides of the bank during the construction, if necessary, side ditches and reservoirs shall be built along the water courses; earthworks shall be properly dumped into the construction site, kept away from the waters, such as water course and ditches, etc., enclosed by straw bags to hold up sands, ingress of water shall be avoided as much as possible so as to reduce mitigate the influence of water and soil losses to the rivers and drainage ditches; greens should be timely accomplished on the spot on completion of slope protection construction.</p> <p>(4)The land blocks to be relocated shall be set to work orderly so as to avoid disordering landscapes along the route, blocking the landscapes and also baffle plates (trees, glasses and iron sheets, etc) shall be established as enclosures to reduce pollution on landscapes. During the construction, the vegetation in neighboring areas shall be protected, such as trees and green lands, etc..</p> <p>(5)Prepare properly to excavate earthworks, the temporary discarded soils and waste residue dumping sites shall be protected and excavation of earthworks shall be avoided when it rains so as to prevent water and soils losses, pollution of water and blockage of drainage pipelines due to rain wash. Meanwhile, balance the earthworks engineering as much as possible and the excavated earthworks should be used to level and backfill the construction site as much as possible; the superfluous parts of the discarded earthworks arising from laying of pipelines shall be delivered to other building construction site after the backfill (such as embankment and flood-control road engineering, etc.) for backfill and greens of the construction so as to avoid improper landfill.</p> <p>(6)The temporary construction site shall be within the relocated houses and lands used by enterprises, save occupation areas as much as possible, properly arrange construction progress, clean up the construction site on completion of the engineering and accomplish greening or second plowing accordingly.</p> <p>(7)After accomplishment of sludge disposal site construction, green the back slope of the dam covering approximately 25,000 sq.m., which can strengthen the stability of the dam slope on the one hand and also improve influences on neighboring landscapes on the other hand?</p> <p>Among the sludge stock yards used for this project, the Kongwan yard, all of the Baimiao No. 1 yard, Baimiao No. 2 yard and Baimiao No. 3 yard are built for dredging engineering of Tai Lake in past years. According to the on-spot investigation, it is found out that there is little green on the dam slopes of some yards, thus greening measures shall be strengthened within non-disturbing areas of sludge disposal yard, recover regional ecological environments as soon as possible and reduce water and soil losses as well as wind, sand and flying dusts during this dredging engineering.</p>
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		<p>(8) Green the sludge disposal yards by planting grasses after accomplishment of hydraulic reclamation of the yards so as to prevent drying of surfaces, flying dusts caused by big wind while recover the neighboring landscapes and ecological environments.</p> <p>(9) During the dredging construction of lakes, strictly control depth of dredging to avoid any unnecessary damages to the water ecological system; carefully control the constructions to avoid large-scale pollution of the water during the dredging construction.</p> <p>(10) During the construction, the environmental protection officers of the project supervision department and the construction departments jointly are responsible for the ecological supervision on basis of tour inspections to check fulfillment of ecological protection measures.</p>
6	social environment	<p>(1) Control measures for people's health</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Strengthen drinking water sanitation management, purify and sterilize domestic water and drinking water, the drinking water should comply with &lt;Sanitation specification of living water and drinking water&gt;, detect domestic and drinking water resources of work sites and take protection measures;</li> <li><input type="checkbox"/> Strengthen sanitation of foods, avoid unclean food. Workers engaging in foods must be obtain sanitary license, receive periodic physical examination and those carrying with bacteria of infectious disease will be withdrawn from their posts.</li> <li><input type="checkbox"/> Builders must receive physical examination prior to entry into work site and those suffered from diseases are allowed entering into the work site after they are cured so as to control diseases from the resources;</li> <li><input type="checkbox"/> During the construction period, also make periodic physical examination and supervision to builders, early separate and cure patients if any diseases are found out so as to prevent infectious diseases spread in work site and guarantee builders healthy;</li> <li><input type="checkbox"/> The construction unit should specify principals in sanitary and epidemic prevention, carry out management works according to epidemic prevention management system and reporting system and is supervised by local health department;</li> <li><input type="checkbox"/> Establish sanitary management system of the work site and strengthen sanitary conditions of work site;</li> <li><input type="checkbox"/> Carry out activities of elimination of "four pests" and reduce density of mosquito, rats, flies and black beetle, etc.;</li> <li><input type="checkbox"/> Strengthen treatment and management of domestic sewerage, wastes and other pollutants in work site, carry out domestic waste water on schedule and collect and delivery solid wastes outside, such as domestic wastes, etc.;</li> <li><input type="checkbox"/> Strengthen planned immunity and increase the immunity of people;</li> <li><input type="checkbox"/> Carry out education of health, sanitation and disease presentation, popularize health common knowledge, improve individual protection awareness: do not sleep in the field and hang a mosquito net in rooms so as to avoid any infectious diseases due to bite of mosquito, such as malaria, etc..</li> </ul> <p>(2) Mitigation measures for influence on traffics</p>

		<p><input type="checkbox"/> During the design and construction period, fully coordinated with urban traffic management department, planning department, civil works construction management department and environment protection department uniformly held by the District Government, then supported by all relevant department, the construction unit properly branch vehicles and travelers so as to resolve the traffic troubles during the construction period.</p> <p><input type="checkbox"/> scientifically arrange construction sequences during the construction design, speed up construction progress of reclaimed water pipeline network, and reduce influence of construction on traffics. The pipe jacking way is firstly used to the construction when pipeline passes through trunk road and thus reduce influence on traffics at most. Strengthen traffic dispatching and management to engineering transportation vehicles, select proper traveling routes, avoid peak traffics and reduce blockage due to construction vehicles.</p> <p><input type="checkbox"/> Roads damaged by construction vehicles should be repaired timely and guarantee good conditions of the roads. Narrow roads may be extended according to the planning of roads.</p> <p><input type="checkbox"/> strictly manage routes along the work site, strictly specify boundaries of construction site, properly pack muck, sands and stones, properly park vehicles, mechanical equipments and reduce blockage of traffics. The reclaimed water pipeline network should be constructed section by section, accomplish excavation and backfill as soon as possible, set up temporary ways and assign special persons to command the traffics.</p> <p><input type="checkbox"/> Educate builders and pay attention to that your actions will not block surrounding traffics. Strengthen education on drivers, strictly prohibit overloads and timely remove scattered materials.</p>
7	environmental risks	<p>(1) Properly arrange residual water treatment facilities at the discharge outlets and set up accident gates and suspended solid monitors at the discharge outlets. If suspended solid exceeds the limit, immediately shut off the discharge outlets of the sludge discharge field.</p> <p>(2) Strengthen maintenance of sludge discharge pipeline and guarantee the sealing of pipelines; strengthen dredging and management of traffics in the construction area and set up temporary warning marks along the sludge discharge pipes to prevent any sealing damages of sludge discharge pipes due to other factors except the construction.</p> <p>(3) Organize patrol on construction site and arrange construction ships to patrol along the sludge discharge pipeline when the dredgers work and drive out working ships entering into warning areas of sludge discharge areas by mistake.</p> <p>(4) Select high strength and impact-proof sludge discharge pipelines and separately arranged valves at joints of pipelines so as to shut off the sludge discharge pipelines during any leakage accidents.</p> <p>(5) Arrange pipeline pressure online monitors in the sludge discharge pipelines, immediately notify the dredgers to stop working and detect the sealing of sludge discharge pipelines.</p>

**Table 3.3-2 Environment protection measures taken during operation of the project**

SN	Environment factors	The environmental protection measures
1	Air environment	After the project has been accomplished and put into operation, the major pollutant in the air is mainly the odor substance composed of sulfureted hydrogen and ammonia, etc., which maybe influence the neighboring environment. With respect of feed-water pump rooms, rotational flow grit chamber, sludge thickener, adjustive pool and spin-drier rooms, odor will be removed by active oxygen purification method, trees are planted around the sewage water treatment plant to improve greening and reduce pollution on neighboring environment caused by odor, which is practical.
2	Water environment	(1)Intercept sewage for relevant waters, such as Xibei canal while dredge sludge of the water courses so as to quickly improve the waters; (2)Strengthen operation control and eliminate incidental discharge. Additionally, strengthen maintenance and management of pipeline networks to keep pipelines unblocked and collect domestic sewage and industrial waste water at most; (3)Strengthen management of newly-established enterprises within sewage interception areas, strictly limit noxious and harmful pollutants, especially waste water containing heavy metals, into the sewage disposal plant.
3	Sound environment	the materials better in noise-absorbing properties should be used as the indoor decoration materials as much as possible; the selected materials of doors, windows and walls should be better in sound insulation. the green belts should be constructed in the plant area and around the plant.
4	solid waste	the sludge produced by the sewage water treatment plant is treated by Lanhai Sludge Treatment Company. Once the project is accomplished, all sludge produced by the whole plant will be processed by Wuxi Jinyuan Sludge Treatment & New-style Fuel Science & Technologies Co., Ltd. and thus treatment of the sludge produced from this project is practical. Small quantities of sediment and domestic wastes will be separately hauled to the backfill sites of domestic wastes by local environment protection authorities.
5	environmental risks	(1)Fully consider the emergent measures against unsteady conditions of water quantities due to various kinds of factors so as to mitigate disadvantageous conditions. (2)Industry enterprises should set up water tanks against accidents if serious pollution occurs; (3)Strengthen management of power stations and guarantee that power supply facilities and power lines normally operate; (4)Strengthen tour check on water delivery pipelines so as to timely find out and resole any issues; (5)Establish operation management and operation duty

