

**GEF SHANGHAI AGRICULTURAL AND NON-POINT POLLUTION  
REDUCTION PROJECT**

**E2150v19**

**COW MANURE TREATING ENVIRONMENTAL PROJECT AT  
JINSHAN DAIRY FARM**

**AND**

**RIVER-NETWORK WETLAND DEMONSTRATION  
PROJECT IN SHUXIN TOWN, CHONGMING COUNTY**

**ENVIRONMENTAL MANAGEMENT PLAN  
(UPDATED)**

**EAST CHINA NORMAL UNIVERSITY**

**July 26, 2012**

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## **1 INTRODUCTION**

### **1.1 Background**

Shanghai is the most economically developed and the most populated city in China. At the end of 2010, Shanghai had a population of 23 million across its 6340.5 km<sup>2</sup> of land. The suburban area beyond the outer ring is an important production base for agriculture and industry of Shanghai. N, P and organic matters discharged to water bodies in suburban area account for 60-70%, mainly from agriculture and animal husbandry, agricultural chemicals and surface runoffs including rain runoff and farmland irrigation water drainage, livestock and poultry manure and untreated industrial and domestic wastewater are the major causes for eutrophication of water bodies. Non-point pollution has become a major form of pollution for the water environment of Shanghai. Contaminated surface waters draining into Huangpu River and Yangtze River impose an adverse impact on the two rivers that we cannot afford to neglect. As the municipal drinking water source protection area upstream Huangpu River suffers from increasingly heavier contamination of water in recent years, the development of the higher-quality new Qingcaosha municipal drinking water source has to be accelerated. To reduce land-based pollution of offshore waters of Yangtze River Estuary, improve natural and ecological environment of Shanghai, and eliminate the conflicts between agricultural and non-point pollution in Shanghai and its objective of becoming an environment-friendly city, Shanghai Municipal Government cooperates with the World Bank, the PIU of GEF, to seek a feasible new approach to pollution reduction in relation to the non-point pollution in suburban areas where the economy experience ongoing growth, and to find solutions for difficulties in regional economic growth and urbanization.

The project consists of a series of environmental protection demonstration components aiming at mitigating agricultural and non-point pollution, reducing pollutants discharged via runoffs into Huangpu River and Yangtze River, and protecting and improving water environment.

Because of the project changes, Jiading Town River-network Wetland Demonstration Project for planning reasons, is no longer included in the GEF Shanghai Agricultural and Non-point Pollution Reduction Project, and replaced by the Shuhe Village and Huimin Village of Shuxin Town River-network Wetland Demonstration project. The project of livestock waste management on large farm (Jinshan dairy farm), due to major changes in the technical process, the biogas-fueled power generation is canceled, so the EMP for the two Components, on the basis of updated FSRs and EA documents, needs to be updated and consolidated as a single report included major key points of EIA.

### **1.2 Objectives of the EMP**

A key objective of the environmental impact assessment process is to identify the

potential impacts on the environment of the activities anticipated in project development, construction and operation by engineering analysis and impact forecast to suggest and make a set of mitigation measures technically appropriate, financially acceptable and practically applicable in the concerned regions. The role of the EMP is to guarantee the mitigation, monitoring and institutional measures to be carried out during project construction and operation to avoid or control adverse environmental impacts, and to outline the actions needed to implement these measures.

### **1.3 Organization of the EMP Report**

The ensuing chapters of this report deal with the following topics:

- ◇ Overview and EA on the Project
- ◇ Environmental Management Plan
- ◇ Environmental Monitoring Plan
- ◇ Budget Estimate and Source Funds
- ◇ Staff Training
- ◇ Information Mangement
- ◇ Summary of Environmental Management Plan

## 2 OVERVIEW AND EA ON THE PROJECT

### 2.1 Overview of Project

The overview of Project is shown in table 2.1.

**Table 2.1 Overview of the Project**

<b>Item</b>	<b>Component A</b>	<b>Component B</b>
The name of construction project	Cow Manure Treating Environmental Project at Jinshan Dairy Farm,	River-network Wetland Demonstration Project in Shuxin Town, Chongming County
Project position	Component A is located at the existing site of Shanghai Bright Holstein Dairy Farm in the Jinshan Modern Agricultural Park, Langxia Town, Jinshan District. (see Fig. 2.1)	Component B is located at the Shuhe Village and Huimin Village of Shuxin Town, Chongming County (see Fig. 2.1)
Owner	Shanghai Bright Holstan Co., Ltd.	Shuxin Town Government, Chongming County
Major elements of the Project	The major elements of the <i>Component A</i> include aspects: main building (wastewater treatment system), supporting project (supporting organic fertilizer), utilities and environmental projects. For details of the major elements of the Project, please refer to p11.	The Component B consists of the following two aspects: Part I: Rural domestic wastewater treatment plants Part II: Ecological restoration of the Dazhang River. For details of the major elements of the Project, please refer to p27.
Total investment	RMB 15.82 million	RMB 15.916 million
Construction phase	Two years, and the work will be completed at the end of 2013.	One year, and the work will be completed at the end of 2012.
EA approval status	In process of being submitted for approval.	In process of being submitted for approval.
EPB responsible for clearance	Jinshan DEPB	Chongming County EPB



**Fig. 2.1 Locations of Component A in Jinshan District and Component B in Chongming County**

## 2.2 Basis of the EA and EMP

### 2.2.1 EA Documents and FSRs of Related Components

- (1) Feasibility Study Report on Cow Manure Treating Environmental Project at Jinshan Dairy Farm, January, 2012, China Shipbuilding NDRI Engineering Co., Ltd.
- (2) Environmental Impact Report on Cow Manure Treating Environmental Project at Jinshan Dairy Farm, February, 2012, Shanghai Academy of Environmental Sciences;
- (3) Feasibility Study Report on River-Network Wetland Demonstration Project in Shuhe Village and Huimin Village of Shuxin Town, Chongming County, April, 2012, Shanghai Environmental Engineering Design & Research Institute Co., Ltd.
- (4) Environmental Impact Report on River-Network Wetland Demonstration Project in Shuhe Village and Huimin Village of Shuxin Town, Chongming County, April, 2012, Shanghai Environmental Research Centre Co., Ltd.