	<p>systems of the sewerage water treatment plant; carry out staffs trainings, establish technical examination and verification records and prohibit disqualified staffs taking their posts;</p> <p>(6) Strengthen the maintenance and management of equipments and facilities, provide standby machines for key equipments and dual-circuit power supply; once any accidents occur, the following measures should be taken:</p> <ul style="list-style-type: none"> <li>① Try to guarantee normal operation of grids and swirl grit settlement tank and reduce quantities of SS and COD in the water;</li> <li>② Find out reasons from the main pollution resources of the water collection systems, relevant plants should take emergency measures to control the discharge quantities of materials noxious and harmful to microorganisms.</li> <li>③ If the sewerage water is directly discharge without any treatment due to any force majeure occurs, such as power failure of the dual-circuit power supplies, unexpected natural disasters, etc., require the plants connected with the sewerage treatment plant to completely or fully stop discharging sewerage water to the pipelines so as to guarantee safety of the waters functions;</li> <li>④ When accidents occur and is treated, warning marks should be used for the water near to the discharge outlet to remind relevant parties taking control measures.</li> </ul>
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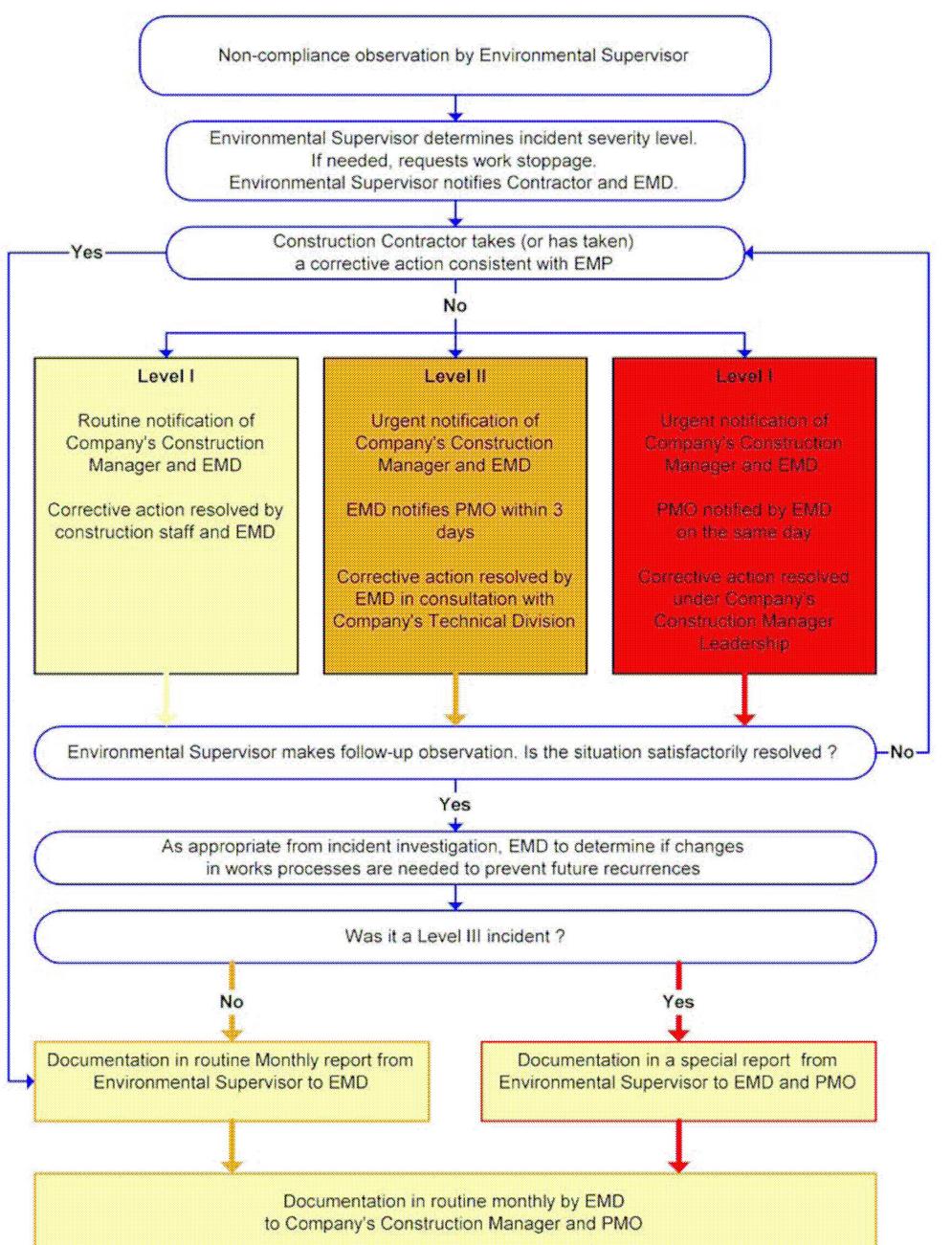
### 3.4 Information Communication and Solution to Discrepancy

Environmental monitoring information shall be disclosed or open to the site environment supervisors, corporate environment management managers and PMO. In order to focus on the management of the most important issues, the discrepancy or non-compliance of the project as per the difference of the importance is divided into the following three levels.

Level 1: Definition: The status of non-compliance is defined as incompatible with the original requirements, but it is not believed to exert a recent impact on the important resource. If the first level recurs without arousing the concern, it will lead to the second level. Measures: the situation of the first level can be appropriately dealt with via appropriate cooperation and regular communication. For example, through the discussion with construction units and operation units, remedial measures can be implemented quickly; the official communication way is typically: the routine weekly reports from the environment supervision engineer to manager of corporate environmental management and on-site construction manager.

Level 2: Definition: The state of non-compliance has not caused the significant damage or irreversible effects on the sensitive and important resources, but it is necessary to conduct the immediate remedy and on-site disposal to prevent the said effects. If the second level recurs without arousing the concern, it will lead to the third level. Measures: If the level-2 event is found, at the same day the manager of corporate environmental management must report the event to the PMO environmental manager and on-site construction manager to reach the remedial measures as soon as possible; in general, the remedial measures shall be proposed within a week after the discovery of the event.

**Level 3: Definition:** This level contains the damage to specially concerned sensitive targets or the foreseeable or forthcoming damage. The special conducts prohibited by the international community are also turned into the third level. Measures: in case of discovering the event of this level, it shall be reported by the environment management manager to PMO environmental manager and on-site construction manager to reach the remedial measures as soon as possible; in general, remedial measures shall be proposed within three (3) days after the discovery of the event unless it shall be prolonged due to special circumstance. If necessary, the corporate environmental management manager may require the construction manager to stop some special projects for purpose of protecting the resources before the implementation of remedial measures.



**Figure 3.4-1** Disposal Mechanism of Discrepancy

## **4 Environmental Risk Analysis**

### **4.1 Identification of environmental risks**

#### **4.1.1 Construction period**

The risks during construction period mainly refer to accidental discharge of residual water in the sludge discharge fields and accidental leakage of discharge pipelines. The dredged up sludge of this project needs to be discharged to 4 sludge discharge fields on ground with large quantities of discharge of the discharge fields and residual water as well as large contents of suspended solids. According to the characteristics of residual water discharge points of the sludge discharge field, put flocculant to settle down and treat the residual water and thus make concentration of suspended solids in the residual water less than 100mg/L. influences on environments can be effectively controlled, however, if the residual water of drudge discharge fields are directly discharged without disposal will significantly impact surrounding water quality of waters and ecological environments when the feed equipments fails. Additionally, the sludge produced in this project will be delivered to the near discharge fields through fully enclosed discharge pipelines, the discharging distance of the discharge pipelines can reach up to 8km and the sludge shall be pumped through relay pump ships along the pipeline. When discharge pipelines leak or the relay pump ships fail, the discharge pipeline will leak slurry and significantly influence water quality of lakes and ecological environment of waters around the leakage points.