### 2.2.2 Laws of the PRC for Environmental Protection

- (1) Law of Environmental Protection of the PRC, December, 1989;

- (2) Law of Environment Impact Assessment of the PRC, October 28, 2002;
- (3) Law of Air Pollution Prevention and Control of the PRC, April 29, 2000;
- (4) Law of Water Pollution Prevention and Control of the PRC (Reissued), February 28, 2008;
- (5) Law of Environmental Noise Pollution Prevention and Control of the PRC, October 29, 1996 ;
- (6) Management Regulations on Environmental Protection for Construction Projects, People Republic of China State Council No.253 order, November. 1998;
- (7) Law of Solid Waste Pollution Prevention and Control of the PRC, December, 2004.
- (8) Law of Cleaning Production Promotion of the PRC, June 29, 2002;

### **2.2.3 Shanghai's Rules for Environmental Protection**

- (1) Regulations of Shanghai Municipality on Environmental Protection, October 28, 2005;
- (2) Functional Division of Shanghai Water Environment (Reissued), July 5, 2011;
- (3) Functional Division of Shanghai Ambient Atmospheric Quality (Reissued), July, 2011;
- (4) Functional Division of Shanghai Environment Noise (Reissued), February, 2012;
- (5) Twelfth Five Year Plan of Shanghai National Economic and Social Development; January 21, 2011;

### **2.2.4 World Bank's Safeguard Policies**

- (1) The World Bank's OP/BP4.01, Environmental Assessment;
- (2) The World Bank's OP/BP4.12, Involuntary Resettlement;

### **2.2.5 Technical Documents for Assessment**

- (1) Professional Standard, Technical guidelines for environmental impact assessment general programme, (HJ 2.1-2011);
- (2) Professional Standard, Guidelines for Environmental Impact Assessment Atmospheric Environment, HJ 2.2-2008;
- (3) Professional Standard, The Technology Guiding of Environment Impact Assessment — Surface Water Environment, HJ/T2. 3-93;
- (4) Professional Standard, Technical Guidelines for Noise Impact Assessment, HJ 2.4-2009;

- (5) Professional Standard, Technical Guideline for Environmental Impact Assessment Ecological Impact, HJ 19-2011;
- (6) Farmland environmental quality evaluation standards for livestock and poultry production (HJ 568-2010), April, 2010

**2.2.6 Standards of Assessment**

The following assessment standards are employed in line with the location of the Component A and Component B and Shanghai Municipal Government’s zoning water environment, ambient air and noise and applicable laws and regulations.

**2.2.6.1 Standard of Environment Quality Assessment**

**(1) Environmental Quality Standard for Surface Water**

According to the Functional Division of Shanghai Water Environment (Reissued), Component A is situated in Langxia Town, Jinshan District and subject to Class V standard, falling into Class V area; Component B is situated in Shuxin Town, Chongmin County and subject to Class III standard, falling into Class III area; Table 2.2 lists selected indicators for the environmental quality standards for surface water.

**Table 2.2 Environment Quality Standard for Surface Water (GB3838-2002)  
(mg/L, except pH)**

Parameter	pH	DO	COD <sub>Cr</sub>	BOD <sub>5</sub>	NH <sub>3</sub> -N
Class III standard	6~9	≥5	≤20	≤4	≤1.0
Class V standard	6~9	≥2	≤40	≤10	≤2.0

**(2) Environmental Quality Standard for Noise**

According to the Functional Division of Shanghai Environment Noise (Reissued), Component A, is within Class 2 zone and subject to Class 2 standard defined in Environmental quality standard for noise (GB3096-2008), and Component B, is within Class I zone and subject to Class 1 standard. Table 2.3 lists the standard values in Environmental quality standard for noise (GB3096-2008).

**Table 2.3 Environmental Quality Standard for Noise (GB 3096-2008) Leq(A):dB**

Grade	Daytime	Nighttime
Class 1 standard	55	45
Class 2 standard	60	50

**(3) Ambient Air Quality Standard**

According to the Functional Division of Shanghai Ambient Atmospheric Quality (Reissued), Component A is within Class II Zone and subjects to Class II standard.

Component B area consists of two parts, Shuhe village area is within Class I Zone and subject to Class I standard, and Huimin village area is within Class II Zone and subject to Class II standard. Table 2.4 lists the standard values of ambient air quality standards (GB 3095-2012).

**Table2.4 Ambient Air Quality Standard (GB 3095-2012) (mg/m<sup>3</sup>)**

Standard Reference	Sampling Time	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>
Ambient air quality standard GB3095-2012, Class I standard	Annual mean	0.04	0.02	0.04
	24-hour average	0.05	0.05	0.08
	1-hour average	—	0.10	0.12
Ambient air quality standard GB3095-2012, Class II standard	Annual mean	0.07	0.06	0.04
	24-hour average	0.15	0.15	0.08
	1-hour average	—	0.50	0.20

#### (4) Standard of Assessment for Sediment

The Class II standard defined in Environmental Quality Standard for Soils (GB15618—1995) is used for assessment on river sediment removal involved in the Project, see Table 2.5.

**Table2.5 Executive Standard of Assessment for Sediment**

Environmental Factor	Standard Reference	Pollutant Parameter	Unit	Standard Value
Soil	Environmental quality standard for soils ( GB15618-1995 ) Grade II	Copper	mg/kg	≤100
		Lead	mg/kg	≤350
		Chromium	mg/kg	≤250
		Zinc	mg/kg	≤300
		Cadmium	mg/kg	≤0.60
		Arsenic	mg/kg	≤30
		Mercury	mg/kg	≤1.0

#### 2.2.6.2 Pollutants Discharge Standard

##### (1) Wastewater Discharge Standard

Wastewater discharge is subject to the Discharge Standard for Municipal Sewerage System (DB31/425-2009) for Component A. Table 2.6 lists selected indicators for the Discharge Standard for Municipal Sewerage System (DB31/425-2009). Wastewater discharge is subject to Class I B standard defined in Discharge standard of pollutants for municipal wastewater treatment plant (GB 18918-2002) for Component B, and the discharge standard limited values are shown in Table2.7.

**Table 2.6 Discharge Standard for Municipal Sewerage System**  
(DB31/425-2009)

S/N	Parameter	Maximum Allowable Concentration of Pollutants Discharged
1	pH	6~9
2	COD <sub>Cr</sub> (mg/L)	500
3	BOD <sub>5</sub> (mg/L)	300
4	SS (mg/L)	400
5	TN (mg/L)	60
6	NH <sub>3</sub> -N (mg/L)	40
7	TP (mg/L)	8

**Tab.2.7 Executive Discharge Standard Limited Values for Wastewater in the Project Area**

Stage	Standard Reference	Standard Limited Values (mg/L)					
		COD <sub>Cr</sub>	BOD <sub>5</sub>	Coliform	NH <sub>3</sub> -N	TN	TP
Operation stage	Discharge standard of pollutants for municipal wastewater treatment plant (GB 18918-2002); Class I B standard	60	20	10 <sup>4</sup>	8	20	1.0

## (2) Integrated Emission Standards for Air Pollutants

The flue gas emission in biogas-based power generation projects is subject to the maximum allowable emission concentration for air pollutants emitted by gas-fired boilers defined in the Emission Standard for Air Pollutants from Boilers (DB31/387-2007), see Table 2.8. Fugitive emission of malodorous pollutants is subject to Class II standards for plant boundary defined in the Emission Standards for Odor Pollutants, see Table 2.9.

**Table 2.8 Emission Standard for Air Pollutants from Boilers (DB31/387-2007)**

No.	Pollutants	Unit	Maximum Allowable Emission Concentration for Air Pollutants Emitted by Gas-fired Boilers
1	SO <sub>2</sub>	mg/m <sup>3</sup>	50
2	NO <sub>x</sub>	mg/m <sup>3</sup>	200
3	Smoke	mg/m <sup>3</sup>	30

**Table 2.9 Plants Boundary Standard Value of Odor Pollutants (GB14554-93)**

Pollutant	Standard Reference	Factors	Concentration Limited Value Of Fugitive Emission	
			Class I	Class II
Odor pollutants	Emission standards for odor pollutants GB 14554-93 Class II standard (for the projects of new construction, reconstruction or expanded construction)	H <sub>2</sub> S (mg/m <sup>3</sup> )	0.03	0.06
		NH <sub>3</sub> (mg/m <sup>3</sup> )	1.0	1.5
		Odor concentration (No unit)	10	20

### (3) Emission Standards for Noise

According to the Emission Standard for Industrial Enterprises Noise at Boundary (GB12348-2008), Component A falls into Class 2 area, where the noise at plant boundary must meet Class 2 standard, and Component B falls into Class 1 area, where the noise at plant boundary must meet Class 1 standard, see Table 2.10. The executive emission standard for noise during construction stage is shown in Table2.11.

**Table2.10 Emission Standard for Industrial Enterprises Noise at Boundary (GB12348-2008),**

Leq(A): dB		
Time Interval	Daytime	Nighttime
Class 1 standard	55	45
Class 2 standard	60	50

**Table2.11 Executive Emission Standard for Noise during Construction Phase**

Pollutant	Standard Reference	Factors	Standard Limited Value	
			Daytime	Nighttime
Noise	Emission standard of environment noise for boundary of construction site (GB12523-2011)	Leq	70	55

## 2.3 Overview of Local Environment

### 2.3.1 Physical Environment

#### (1) Locations of the Project

Component A is located at Langxia Town, Jinshan District in South Shanghai. Component B is located at Shuxin Town, Chongming County in East Shanghai.

#### (2) Geology and Terrain Features

This area is a part of the alluvial plain of the Yangtze Delta, flat and level. According to its microtopographic features, components of the earth surface and development history, it falls into sedimentary geomorphology. The area is a dish-edge highland at the toe of the Yangtze Delta, with surface elevation ranging from 4 m-5 m.

#### (3) Climate

The project area is in the oceanfront at the northern edge of the northern subtropical zone where the East Asian monsoon prevails and falls into the tropical oceanic monsoon climate. As an effect of the monsoon climate, northwest wind prevails in winter, and the weather is cold and dry; southeast wind prevails in summer, and the weather is hot and humid. The annual average precipitation is 1,145 mm, and the annual sunshine hours are 1,872-2,115. The annual average temperature is 15.7°C.

The annual mean precipitation is 1,127.7 mm, the annual mean sunshine hours are about 2,170, and annual mean wind speed is 3.2 m/s.

#### **(4) Surface Water**

Huigao Creek and its tributary Hongqiao Port are in Langxia Town, Jinshan District; Jinshan District; Nanheng Diversion River, Zhihe River and Zhangzhanggang River and its tributary Huimin River and Dazhang River in Shuxin Town; Inland rivers not affected by tides usually stay at a water level of about 2.5 m, utilized for flood control, shipping and irrigation.

##### **2.3.2 Water Quality**

According to the EIA report on Cow Manure Treating Environmental Project at Jinshan Dairy Farm provided by Shanghai Academy of Environmental Sciences, the water quality of Hongqiao Port located west of the Dairy Farm is described below: The dissolved oxygen (DO) is 2.02-2.41 mg/L (Class V), COD is 5.88-7.16 mg/L (Class IV), BOD<sub>5</sub> is 3.31-4.28 mg/L (Class IV) and ammonia nitrogen (NH<sub>3</sub>-N) 2.56-5.02 mg/L (inferior to Class V).

According to the EIA report on Component B provided by Shanghai Environmental Research Centre Co., Ltd., the water quality of Huimin River is described below: The dissolved oxygen (DO) is 6.4 mg/L (Class II), COD is 9 mg/L (Class II), five-day BOD is 3.7 mg/L (Class III), ammonia nitrogen is 0.82 mg/L (Class III), total phosphorus is 0.22mg/L(Class IV) and total nitrogen is 1.71 mg/L.

##### **2.3.3 Ambient Air Quality**

The pollutants in Component A area are mainly nitrogen oxides, total suspended particulate (TSP), sulfur dioxide and PM<sub>10</sub>. In the area, the average concentrations of air pollutants in 2010 are as follows: about 0.022 mg /m<sup>3</sup> for SO<sub>2</sub>, about 0.034 mg /m<sup>3</sup> for NO<sub>2</sub>, about 0.143 mg /m<sup>3</sup> for TSP and about 0.065 mg /m<sup>3</sup> for PM<sub>10</sub>. The ambient air quality in the area currently meets national Class II standard for ambient air.

According to the EIA report on Component B by Shanghai Environmental Research Centre Co., Ltd., the ambient air quality in the area currently meets national Class I standard(GB3095-1996) for SO<sub>2</sub> and NO<sub>2</sub>.