#### **4.1.2 Operation period**

With analysis on the mechanism of wastewater biological treatment and operations of the similar waste water treatment plants, the main reasons why undisputed waste water overflows from municipal wastewater treatment plant are as follows:

(1) Equipments and facilities fails due to issues or improper maintenance of wastewater treatment equipments and facilities and thus wastewater treatment efficiency will be reduced and even the wastewater will be directly discharged without any disposal.

(2) If wastewater treatment plant loses power, the wastewater will be directly discharged without any disposal.

The above two situations will influence the water quality of Xibei Canal.

## **4.2 Accident control measures for environmental risks**

### **4.2.1 Control measures for risks during the construction period**

(1) Properly arrange residual water treatment facilities at the discharge outlets and set up accident gates and suspended solid monitors at the discharge outlets. If suspended solid exceeds the limit, immediately shut off the discharge outlets of the sludge discharge field.

(2) Strengthen maintenance of sludge discharge pipeline and guarantee the sealing of pipelines; strengthen dredging and management of traffics in the construction area and set up temporary warning marks along the sludge discharge pipes to prevent any sealing damages of sludge discharge pipes due to other factors except the construction.

(3) Organize patrol on construction site and arrange construction ships to patrol along the sludge discharge pipeline when the dredgers work and drive out working ships entering into warning areas of sludge discharge areas by mistake.

(4) Select high strength and impact-proof sludge discharge pipelines and separately arranged valves at joints of pipelines so as to shut off the sludge discharge pipelines during any leakage accidents.

(5) Arrange pipeline pressure online monitors in the sludge discharge pipelines, immediately notify the dredgers to stop working and detect the sealing of sludge discharge pipelines.

### **4.2.2 Control measures for risks during the operation**

(1) Fully consider the emergent measures against unsteady conditions of water quantities due to various kinds of factors so as to mitigate disadvantageous conditions.

(2) Industry enterprises should set up water tanks against accidents if serious pollution occurs;

(3) Strengthen management of power stations and guarantee that power supply facilities and power lines normally operate;

(4) Strengthen tour check on water delivery pipelines so as to timely find out and resolve any issues;

(5) Establish operation management and operation duty systems of the sewerage water treatment plant; carry out staffs trainings, establish technical examination and verification records and prohibit disqualified staffs taking their posts;

(6) Strengthen the maintenance and management of equipments and facilities, provide standby machines for key equipments and dual-circuit power supply; once any accidents occur, the following measures should be taken:

① Try to guarantee normal operation of grids and swirl grit settlement tank and reduce quantities of SS and COD in the water;

② Find out reasons from the main pollution resources of the water collection systems, relevant plants should take emergency measures to control the discharge quantities of materials noxious and harmful to microorganisms.

③ If the sewerage water is directly discharge without any treatment due to any force majeure occurs, such as power failure of the dual-circuit power supplies, unexpected natural disasters, etc., require the plants connected with the sewerage treatment plant to completely or fully stop discharging sewerage water to the pipelines so as to guarantee safety of the waters functions;

④ When accidents occur and is treated, warning marks should be used for the water near to the discharge outlet to remind relevant parties taking control measures.

### **4.3 Emergency plan**

According to the file “Huanguanzi No. 057, State Environment Protection Bureau (90)”, with the assessment on risks of pollution accidents, establish work plans for prevention of serious environment pollution accidents, measures to eliminate hidden troubles of accidents and emergency treatment methods during unexpected accidents, etc.. Once any serious accidents occur, effectively organize rescue, timely control pollution and reduce losses caused by pollution.

## **4.3.1 Stage VI Engineering of Wuxi Huishan Sewerage Water Treatment Plant and Stage I Engineering of Reclaimed Water Project**

### **4.3.1.1 Classification and organization structure of emergency plan**

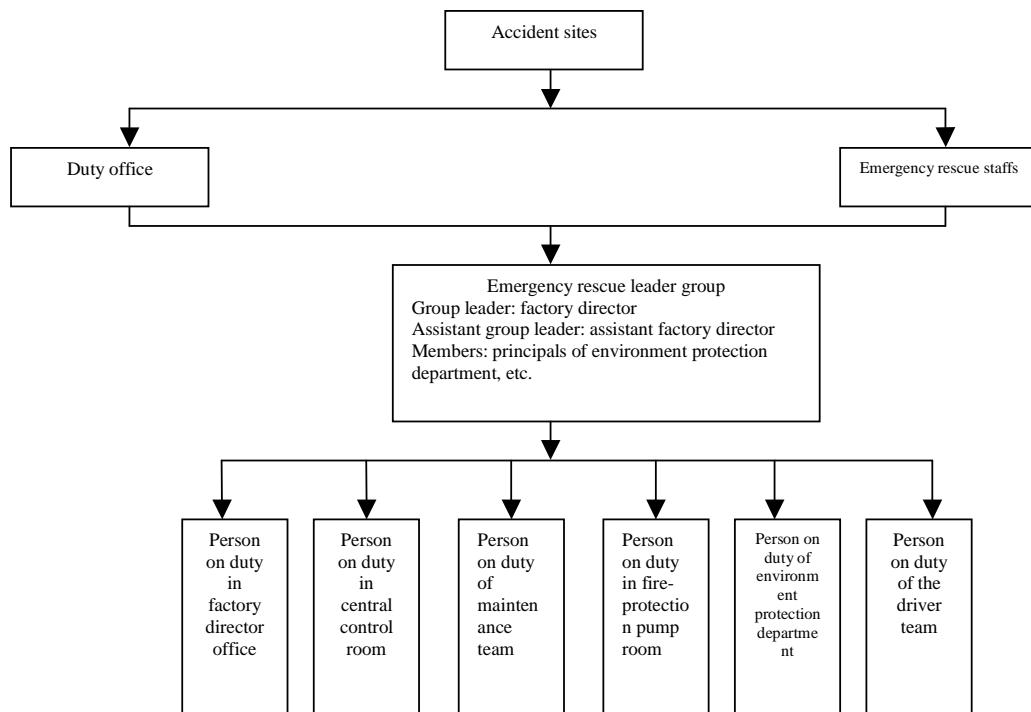
When sewage water accidents occur, the emergency team leaders should determine the influence and hazardless of such accidents according to the information collected by the duty office of emergency rescue command center, if they are just common accidents, only take class III emergency rescue procedures, the factory director on duty, persons on duty on the site and process operators form an emergency team to carry out rescue actions. If such accidents spread widely and cause serious damages, the emergency rescue leader team should quickly organize an emergency rescue command on the site composed of the factory director, assistant factory director, process, instruments and equipments engineers of the sewerage treatment plants while establish professional teams according to the requirements for rescue on the accident sites and on basis of part-time rescue staffs, such as rescue, medical and first-aid, warning watch, communication and information release, etc., so as to completely carry out the emergency rescue actions.

According to the hazardless of the accident and required emergency rescue forces, the emergency rescue action is classified as 3 classes as follows: class III (emergency preparedness and response against common accidents); Class II (emergency on site against serious accident) and Class I (complete emergency against significant accidents).