##### **2.3.4 Environment Noise**

According to the existing project completion acceptance report, the noise monitoring values are 53.3-55.5 dB (A) at boundary of the Component A in the daytime, and the environmental noises meet standards for the Class II function zone.

The environmental status in the surroundings of the Component B is mainly farmland and village roads, environmental quality for noise meets standards for the Class I function zone.

##### **2.3.5 Social and Economic Conditions**

###### **(1) Langxia Town, Jinshan District**

Langxia Town, planned as a municipal modern agricultural park of Shanghai, consists of 1 Neighborhood Committees and 12 Administrative Villages. The town has a population of 31,107 and land area of 51 km<sup>2</sup>. In 2006, the park generated a GDP of RMB730 million, state revenue of RMB125 million and farmers' per capita income of RMB 8,711.

## **(2) Shuxin Town, Chongming County**

Shuxin Town consists of 2 Neighborhood Committees and 21 Administrative Villages. The town has a total population of 47272, of which agricultural population of 35897, and land area of 58.84 km<sup>2</sup>. In 2010, the town produced RMB828.61 million of domestic value added, RMB38.00 million of state revenue, and RMB 6,660 of farmers' per capita income.

## **2.4 Main Contents and Conclusions of EA Report for the Component A**

### **2.4.1 General Description of the Component A**

#### **(1) Project Location**

The project is located at the existing site of Shanghai Bright Holstein Dairy Farm in the Jinshan Modern Agricultural Park, Langxia Town, Jinshan District, Shanghai.

#### **(2) Description of the Component A**

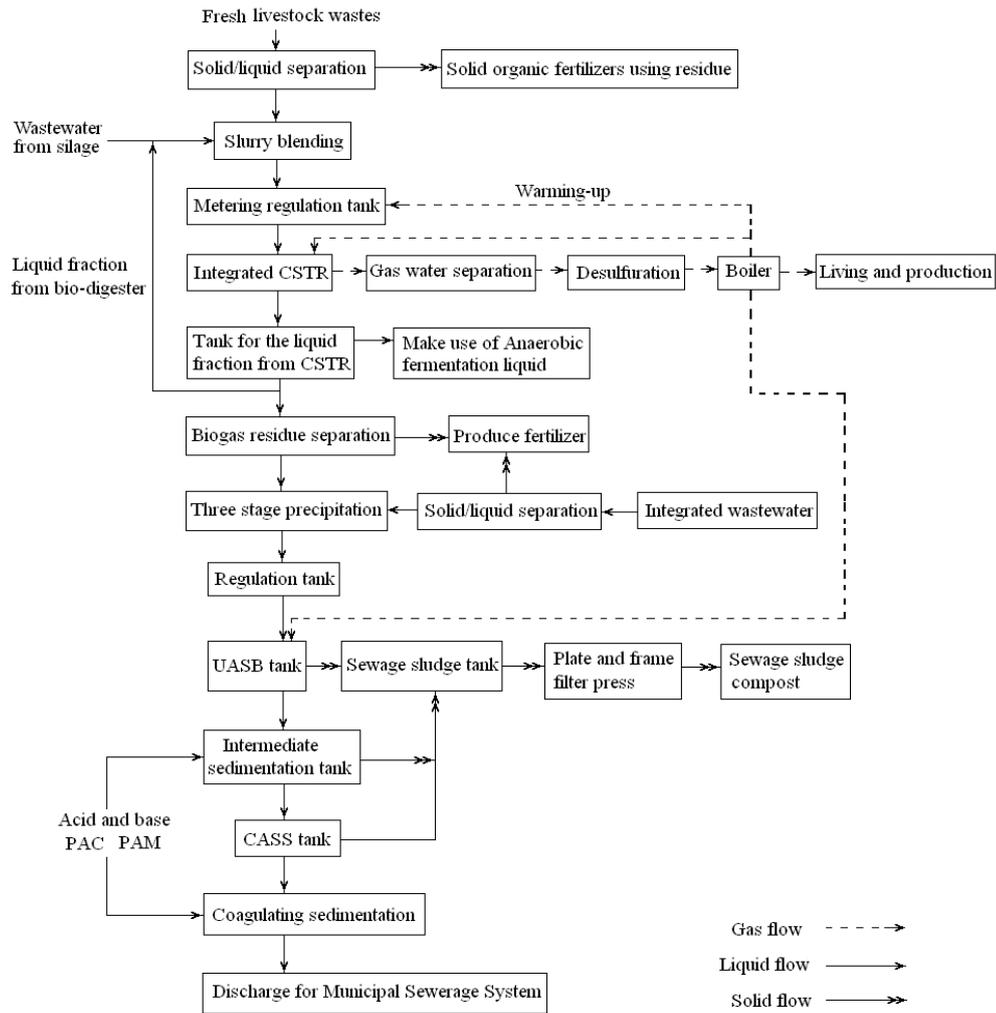
The major elements of the Component A include aspects: main building (wastewater treatment system), supporting project (supporting organic fertilizer), utilities and environmental projects.

- ◇The main buildings (wastewater treatment system) include slurry blending tank, complete mix anaerobic reactor, biogas purification room, UASB tank, CASS tank, coagulating sedimentation tank and others.
- ◇The supporting projects (supporting organic fertilizer) include road, Film greenhouse and others.
- ◇Public works include boiler house, management room and others.
- ◇Environmental installations include biogas desulfuration, biogas residue treatment, green and others.

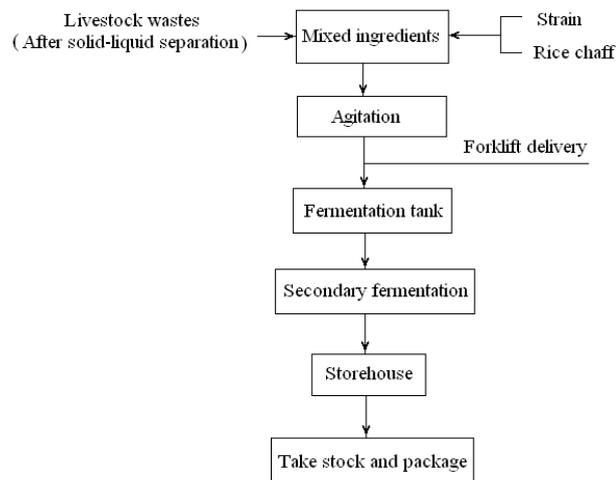
After implementation of the Component A, the Project can treat 280 t/d cow manure and 347 t/d wastewater, and produce 29,200 t solid organic fertilizers using biogas residue one year.

#### **(3) Process Flow of Wastewater Treatment**

For the process flow diagram of wastewater treatment, see Fig. 2.2, and process flow diagram of the wastewater treatment is shown in Fig. 2.3.



**Fig. 2.2 Process Flow Diagram of the Wastewater Treatment**



**Fig. 2.3 Process Flow Diagram of the Sewage Sludge Compost**

## 2.4.2 Project Alternative

### (1) With and Without the Component A

According to the analysis on environmental and social benefits of the Project and requirements on local economic development, without the Component A, the environmental quality in the rural areas will deteriorate, and, in particular, the environmental quality of surface waters will continue to worsen, which may drag on the reduction of rural and agricultural non-point pollution to the Yangtze River Estuary and the East China Sea. As for the livestock and poultry sector, the environmental pollution caused by livestock and poultry manure must be addressed.

In the organic fertilizer center at Shanghai Bright Holstein Jinshan Dairy Farm, odors arising from manure storage will disperse in an fugitive way and cause heavy pollution to the farm and ambient environment. Without the Component A, these wastes would be discharged without proper treatment and finally pollute the water environment of the East China Sea. Therefore, the Project is necessary.

### (2) Alternative Locations for the Component A

To the extent as permitted by the State's land policies, the sites of the Project are selected under the following principles.

- ◇ Site selection will take into account the convenience and advantages of land, such as proximity to pasture and remoteness from residential community.
- ◇ Avoid resettlement of local residents and environmentally sensitive points.
- ◇ Saving investment for project construction

Based on field conditions of Shanghai Bright Holstein Jinshan Dairy Farm, the Component A will be located on the existing site, which is less in environmental impact, less in investment, and the most cost effective and the most reasonable in operation than all other options. Thus the optimal option is seating the Component A at the existing site of Shanghai Bright Holstein Jinshan Dairy Farm.

### (3) Alternative Technical Process

The original technical process to be adopted for Component A is described as follows: After pretreatment and anaerobic digestion, the cow dung and urine of the project produce biogas, which is then purified and generate electricity with the biogas-fueled co-generation units; the residual heat from the biogas-fueled co-generation units are used to heat anaerobic feedstock; the liquid fraction from bio-digester will be discharged into the municipal sewer network after treatment at the wastewater treatment station reconstructed to the discharge standard of Jinshan Langxia Wastewater Treatment Plant, while the sludge is transported to organic fertilizer plant and made into organic fertilizer.

Adjustment of wastewater treatment process by UASB and CASS (see Figure

2.2), cancel the process of electric power generation with the biogas-fueled co-generation units, after treatment, water quality can meet the requirements of the *Discharge Standard for Municipal Sewerage System* (DB31/425-2009). In organic fertilizer producing process, the addition amount of the rice chaff can be reduced from 65% to 50%, increasing the fertility of organic fertilizer. The table 2.12 is a comparison between the original technical process and the adjustment of the technical process.

**Table 2.12 Comparison between the Original Technical Process and the Adjustment of the Technical Process**

Item	Original Technical Process	Adjustment of the Technical Process
Wastewater treatment	The liquid fraction from bio-digester treated, the tail water can meet standards for the wastewater discharge to the municipal sewerage system	After treatment, the tail water can meet standards for the wastewater discharge to the municipal sewerage system
Operating conditions	There are many uncertain factors during the operation	Generally speaking, running smoothly
Production management	The process is more complex, difficult to operation	Mature technology, easy to manage
Biogas use	Used for power generation, it is difficult for incorporated into the power grid.	The heat produced by burning biogas is used for sewage treatment and daily life
Total investment	RMB 36 million, larger investment	RMB 15.82 million, smaller investment

For the foregoing reasons, it is reasonable to adopt the technical process after adjustment.

#### (4) Selection of key techniques of the anaerobic reactor process

The application of currently available typical anaerobic reactors is compared in Table 2.13

**Table 2.13 Comparison of Typical Anaerobic Reactors**

Name of Reactor	Pros	Cons	Scope of Application
Continuously stirred tank reactor (CSTR)	Low investment, simple operation and management, strong resistance to shock load, high gas output rate;	Stirring device required	Treatment of livestock wastes with high concentration and high percentage of suspended solids
Anaerobic contact reactor	Low investment, simple operation and management, strong resistance to shock load	Long residence time; sludge backflow device required	Organic wastewater with high concentration and high percentage of suspended solids

Upflow anaerobic sludge blanket (UASB)	High treatment efficiency, good output water quality	High investment, stringent requirements on SS content of wastewater	Soluble organic wastewater with low SS content
Upflow solid reactor (USR)	High treatment efficiency and high volumetric loading rate	Stringent requirement on uniform distribution of feedstock	Organic wastewater with high solid content

After comparison, the CSTR and UASB are selected for the project. It features high treatment capacity, high biogas output, easy management, readily startup and low operational cost.

### 2.4.3 Analysis of Pollution Source

#### (1) Main Environmental Impacts in the Construction Period

According to field surveys, the main environmental impacts in the construction period are listed in Table 2.14.

**Table 2.14 Main Environmental Impacts in the Construction Period**

No.	Main Environmental Impacts	Environmental Element
1	Slurry and domestic wastewater generated in construction	Surface water pollution
2	Fugitive dust from construction and exhaust gas of machines	Ambient air pollution
3	Noises from construction equipments	Noise
4	Domestic wastes from construction personnel and decoration wastes	Solid wastes
5	Construction wastes from removal and upgrading of existing workshops	Solid wastes
6	Temporary occupation of lands and roads during construction	Social environment
7	Occupation of the existing composting site during construction and temporary displacement of the existing composting site	Pollution of surface water and ambient air
8	Transplant trees	Ecological Environment

Pollutants that affect ambient air in construction period are mainly fugitive dusts and exhaust gas emitted by construction machines and vehicles. Excavation surfaces, loading and unloading of construction materials, excavation spoils, construction wastes and vehicles entering and leaving site will all produce fugitive dusts; noises are principally from construction and moving vehicles. Impact on surface water environment in construction period is primarily from oil and SS contained in drainage from construction process.