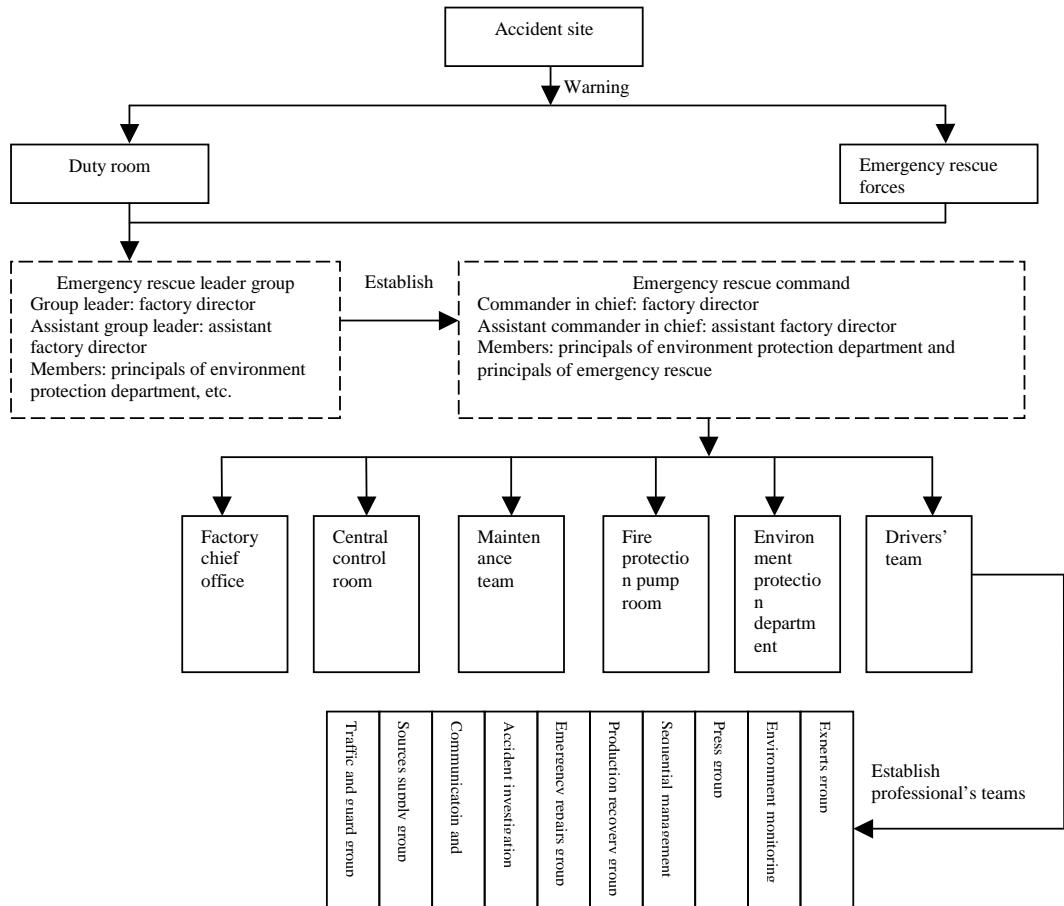
1. Class III: When any controllable unusual accidents or unexpected accidents easily to be controlled, such as small-scale sewerage water leakage and failure of equipments, etc., the sewerage treatment plant take emergency actions according to given procedures to stop leaking, provide medical services and emergency repairs;
2. Class II: accidents occurs, such as large-scale sewerage water leakage, significantly increase of concentration of pollutants in feed-water and power supplies failures of the sewerage water treatment plants, the hazardless and influence of the accident exceeds treatment capacities of class III emergency rescue forces and requires treatment of complete emergency rescue forces of the plant;
3. Class I: the influence of the accident exceeds the boundaries of the sewerage treatment plant and it needs emergency rescue leader organizations to coordinate surrounding enterprises or emergency rescue management institutions to get support

of social rescue forces and organize traffic controls, withdrawal and escape of surrounding persons as well as supports of rescue teams so as to reduce casualties, economical losses and social impacts caused by the accident as much as possible.

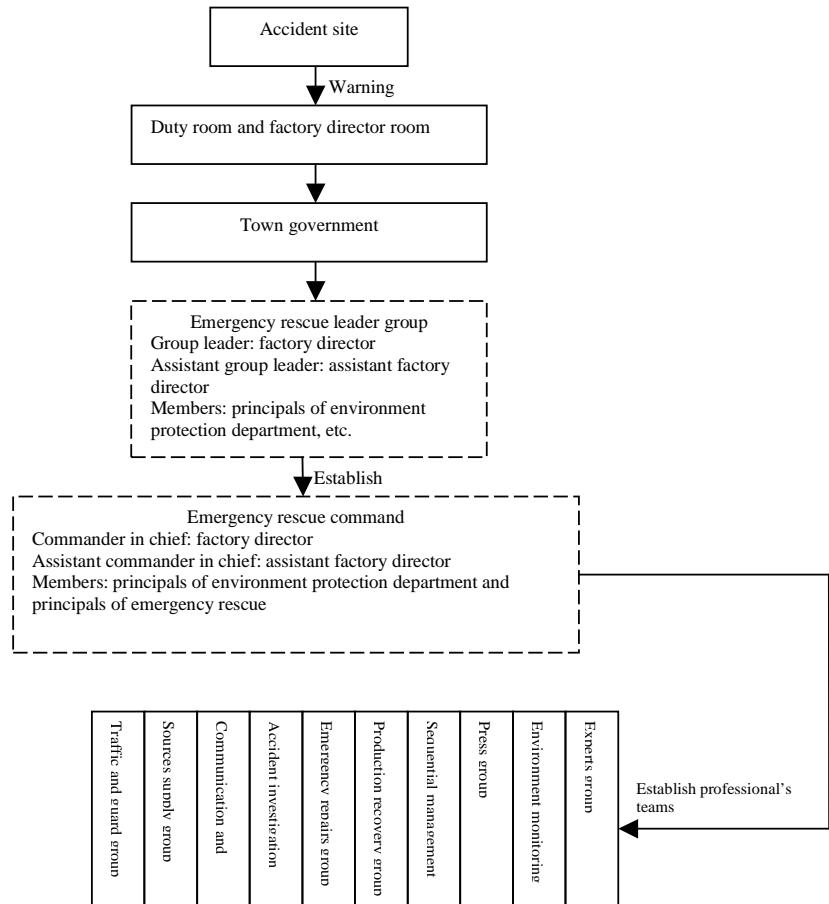
For the institutions of Class I, II and III emergency, please refer to Diagram 4.3-1~4.3-3.



**Diagram 4.3-1: Class III Emergency Institution**



**Diagram 4.3-2: Class II Emergency Institution**



**Diagram 4.3-3: Class I Emergency Institution**

#### 4.3.1.2 Alarm and Communication

##### (1) Alarm and Communication

The alarm system of the whole factory area combines manual alarm and call alarm system.

If emergency conditions or accidents occur, the person giving an alarm can push down the bottom and give alarms to the central control room. A central control room is arranged in the factory area to monitor and control the factory area and sewerage treatment facilities.

##### (2) Communication facilities

The telecommunication cables in the factory area include lines of amplifier, interphone and telephone and wireless interphone lines. Cables of all systems are independent from each other and respectively form their own systems. The

communication facilities in the factory area include: two sets of amplification, interphones and two pairs of wireless interphones.

### (3)Procedures of alarms

After accidents or dangerous conditions occur, the first person who finds it out should give alarms to the duty room of the emergency rescue command center (arranged in the central control room) and meanwhile report the accident to the factory director charging in production on duty at the day. Alarm mode: (1) activate the alarm button near to the accident site and notify the central control room; (2) notify the duty room.

Upon receipt alarms, the emergency rescue forces should quickly prepare for response and persons on duty in emergency rescue command center reports the accidents to the emergency rescue leader group together with reports of accident site and safety monitory system. The emergency rescue leader group will determine activation of emergency rescue plan according to the scale of the accident.

If serious and significant unexpected environment pollution accident occurs in the factor, the emergency rescue command center will directly contact and give alarm to local government, environment protection departments and fire protection department for information and technologies support.

#### **4.3.1.3Emergency control measures**

Shutoff valves are arranged at outlet of rain water pipeline and sewerage discharge outlet, thus once accidents occur, close the shutoff valves, timely intercept sewerage water and prevent sewerage water directly entering into the water.

If sewerage water enters into the receiptant of Xibei Canal because shutoff valves are not timely closed, the local government and district level or municipal level environment protection department must be notified immediately. The government will command all enterprises whose sewerage pipes are connected with the sewerage treatment plant to stop production as a temporary command; the environment protection departments organize to establish emergency rescue teams to immediately construct dams around the sewerage discharge outlet while assign persons to monitor in real time the pollution belts within 2km from tailwater discharge outlets to downstream of Xibei Canal and analyze whether water quality parameters of the water exceeds or complies with the limit.

#### **4.3.2 Ecological dredging engineering of key area of Tai Lake**

It will play a key role in effectively controlling pollution, reducing losses due to pollution and eliminating pollutions whether quick and effective response can be made after risks and accidents occur. In order to make quick response to accidents during the construction period of this project, such as residual water discharge and leakage of sludge discharge pipelines, etc. and reduce damages to the ecological environment of the water of the lake area, it is necessary to establish an emergency rescue command system and organize to prepare a copy of practical risk emergency action plan.

##### 1. Contents of emergency plans

###### (1) Emergency command institution

Establish a risk emergency command composed of public security, drainage area management department, environment protection, sanitation and epidemic prevention department and safety monitoring department, etc.. The command specify duties of all departments and staffs, which is specific to responsibilities, division of works and coordination ship and everybody should know about their own duties. The persons received emergency accident treatment trainings should be on duty in a ground and a strict shift system must be established.