#### (2) Main Environmental Impacts in the Operation Period

Main environmental impacts in the operation period are shown in table 2.15.

**Table 2.15 Main Environmental Impacts in the Operation Period**

No.	Main Environmental Impacts	Environmental Element
1	Rainwater on the composting site discharged into the rainwater drainage system and the epidemic prevention river.	Surface water pollution
2	Odor from animal manure	Ambient air pollution
3	Noises from fertilizer workshop and equipments	Noise
4	Exhaust gas from biogas combustion	Ambient air pollution
5	Odor from wastewater treatment station and noise from its equipments	Ambient air pollution , Noise
6	Dust from solid organic fertilizer workshop	Ambient air pollution

### ( 3 ) Analysis on Pollution Source

#### A. Analysis on Wastewater Pollution Source

Wastewater in the Project principally includes liquid fraction from bio-digester and domestic wastewater.

According to the updated FSRs and EA documents, actual wastewater quantities of existing project are about 347m<sup>3</sup>/d, not added after the completion of the *Component A*, the wastewater is treated by wastewater treatment station in cow farm, the tail water which can meet the requirements of the *Discharge Standard for Municipal Sewerage System* (DB31/425-2009) is discharged into the Jinshan Langxia wastewater treatment plant. The Jinshan Langxia WWTP has a design capacity of 10,000 t/d and currently treats about 5,000 t a day, fully capable of receiving all wastewater of the Project. Jinshan Langxia Wastewater Treatment Plant has consented to accept treated wastewater of the Project and entered into an agreement with the Owner

#### B. Analysis on Waste Gas from Combustion

In biogas combustion, the purified biogas has a very little content of H<sub>2</sub>S and other impurities. According to estimation, the maximum emission concentration of SO<sub>2</sub> contained in the combustion emissions is 2.86 mg/m<sup>3</sup>.

#### C. Analysis on Solid Wastes

During operation of the Project, solid wastes are mainly biogas sludge. The Project generates about 2555 t/a of biogas sludge (moisture content of 80%), which will be treated in the existing manure treatment system and turned into fertilizers or otherwise used for the purpose of integrated utilization.

Every year about 4.5 tons of waste desulfurizer will be produced, and the waste desulfurizer all return to supply manufacturers for unified disposal, however, does not constitute a new pollution source.

#### **D. Analysis on Noise Pollution Sources**

Noises are mainly from pumps, motors and mixers. Motors operate at a noise level of about 75 dB (A).

#### **2.4.4 Environmental Impacts and Mitigation Measures**

The construction of Component A would have a negative impact on the environment to some extent, but the impact is of temporary and local nature. If appropriate mitigation measures are adopted, this impact can be minimized or even eliminated. Possible potential impacts generated in the construction period include soil, air, noise, greening and surrounding communities. Environmental impacts and mitigation measures in the construction period are shown in the table 2.16.

Environmental impact produced in the project operation period mainly refers to noise generated by running of machinery, such as pump noise and so on, offensive smell from livestock wastes and sewage treatment sites and solid wastes like sludge from sewerage sumps and sedimentation tanks. Environmental impacts and mitigation measures in the operation period are shown in the table 2.17.

**Table 2.16 Environmental Impacts and Mitigation Measures during the Construction Period**

<b>Environment Impact</b>	<b>Related Mitigation Measures</b>	<b>Responsibility for Implementation</b>	<b>Responsibility for Supervision</b>
Dust	<p>Spoil would generate dust to pollute air in the process of handling and stacking, so that TSP is increased, in particular in windy days. Following measures shall be adopted:</p> <ul style="list-style-type: none"> <li>● "Shanghai Dust Pollution Control Management Methods" should be strictly enforced. Spoil generated in road excavation should be frequently watered in fine and windy days. Construction period shall be shortened as far as possible and dust shall be timely removed. In transportation, watering or covering shall be conducted to prevent dust.</li> <li>● Sand, cement and other building materials easy to produce dust should be put in appropriate places with wind boards and isolated wall installed; cement should be put in warehouse. Dust prevention bag shall be installed when unloading bulk cement.</li> <li>● Vehicles entered on to the construction site should have their speed limited. Road surface shall be maintained clean and wet to reduce dust.</li> <li>● Construction site management shall be strengthened. When choosing construction units PIA shall consider the quality of construction unit. Environmental impact mitigation measures shall be included in the contract, which shall be under strict supervision and inspection from the beginning to the end.</li> <li>● In transportation, spoil, building garbage, building materials (sand and cement) shall be covered.</li> </ul>	Contractor	SEPB/Jinshan DEPB
Greening and vegetation	<ul style="list-style-type: none"> <li>● If project buildings or structures are constructed on the original greening area, this will have impact on greening, which shall be addressed in accordance with provisions of the "Shanghai Municipal Afforestation and Green Land Administration Regulation". Trees within construction area should be transplanted. In order to ensure the survival rate of trees, the construction unit shall engage green professionals to be responsible for this work.</li> <li>● After the completion of the project, greening shall be restored as far as possible to minimize the</li> </ul>	Contractor	SEPB/Jinshan DEPB

	adverse impact on green space and trees.		
Solid waste	<ul style="list-style-type: none"> <li>● Construction of this project will produce a certain amount of spoil and building garbage. PIA should, in accordance with the requirements set in the "Management and Regulation of the Shanghai Municipality Regarding Disposal of Building Garbage and Engineering Spoil", apply to the Jinshan District Municipal Spoil Management Department for approval of its building garbage and spoil disposal plan prior to the commencement of construction. Do accordingly after approval.</li> <li>● In case toxic and hazardous wastes are produced, construction should be suspended and the EP and health department contacted timely. Construction can be restarted after safety measures are adopted.</li> </ul>	Contractor	SEPB/Jinshan DEPB
Noise	<ul style="list-style-type: none"> <li>● Low-noise construction machinery and equipment should be chosen as far as possible. Simple noise barriers should be set up when construction area is quite close to sensitive areas.</li> <li>● In the construction period, construction noise should be strictly controlled and it is required to meet the requirements in GB12523-2011. No high-noise operations could be performed from 22:00 to 6:00. In case night operation is required by technology, application to the local environmental protection department for approval shall be made before operation to be carried out. Prior-notice shall be given to gain forgiveness of the masses.</li> <li>● In order to reduce noise impact on the environment in the operation of equipment, sound insulation measures shall be adopted in civil works and surrounding environment shall be considered in the civil works design.</li> </ul>	Contractor	SEPB/Jinshan DEPB
Wastewater	<ul style="list-style-type: none"> <li>● The construction process (such as land excavation, etc.) will produce a lot of mud water. Sedimentation tanks of different sizes shall be installed according to mud water volume. Water on the upper level of the tank can be discharged into rivers nearby as ordinary wastewater. Sediment shall be treated regularly as solid wastes and should not be put together with domestic garbage.</li> </ul>	Contractor	SEPB/Jinshan DEPB
Residential wastes	<ul style="list-style-type: none"> <li>● Construction of the project requires a certain amount of construction staff. Contractors will often provide necessary facilities within the temporary work area for construction workers in order to complete the project on quality and time. Thus, a certain amount of domestic wastes will be produced. PIA must contact with sanitation department for timely removal of wastes.</li> </ul>	Contractor	SEPB/Jinshan DEPB