###### (2) Liaison institution

Establish a quick and sensitive alarm system and communication, command and liaison system, including liaison with the command system of Wuxi emergency response system and their respective departments, 24h effective alarm devices and contents and external communication means so as to timely make emergency rescue arrangements. It is a key point whether the accident is timely reported to the success of the whole response process and elimination of pollution effects during an accident emergency response.

###### (3) Rescue team

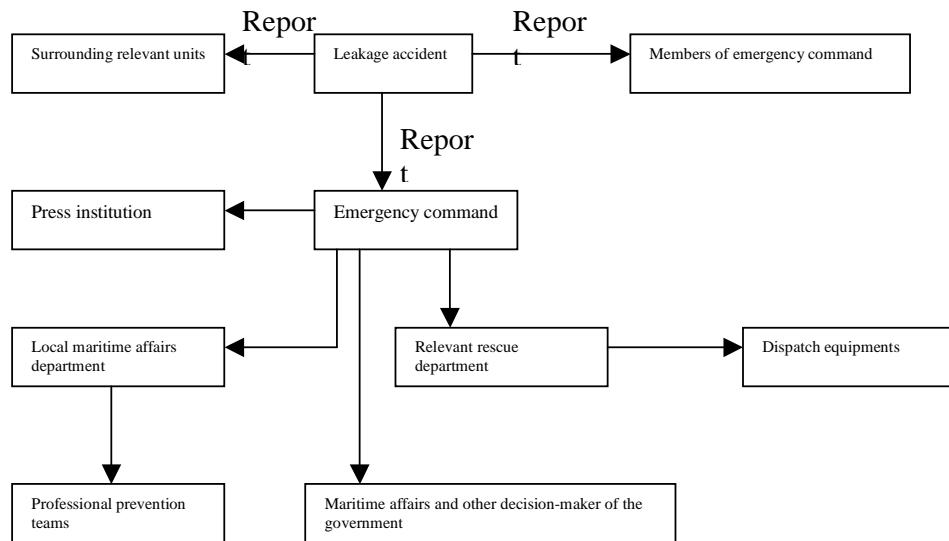
The management department or engineering construction leader teams of the drainage area should establish liaison system with surrounding units who have established emergency facilities and rescue teams and assign construction managers to participate emergency treatment training and exercise so as to guarantee that such liaison system will play a key role in crisis time. The emergency team should be

composed of managers familiar with construction organization and plan, anti-pollution and ships safety and responsible for emergency treatment, etc..

Once any accidents occur, timely report such accident, require local department activating emergency plans or require local rescue center or civil air defense organization's support and also can require rescue from surrounding districts or counties.

#### (4)Emergency alarm

It is a key to timely execution of emergency rescue whether the accident alarm is timely and correctly given out. When unexpected leakage accident occurs, except organize their rescue works, the responsible unit or persons on site must timely report the accident to emergency command and relevant department. The process that emergency alarm is given, please refer to Diagram 4.3-4.



**Figure 4.3-4: Accident Emergency Alarm Process**

#### (5)Emergency treatment measures

Once accident occur, the principal on duty should timely report it to the emergency command center, start up emergency plan, close water intake near to the place where accident occurs and implement proper dredging programs. The command center keeps contact with drainage area management, water affair bureau and environment protection bureau according to practical situations on site, timely report treatment of pollution accident and current situations. The dredging ships or sludge discharge fields should immediately stop working and take proper measures to remove pollutions according to the characteristics of the pollution.

The dredging measures possibly adopted against accident discharge of residual water of sludge discharge field and leakage of sludge discharge pipelines include: enclose discharge outlets of accident drudge discharge field, stop dredging ships upwards along the sludge discharge pipeline, shut off joints of leaked drudge discharge pipelines upwards and downwards, reduce leakage of sludge in discharge pipeline, search for leakage location of the sludge discharge pipelines, cast sand bags to seal and block the leakage, dispatch construction ships to throw in flocculants to quicken settlement and reduce influence scope of the suspended solid.

(6)Emergency technologies reserve

A series of data is stored in mobile phone for viewing when accident occurs. It includes: hydrograph and weather, value prediction of leakage conditions of different pollutants, priorities of sensitive area and resources protection, varieties, quantities and storage places of accident emergency treatment equipments, staffing of environment accident treatment and assessment on pollution damages, etc..

(7)Emergency training plans

Provide trainings on emergency rescue and response to staffs and publicize emergency response to surrounding residents and enterprises.

Prepare, organize and train exercises, thus quickly organize emergency rescue once unexpected risk accidents occur so as to timely control development and spreading of the accident and reduce damages caused by risks.

2. Emergency response procedures

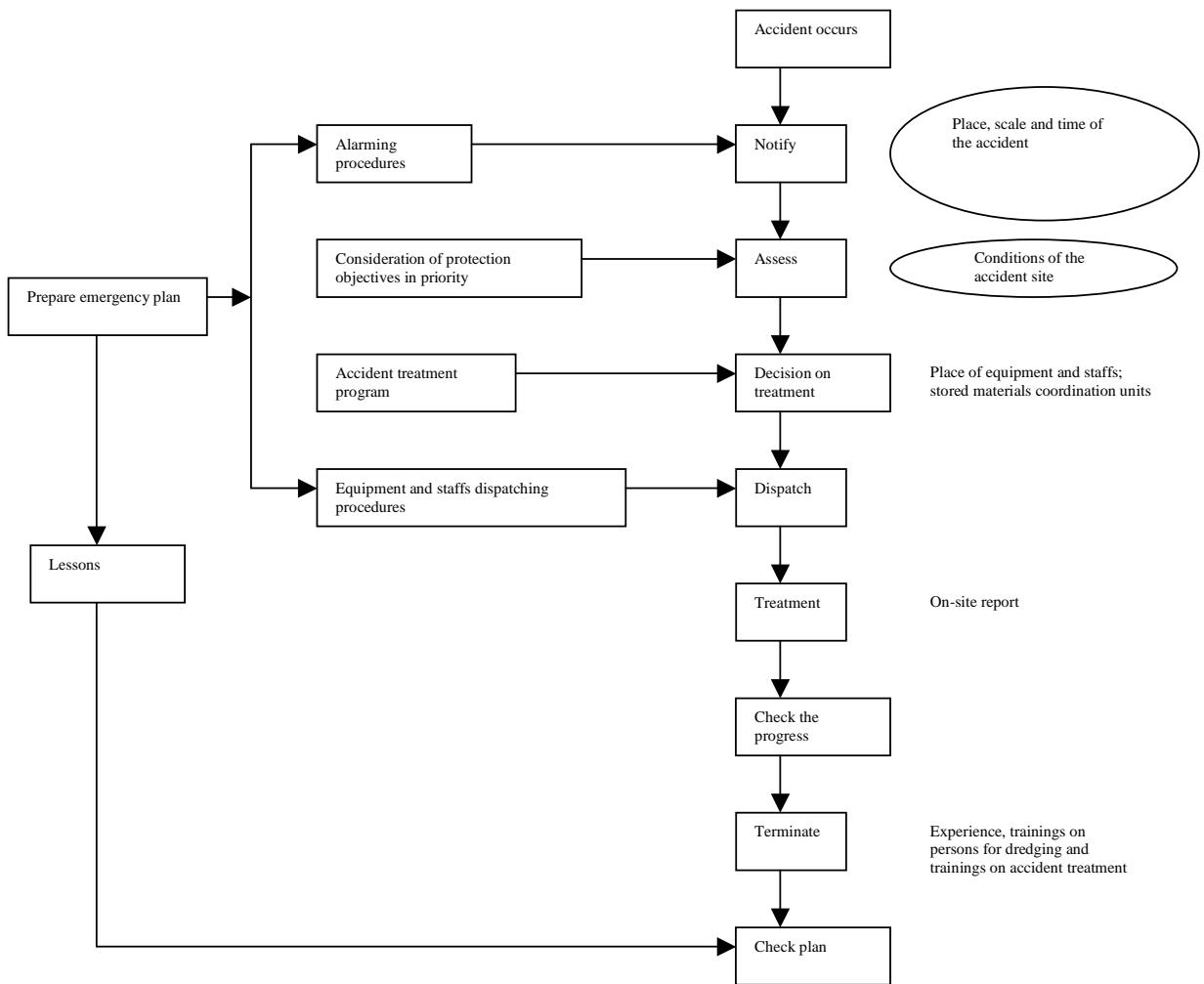
Response process of risk accidents should include: report procedure, necessary emergency means, description of emergency measures, principals and scope of responsibilities, etc..

(1)The accident ship should immediately stop working after accident occurs;

(2)Immediately report to the principal on duty and the latter will report it level by level according to the seriousness of the accident;

(3)The emergency commanders should command emergency rescue team enter into the accident site according to the properties of the accident and take corresponding measures to remove pollution according to the characteristics of the leaked materials.

For the risk accident emergency procedures, please refer to Figure4.3-5.



**Figure 4.3-5: Risk emergency response procedure**

### 3. Emergency environment monitoring and post-accident assessment

Assign professional teams to monitor the water quality of the accident site, provide sets of monitoring equipments to monitor the accident, timely and accurately find out the accident, monitor and assess the property, parameters of the accident and post-accident and provide information for the command to make decisions.

After accidents have been treated, the drainage area management department shall report causes of the accident, leakage amounts, pollution removal process, pollution scope and influences to local environment protection bureau, the latter will

organize investigation, determine compensation due to the accident and provide economical compensation after final award of the court.

#### 4. Termination and recovery measures of emergency conditions

Specify the termination procedures of emergency conditions, sequential management of the accident site and recovery measures then.

The sequential management of accident site is a key part of the emergency plan. The plan of sequential management relates to preventing enlarging pollution and further development of accidents, thus it should be paid more attention.

The sequential management plan should include further safety examination on accident site, especially whether the hidden troubles left in the accident or rescue process maybe cause further new accidents.

The sequential management plan include analysis on accidental reasons, drawing lessons, improvement measures and summary, an accident report shall be written and reported to relevant department.

## **5 Environmental Monitoring Plan**

Environmental monitoring is an important means to project operation and management. Project management involves a lot of aspects, while environmental monitoring is the most important one, for it is a chief mark of standardized operation and management of facilities. Environmental monitoring covers air, waste water, yard remained water, noise and all other environmental factors.

### **5.1 Environmental monitoring organization**

If construction units do not have monitoring qualifications in the above-mentioned environmental monitoring, they may entrust a qualified environmental monitoring unit, with the monitoring data reported to the local environmental protection authorities in the form of statement. Every year, the environmental monitoring results of the construction stage and regular monitoring results of the operation stage shall be gathered into an annual monitoring report and submitted to the local environmental protection authorities.

### **5.2 Environmental Monitoring Plan**

Since results can be predicted based on the environmental impact, the sensitive sites with more pollution will be treated as monitoring points. According to pollution at the construction and operation stage, the monitoring will cover much-affecting acoustic environment, ambient air and surface water environment and monitoring factors will be determined in line with the pollution feature factors in engineering analysis. The monitoring and analysis methods of the corresponding projects of Technical Specification for Environmental Monitoring issued by the Ministry of Environmental Protection of the People's Republic of China will be adopted, and related national standards will be executed in terms of evaluation.

**5.2.1Changguangxi Ecological wetlands repair engineering**

**Table 5.2-1 Supervision schedule of Changguangxi Ecological wetlands repair engineering**

Supervision period	Major factors of influence on environment	Monitoring point	Monitoring index	Monitoring frequency	Executive standard	Supervision institution	Responsible unit	Supervisory organ
Construction period	Environment air	2 sites around construction site	TSP,PM <sub>10</sub>	1 period/quarter, 2 days/period, 2 times/day	<Environment Air Quality Standards>(GB3095-96)and class II standard in modification leaflet	Qualified unit or municipal supervision station	Wuxi Chengkai Investment Co., Ltd.	Wuxi Municipal Environment Protecton Bureau
	Noise	4 dwelling sites around the construction sites	continuous and equivalent A sound level	1 period/quarter, 1 day/period, 2 times/day, each time for day and night	<Limit of noises within boundary of building construction>(GB12523-90)			
Operation period	Environment air	2 sites as the same as Environmental Impact Report	NH <sub>3</sub> 、H <sub>2</sub> S	1 period/ quarter, 1 day/period, 2 times/day	<Environment Air Quality Standards>(GB3095-96)and class II standard in modification leaflet	Qualified unit or municipal supervision station	Wuxi Chengkai Investment Co., Ltd.	Wuxi Municipal Environment Protecton Bureau
	Surface water	3 sites on the sludge discharge outlet entering into wetlands system, within the wetlands and inlet the wttlands system	COD,BOD <sub>5</sub> ,ammonia nitrogen, total nitrogen and total phosphor	1 period/ quarter, 1 day/period, 1 times/day	<Surface Water Environment Quality Standards>(GB3838-200)Class III standard			

### 5.2.2Stage IV of Wuxi Huishan Sewerage Treatment Plant and Reclaimed Water Reuse Stage I Engineering

**Table5.2-2 Supervision schedule on Stage IV of Wuxi Huishan Sewerage Treatment Plant and Reclaimed Water Reuse Stage I Engineering**

Supervision period	Major factors of influence on environment	Monitoring point	Monitoring index	Monitoring frequency	Executive standard	Supervision institution	Responsible unit	Supervisory organ
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Construction period	Environment air	2 sites around construction site	TSP,PM <sub>10</sub>	1period/quarter, 2 days/period, 2 times/day	<Environment Air Quality Standards>(GB3095-96)and class II standard in modification leaflet	Qualified unit or municipal supervision station	Environment Protection Section of Wuxi Huishan Sewerage Treatment Plant	Wuxi Municipal Environment Protecton Bureau
	Noise	1 dwelling point near t construction operation site and within the construction operation site	continuous and equivalent A sound level	1 period/quarter, 1 day/period, 2 times/day, each time for day and night	<Limit of noises within boundary of building construction>(GB12523-90)			
Operation period	Environment air	2 points on the boundary of the plant	NH <sub>3</sub> , H <sub>2</sub> S and odor concentration	1period/ quarter, 1day/period, two times/day	<Environment Air Quality Standards>(GB3095-96)and class II standard in modification leaflet	<Surface Water Environment Quality Standards>(GB3838-200)Class IV standards(Class III by the end of 2020)		
	Surface water	Sewerage port, section of No. 5 bridge and section of Zhangtang Bridge	pH,COD,BOD <sub>5</sub> ,SS,ammonia nitrogen, total nitrogen, total phosphor, oil, etc..	1period/ quarter, 1day/period, 1 time/day				
		4 discharge outlets of major enterprises	Determined according to characteristics of waste water	1period/ month, 1day/period, 1 time/day				
		4 water inlets of sewerage treatment plant	pH,COD,BOD <sub>5</sub> ,SS,ammonia nitrogen, total nitrogen, total phosphor, volume of waste water	1period/ month, 1day/period, 1 time/day				
		1 water outlet of sewerage treatment plant	pH,COD,BOD <sub>5</sub> ,SS,ammonia nitrogen, total nitrogen, total phosphor, volume of waste water	Automatic online monitor at water outlet of sewerage treatment plant				

	Noise	2 points on the plant area and boundary of pump station	continuous and equivalent A sound level	1 period/ quarter, 2 days/period and one time for each day and night	<Noise Environment Quality Standards>(GB3096-2008)Class 2 standards			
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### 5.2.3 Ecological Dredging Engineering of Key Area of Tai Lake

**Table 5.2-3 Supervision Schedule on Ecological Dredging Engineering of Key Area of Tai Lake**

Monitoring period	Environment factors	Monitoring contents	Monitoring index	Monitoring point	Monitoring frequency	Executive standards	Daily monitoring unit	Responsible unit	Responsibilities for supervision
Construction period	Water environment	Residual water of sludge discharge plant	pH,SS,COD <sub>Mn</sub> ,TP,TN,NH <sub>3</sub> -N	Water outlet of sludge discharge field and settlement tank of residual water	1 period/month, 1 day/period, 1 time/day	<Sewerage Discharge Standards>(GB8978-1996) Class I standard	Qualified unit or municipal supervision station	Wuxi Municipal Irrigation Works Bureau	Sub-project Office
		Pore water of sediment within dredging area	ORP(Eh),NH <sub>3</sub> -N,PO <sub>4</sub> <sup>3-</sup> -P,TOC	Dredging area	1 period/month, 1 day/period, 1 time/day				
		Tai Lake area	Water temperature,SD,SS,COD <sub>Mn</sub> ,BO <sub>D5</sub> ,TN,TP,chlorophyll,a,pH,DO,volatile phenol,oil,NH <sub>3</sub> -N	Dredging area, entry of lakes in dredging rivercourses and comparative points	1 period/2 months, 1 day/period, 1 time/day	<Surface Water Environment Quality Standards>(GB3838-2002)Class III standard			