	<ul style="list-style-type: none"> <li>● Contractor is required to carry out education for construction workers, who shall develop civilized construction, creating a clean and hygiene environment for work and living.</li> </ul>		
Waste gas	<ul style="list-style-type: none"> <li>● A certain amount of diesel machinery and vehicles will be employed in construction and tail gas emissions will cause air pollution. Good quality diesel machinery of sufficient combustion shall be chosen and operated in places as far as possible away from residential areas and other sensitive points.</li> <li>● Similar transport vehicle emission mitigation measures shall be adopted. Vehicles of inadequate combustion causing heavy pollution should be repaired before use.</li> </ul>	Contractor	SEPB/Jinshan DEPB
Social impact (traffic and immigrant, etc.)	<ul style="list-style-type: none"> <li>● Road excavation shall have an impact on traffic. Excavation site shall set up isolation binder or board. Persons on duty shall be arranged at the crossroads to direct traffic to guard against the occurrence of traffic accidents.</li> <li>● Construction of this project does not involve the issue of resettlement and immigrant.</li> </ul>	Contractor	SEPB/Jinshan DEPB
Cultural relics	<ul style="list-style-type: none"> <li>● No relics are found. If cultural relics are discovered in the construction, stop the construction and report the case promptly to the local cultural relics management department.</li> </ul>	Contractor	Jinshan cultural relic bureau
Environmental Management	<ul style="list-style-type: none"> <li>● Independent environmental supervision engineers should supervise the whole process of the entire project.</li> <li>● Demand of civilized construction is asked for the contractor during the bidding process. When call for tender, auditing and manage the technique measures and non- technique measures of the contractor.</li> </ul>	Contractor	PMO
Staff Training	<ul style="list-style-type: none"> <li>● Civilized construction (contractor, workers). The training system includes training of professional health and safety regulations and contingency plan.</li> </ul>	Contractor	PIA/ PMO

**Table 2.17 Environmental Impacts and Mitigation Measures during the Operation Period**

<b>Environment Impact</b>	<b>Related Mitigation Measures</b>	<b>Responsibility for Implementation</b>	<b>Responsibility for Supervision</b>
Noise	<ul style="list-style-type: none"> <li>● Choose low-noise equipment with noise level being generally lower than 70 dB (A). Install them at suitable places.</li> <li>● Choose low-noise submersible pumps, whose noise level is less than ordinary water pumps.</li> </ul>	Owner	SEPB/Jinshan DEPB

	<p>Noise level of water pump is an important parameter and should be taken into consideration.</p> <ul style="list-style-type: none"> <li>● Low-frequency noise produced when pump is operating can be absorbed by special materials.</li> <li>● Sound-insulation of pumping room can effectively reduce noise.</li> <li>● Noise generated by dynamic imbalance of rotating parts of machinery can be adjusted. Noise produced by mechanical and pipe vibration can be solved by adding vibro-damping mount, the use of damping materials and cladding measures. Noise silencers shall be installed to eliminate noise generated by inlet and outlet gas. Silence louvers shall be adopted at air ports. Lubricants and acoustic enclosures can be used to control noise generated by gear friction.</li> <li>● Noise at plant boundary shall meet Class 2 standard defined in <i>Emission Standard for Industrial Enterprises Noise at Boundary</i> GB12348-2008.</li> </ul>		
<p>Ambient air</p>	<ul style="list-style-type: none"> <li>● Dust produced in the cut of feed, dry of residues and organic fertilizers could be collected by dust collection devices.</li> <li>● Hydrogen sulfide contained in biogas can be purified by desulfurization devices.</li> <li>● Follow the "Discharge standard of pollutants for livestock and poultry breeding" to control the concentration of odor and plant trees in the factory boundary to insulate sound and adsorb odor.</li> <li>● Preventive separation shall be arranged in accordance with the requirements of EIA. Protective area shall be fully greened and set up greenbelt. Planning and construction of houses, schools, hospitals and other sensitive buildings within in the health preventive area are strictly prohibited.</li> <li>● Stacking, transporting and processing must be strictly managed. Small volume of offensive smell generated from rural sewage treatment stations shall be emitted by means of deodorization devices.</li> <li>● Dust-removal measures must be adopted in the workshop producing dust. Operators there must have preventive devices.</li> <li>● Pretreatment workshops and other odor sources shall be provided with sealing, odor collection and other measures. The extracted odor shall be emitted at height after deodorization.</li> <li>● The concentration of hydrogen sulfide, ammonia and odor at plant boundary shall meet Class II standard defined in <i>Emission standards for odor pollutants</i> GB14554-93.</li> </ul>	<p>Owner</p>	<p>SEPBJinshan DEPB</p>