	Shallow underground water	COD <sub>Mn</sub> ,NH <sub>3</sub> -N,TN,TP,pH,Ni,Cu,Cr <sup>6+</sup> ,Pb,Hg,Cd,As	Separately set up a water quality supervision point in villages around four land sludge discharge fields and total 4 underground water quality supervision points	1 period/2 months, 1 day/period, 1 time/day, if necessary, supervision frequency will be increased	<Underground Water Quality Standard>(GB/T14848-93)Class III standard		
Air environment	Flying dust caused by construction	TSP,PM <sub>10</sub>	Around construction operation area	1 period/quarter, 2 days/period and 2 times/day	<Environment Air Quality Standards>(GB3095-96)and class II standard in modification leaflet		
	Stink	H <sub>2</sub> S NH <sub>3</sub>	4 sediment sludge discharge field and temporary soil stock yards	One time prior to construction of dredging engineering construction as a background value; one time within service life of dredging engineering stock yard	<Stink Pollutants Discharge Standards>, Class II		
Sound environment	Mechanical noises during the construction	continuous and equivalent A sound level	One point within construction works area	1 day/month and each time for day and night	<Limit of noises within boundary of building construction>(GB12523-90)		

	Sediment	Dredging sludge	Cd,Cr <sup>6+</sup> ,Cu,Hg,Pb,As, mineral oil,Cu,Zn,Ni,benzopyrenes,TN,TP			(GB18599-2001)When used for agricultural recovery and greens, it should comply with <Pollutant control standard of agricultural sludge> (GB4284-84) and backfilled according to <Pollutant control standard of storage and treatment field of general industrial solid waste>(GB18599-2001)		
	Ecological environment	Tai Lake area	varieties, quantities and biomass of phytoplankton and zooplankton; varieties, quantities and biomass of benthos and hydrophyte	The same as water quality supervision points of Tai Lake area	It will be monitored for 1 period during the construction period (after completion of dredging)			
Operation period	Surface water		pH,DO, permanganate index ,COD <sub>Cr</sub> ,BOD <sub>5</sub> , NH <sub>3</sub> -N,total phosphor, total nitrogen,Hg,As, Cr <sup>6+</sup> and oil	The same as water quality supervision points of Tai Lake area	Each period for April and July of each year, 2 day/period and 2 times/day	<Surface Water Environment Quality Standards>(GB3838-2000), Class III standard		

	Ecologies	varieties, quantities and biomass of phytoplankton and zooplankton; varieties, quantities and biomass of benthos and hydrophyte	The same as water quality supervision points of Tai Lake area			
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#### 5.2.4 Hongshan Rural Pollution Management Sample Engineering

Table 5.2-4 List of monitoring position arrangement

No.	Contents	Sample effect group	Comparison
1	Rural surface resource pollution regulation	Buffer belt and interception ditch discharge outlet corresponding to Lianghong Village Farm Land Regulation Shuixigang Discharge Outlet	Datang Bridge-farm land discharge outlet
		Buffer belt and interception ditch discharge outlet corresponding to Lianghong Village farm land Shenjialibing discharge outlet	Dongtang village-farm land discharge outlet
		Buffer belt and interception ditch discharge outlet corresponding to Nantang Village farm land regulation Chudeng Bridge River discharge outlet	Wanggengshang River and Nanyuchi River farm land discharge outlet
		Buffer belt and interception ditch discharge outlet corresponding to Nantang Village farm land regulation Wanggengshang River discharge outlet	Qiangengshangbing outlet farm land discharge outlet
2	Repair of ecological rivercourses	Shenjialibing, farm land interception discharge outlet, 500m downstream	Xiangshang River farm land interception discharge outlet, 50m downstream
		Nantang Village, Chudengqiao River, farm land interception discharge outlet, 500m downstream	Chudengqiao River interception discharge outlet, 50m downstream
		Wanggengshang River, Nanyuchi River farm land interception discharge outlet, 500m	Wanggengshang River, Nanyuchi River farm land interception discharge outlet, 50m
		Lianghong Village Shenjiali outlet farm land interception discharge outlet, 500m downstream	Qiangengshangbing outlet farm land interception ditch discharge outlet, 50m downstream
3	Underground water	Xisanfang, Jingengshang, Nanyuchi and Banfangshang	

**Table 5.2-5 Summary list of supervision schedule of Hongshan rural surface resource pollution management sample area sub-project  
(construction period)**

Monitoring object	Monitoring item/parameter	Monitoring frequency	Monitoring position	Executor of supervision	Organization and execution institution	Responsibilities for supervision
Farmer households	Usage of various kinds of fertilizer and pesticide	2 times/year	Farmer households office	Agricultural service center	Boyuan Wu	Sub-project Office
Water discharge outlets of farm lands	TN、NH <sub>3</sub> -N, COD <sub>cr</sub> , TP	paddy field: 4 times/year dry land: subject to water discharge		Unit qualified for supervision and capacity science and research institution		
Underground water of farm lands	TN、NH <sub>3</sub> -N, COD <sub>cr</sub> , TP	4 times/quarter		Unit qualified for supervision and capacity science and research institution		
Water quality of rivercourses	TN、NH <sub>3</sub> -N, COD <sub>cr</sub> , TP、BOD <sub>5</sub>	4 times/year		Unit qualified for supervision and capacity science and research institution		

### 5.3 Monitoring Instruments and Equipments

According to the conducted environmental monitoring projects, monitoring instruments and equipment will be determined. The monitoring instruments and equipment required for the proposed project is shown in the table 5.3-1.

**Table 5.3-1 List of environmental monitoring instruments and equipment**

SN	Name	Specification	Unit	Quantity
1	Atomic absorption spectrophotometer	Furnished with lame and graphite furnace	Set	1
2	UV-visible spectrophotometer		Set	1
3	Spectrophotometer	VIS-723	Set	1
4	COD Analyzer	HH-1	Unit	1
5	BOD Analyzer		Unit	4
6	PH meter	PHS-25	Unit	1
7	Conductivity Meter	BSD-A	Unit	1
8	Automatic potentiometric titration device	ZD-3	Unit	1
9	Nephelometer		Unit	1
10	Precision balance	1/10000auto-coded	Unit	1
11	Table balance		Unit	1
12	Refrigerator		Unit	1
13	Electrothermal constant-temperature dry box	HG202- II 10-300°C	Unit	1
14	BOD incubator	HW-III	Unit	1
15	Automatic monitor		Unit	1
16	Other sporadic equipment and instruments		Unit	1
17	GC		Unit	1
18	Automatic water collector		Set	1
19	Computer		Unit	2
20	Printer		Unit	2
21	Chemical reagent		Set	1
22	Fume hood		Set	1
23	Portable sound grader		Set	1

## **5.4 Environmental Monitoring Report**

### **5.4.1 Environmental Monitoring Report during Construction**

In the period of project construction, according to different construction phases of projects, the environmental management agencies should entrust local environmental monitoring stations to undertake environmental monitoring and submit the report to the local environmental protection department.

The report should cover construction progress, main construction contents and methods, review of environmental impact and the implementation of its mitigation measures.

At the construction stage, the monthly report shall be compiled and submitted to the Project Management Office and the Municipal Environmental Protection Bureau.

### **5.4.2 Environmental monitoring project report during operation**

During the operation period, the environmental management agency (EMA) should entrust the local monitoring stations to carry out environmental monitoring according to requirements of environmental impact assessment (EIA) and timely submit monitoring reports to the local environmental authorities.

Monitoring report covers:

- 1) Monitoring time, frequency, position, project, methods and quality control programs;
- 2) Monitoring data and statistical analysis;
- 3) Operation of facilities during the monitoring period;
- 4) Abnormal projects.

## **6. Personal Training**

### **6.1 Training Requirements**

The main recipients of environment capacity-building are environmental managers and environmental supervisors; their training is part of technical supports of the project. Training is also provided for construction units and workers in the implementation of the project. Before the construction, all construction units, operation units and construction supervisors are required to attend compulsory environment, health and safety training.

### **6.2 Training Content**

#### **6.2.1 Environmental Manager and Environmental Supervision Engineer**

Training is organized by the Municipal Project Management Office and executed by technical experts from the environment department, with the participants of environmental managers of the Municipal Project Management Office, environmental managers of sub-projects. The training contents are shown as in Table 6.2-1.

**Table 6.2-1 Training of Environmental Managers and Environmental Supervision engineers**

Problems	Training content	Duration
Operational capability	<ul style="list-style-type: none"><li>• Skim and recognize hotkeys of Word, Excel and PowerPoint</li><li>• Study the security policies of the World Bank</li><li>• Reinforce learning, the environmental specifications compiled by technical adviser should incorporate monitoring instructions</li><li>• Learn environmental impact of projects and environmental projects required monitoring</li></ul>	4 days
Compliance monitoring	Inspection on the site of training covers organization, communication, roles and responsibilities, decision-making process, observation procedures of reports and standards	1 day
Emergency response team	<ul style="list-style-type: none"><li>• On-site knowledge of hazardous materials</li><li>• Potential leaks and spillover</li></ul>	1 □ 2 day

	<ul style="list-style-type: none"> <li>• Environmental and personal effects of leaks and spillover</li> <li>• Emergency response process including priority response</li> <li>• Location and usage of emergency facilities</li> <li>• Communication and reporting facilities</li> </ul>	
Emergency relief and medical assistance	Seek for medical assistance and other relevant medical help under emergent and non-emergent occasions. (Such as long-distance call, medical advice)	1□2 day
Management of hazardous materials and waste including explosive waste	<ul style="list-style-type: none"> <li>• Proper use and storage</li> <li>• Proper use including fuel filling, calculating usage amount, ensuring effective use of equipment, proper disposal of used storage tanks</li> <li>• Storage management of hazardous waste</li> <li>• Land lease and slash management</li> <li>• Non-hazardous waste management</li> <li>• Medical issues exposed to hazardous medical waste</li> <li>• Emergency response process</li> </ul>	1□2 day
Health and safety inspection and reporting process	<ul style="list-style-type: none"> <li>• Health and safety issues</li> <li>• Health and safety requirements</li> <li>• How to implement health and safety inspection</li> <li>• Reporting and solving problems</li> </ul>	1 day
Traffic safety	<ul style="list-style-type: none"> <li>• Traffic rules</li> <li>• Training on safe driving</li> <li>• Vehicle maintenance</li> <li>• Fuel filling</li> <li>• Emergency response process</li> </ul>	1□2 day
Monitoring and analysis of water, air and noise	<ul style="list-style-type: none"> <li>• Use of equipment, including standards, testing, methods, sample transfer, quality control of data</li> <li>• Monitoring and reporting requirements</li> </ul>	1□2 day

### 6.2.2 Contractors and Construction Workers

Organized by the Municipal Project Office or construction owners of sub-projects, training is conducted on the site of project prior to construction, and executed by environmental management experts or trained environmental managers. Specific training contents and duration are shown in Table 6.2-2.

**Table 6.2-2 Training of Construction Workers**

Mode	Training Content	Training Duration
General environmental knowledge of construction workers	<ul style="list-style-type: none"> <li>• Introduction of environment-related factors and environmental protection measures</li> <li>• Introduction of environment-sensitive areas and problems as well as neighboring areas within the construction area</li> <li>• Roles and responsibilities of design engineers of environmental management, environmental supervisors and construction supervisors, report points of environmental problems</li> <li>• Waste management of construction camps and construction sites</li> <li>• Pollution control measures of construction sites</li> <li>• Penalty of violation of laws and regulations</li> </ul>	Venues in each half-day classes
General health and safety of construction workers	<ul style="list-style-type: none"> <li>• Dissemination and protection means to prevent HIV / AIDS and STD</li> <li>• Alcohol and drug prohibition</li> <li>• Seek for medical assistance and other relevant medical help under emergent and non-emergent occasions.(Such as STD testing, counseling)</li> <li>• Common knowledge of health and safety, including some basic process: traffic safety, electrical safety, explosion, fire, hazardous waste management</li> <li>• Use of personal protective device</li> <li>• Penalty of violation of laws and regulations</li> </ul>	Venues in each half-day classes

### 6.2.3 Operators

**Table 6.2-3 Training of environmental managerial personnel**

Objects	Training content	Training period
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Environmental managerial personnel	<ul style="list-style-type: none"> <li>• Project Management procedure of the World Bank</li> <li>• Archiving, announcement, communication and reporting mechanisms of environmental information</li> <li>• Emergency of environmental risks</li> <li>• Health and safety inspection and reporting</li> </ul>	1 day in Wuxi
	Advanced technology and environmental management inspection	Investigation of advanced municipal projects
Environment staff	<ul style="list-style-type: none"> <li>• The use of equipment, including standards, testing, methods, sample transfer, quality control of data</li> <li>• Monitoring and reporting requirements</li> <li>• Emergency of environmental risks: potential leak and spillover, environment and personal impact of leak and spillover, emergency response process including priority response, location and use of emergency facilities</li> </ul>	2 days in Wuxi

### 6.3 Training Budget

Budget on capacity-building projects is shown in Table 6.3-1.

**Table 6.3-1 Training program of environmental staff of subprojects**

Stages	Category	Number(Person)	Cost(Ten thousand Yuan)
Construction period	Environmental Manager and Environmental Managerial personnel	10	20
	Project Manager Coordinator	4	4
	Environmental Supervision Engineer	4	4
	Complaint receptionist	1	1
	Construction workers	all workers of Contractors	10
	Subtotal		39

Operation period	Training for full-time environmental managerial personnel of company	4	8
	Environmental risk responders of company	4	4
	Skill training of enterprise environment staff	Several	10
	Subtotal		22
Total cost		61	

## 7 Estimated Investment in Environmental Protection

The total cost of environmental monitoring is shown table 7 below.

**Table 7-1 Environmental management budget of sub-projects during construction period**

Project Name	Annual cost of construction period □ 10,000 Yuan □					Construction life	To cc		
	PMU operation			Environmental monitoring	Environmental supervision				
	Wage	Office expenses	Transportation expense						
Rehabilitation Project of Changguangxi Ecological Wetland	9.0	2.0	0.8	0.8	5.0	3	52		
Phase IV of Huishan Sewage Treatment Plant and Phase I of Recycling of Reclaimed Water	9.0	2.0	0.5	0.9	5.0	4	69		
Ecological Desilting Project of Key Areas of Taihu Lake	9.0	2.0	0.8	10.0	5.0	4	10'		
Pollution Control Demonstration Area Hongshan Village	9.0	2.0	0.8	3.0	5.0	5	95		
Staff training				39.0					
Total				367.6					

**Table 7-2 Environmental management budget of sub-projects during operation period**

Project Name	Annual cost of operation period □ 10,000 Yuan □					Total	
	PMU operation			Environmental Monitoring			
	Wage	Office expenses	Transportation expense				
Rehabilitation Project of Changguangxi Ecological Wetland	6	1	0.8	3	10.8		

Phase IV of Huishan Sewage Treatment Plant and Phase I of Recycling of Reclaimed Water	6	1	0.5	4	11.5
Ecological Desilting Project of Key Areas of Taihu Lake	6	1	0.8	4	11.8
Pollution Control Demonstration Area Hongshan Village	6	1	0.8	—	7.8
Staff training	22				
Total	639,000 yuan / year				

the Municipal Project Management Office Environmental management budget□

①□ Wage□200,000 yuan / year□

②□ Office expenses□20,000 yuan / year□

③□ Transportation expense□10,000 yuan / year□

**Total**□RMB2□075,000 yuan / year

## **8. Information Exchanging, Gathering and Reporting**

### **8.1 Information Exchanging**

Environmental management requires that the internal information exchanging should be processed between different departments and positions, and the organization should report some relevant information to the outside (parties concerned, public, etc.).

Internal information exchange can be processed in the forms of meeting, briefing, etc., and it is imperative to have an official meeting every month. All information exchanged shall be recorded and archived.

External information exchange is carried out once every six months or 1 year, and the exchange with coordinating units shall be summarized and archived.

### **8.2 Records**

To effectively run an environmental management system, organizations must establish a complete record system and retain records of the following aspects:

- 1) Legal and regulatory requirements;
- 2) Licensing;
- 3) Environmental factors and related environmental impacts;
- 4) Training;
- 5) Inspection and maintenance activities;
- 6) Monitoring data;
- 7) The effectiveness of corrective and preventive measures;
- 8) Information of parties concerned;
- 9) Auditing;
- 10) Assessment.

In addition, some processes must be conducted to the above-mentioned aspects including identification, collection, cataloging, archiving, storage, management, maintenance, inquiry, retention period and disposal.

### **8.3 Report**

Contractors, monitoring units and project office should record project progress, implementation of EMP and monitoring results of environmental quality and report them promptly to the relevant authorities in project implementation phase. The following three aspects are included:

- 1) The contractors and monitoring units should make a detailed record of and report the implementation of EMP to the Project Office;
- 2) The project progress reports (monthly, quarterly, annual reports, etc.) prepared by the Project Office should include the EMP progress, such as implementation progress and effects of EMP;
- 3) The annual EMP executive report must be completed and submitted to the World Bank before 31 March of the following year.

EMP executive report covers the following parts:

- ① Implementation of training programs;
- ② Progress of the project, such as the dredging area, wetland plant cultivation, the length of laid pipeline, number of composting fields and construction progress of other projects;
- ③ Record the main contents, solutions of complaints (if any) and public satisfaction,
- ④ EMP implementation plan for the next year.