Surface water	<ul style="list-style-type: none"> <li>● Sewage treatment equipment should be strictly managed to ensure that devices are in normal working status and to ensure that the water discharged meets the standard.</li> <li>● Domestic sewage such as cloth-washing waste water can not be directly discharged into the river or dumped at will.</li> <li>● Discharging Sewage and livestock wastes in to farm moat is strictly prohibited.</li> <li>● Rain water after sedimentation can be discharged into the farm moat.</li> <li>● After expansion of capacity, the wastewater treatment facilities shall suffice to treat liquid fraction from bio-digester and other wastewater produced in the Project, with pollutants contained in the effluent to comply with the Discharge Standard for Municipal Sewerage System (DB31/425-2009) . Wastewater is treated by Jinshan Langxi Wastewater Treatment Plant (WWTP).</li> </ul>	Owner	SEPB/Jinshan DEPB
Solid waste	<ul style="list-style-type: none"> <li>● Residues of grill and sludge from sedimentation tanks must be regularly collected. Solid wastes shall be treated by the sanitation department in time.</li> <li>● Domestic garbage shall be collected and treated in time by sanitation department.</li> <li>● Sulfur from biogas desulfurization devices and discarded desulfuration agent must be collected for disposal by a qualified organization.</li> <li>● It is prohibited to stack livestock wastes at any place in the pasture and disposed in sewage pit.</li> </ul>	Owner	SEPB/Jinshan DEPB
Staff training	<ul style="list-style-type: none"> <li>● Production workors, management staff should receive necessary qualification inspection and pre-professional technical training. The training system includes training of professional health and safety regulations and contingency plan.</li> </ul>	Owner	PIA/ PMO
Environmental management	<ul style="list-style-type: none"> <li>● To establish environmental management department, and to frame the environmental protection overall planning and implementation proposal of the project, and to be responsible for the implementation and summary.</li> <li>● To develop and fulfill the emergency plans and measures about pollution incidents.</li> <li>● To establish and implement the monitoring plan of pollution and environment, to make comprehensive understanding of the operation, statistics and monitoring data of processing units to ensure that emissions comply with the national, industry and local relevant standards.</li> </ul>	Owner	PMO

## 2.4.5 Risks Prevention Measures and Emergency Plan

This project involves production, storage and use of biogas, a flammable and explosive gas. These procedures are exposed to certain risks and hazards. In these areas, smoking and fire are strictly prohibited, and fire hydrants, fire control facilities and lightning arrester are required in accordance with the national standards on fire safety. The fire and explosion emergency plan must be developed, and regular fire drill is required. The probability of explosion and deflagration is very low if employees always keep fire safety in mind.

### (1) Risks prevention measures

- ◇ Strictly observe the 《 Criteria for designing of biogas plant in scale livestock and poultry breeding Farms 》. Biogas must go through purification system before entry into the storage tank. Biogas treated in the purification system must meet the following criteria: Methane content must be above 50%, and SO<sub>2</sub> content below than 20mg/m<sup>3</sup>.
- ◇ Layout of facilities in workshop must strictly implement the relevant national norms of fire and explosion prevention, must ensure a sufficient safety distance between devices, and set as required fire fighting access.
- ◇ Reliable sealing techniques must be used for equipments, pipes and fitting, so as to assure a fully sealed environment in digester, biogas tank and conveyance process to prevent biogas leak.
- ◇ The gas storage tank must be designed as per the 《 Safety and technical supervision regulations for pressure vessel 》 and be equipped with relief vessel to eliminate the over-pressure hazards.
- ◇ For materials that may generate static electricity in workplaces exposes to explosion or fire hazards, take preventive measures against industrial static electricity.
- ◇ Near the anaerobic digestion tank, provide emergency, cabinets, first aid kits, protective masks and clothing, goggles, rubber gloves, earplugs and other necessary supplies.

### (2) Safety management and emergency plan

- ◇ Provide education and training for the employees, so that they have the risk consciousness and how to avoid hazards.
- ◇ Strictly follow the environmental accident reporting procedures, and immediately report to the government or competent authorities upon detection of any environmental accident, without any concealment and omissions.
- ◇ Put in place environmental protection and rescue measures. Set up a leadership

team to direct rescue efforts on the scene of accidents, identify causes immediately, develop response and rescue actions and use all resources available to control the pollution accidents to prevent further spreading.

- ◇ If biogas leaks and causes fires, immediately report to fire agents and local government and request emergency rescue services. Setup an emergency rescue leadership team composed of firefighters, medical personnel project technicians and plant leaders to centrally direct fire fighting, and evacuate adjacent people to safe places according to fires and wind direction. Provide first aids to injured people.
- ◇ The owner shall develop an emergency plan, arrange emergency response personnel to receive training and emergency drills, provide safety and health education for workers, and provide people in adjacent areas with education on prevention of environmental risks and accidents, emergency trainings and regular release of relevant information.
- ◇ Keep records of emergency accidents and maintain a filing and reporting system under management by a specially designated department.

### (3) Emergency plan and its particulars

Main emergency plan and its particulars are shown in the table 2.18.

**Table 2.18 Main Emergency Plan and Its Particulars**

S/N	Item	Description and Requirement
1	Emergency plan areas	Targets exposed to hazards: Plant area, storage tank area, environmental protection targets
2	Emergency organization and personnel	Emergency organization and personnel of the factory and the local area
3	Classified emergency response	Define the levels of emergency and classify response procedures
4	Emergency response supplies	Emergency facilities, equipments and devices
5	Reporting and communication methods	Define the reporting, communication and notification methods in emergencies as well as traffic assurance and control measures.
6	Environment monitoring, emergency rescue and control measures	Assign a professional team to monitor the scene of accident assess the nature, parameters and consequences of the accident and provide a base for decision makers.
7	Emergency testing, protection measures, leak removal measures and equipments.	Accident scene, adjacent areas, fire control areas, control and pollution remove measures, and relevant equipments.
8	Emergency evacuation, exposure control and evacuation plan.	Regulations over pollutants over exposure of people on the scene of accident or in areas adjacent to the factory or other affected areas, evacuation plan and rescue, medical treatment and public health.
9	Closing procedures and	Define the emergency closing procedures; Deal with

	restoration measures for emergencies	aftermath of accident on the scene, Restoration measures; Cancellation of emergency alert in adjacent areas and restoration measures;
10	Emergency training plan;	Arrange employees to participate in training and drills after the emergency plan is developed.
11	Public education and information disclosure	Provide public education, trainings and release relevant information in adjacent areas of the factory.

## 2.4.6 Public Consultation & Information Disclosure

According to the World Bank OP4.01, the public participation is needed and a relevant section should be prepared. Therefore, the public participation has been organized, with participants mainly being local people indirectly or directly affected by the Project.

### (1) Information Disclosure

The first public disclosure of the project information was made on January 18, 2012 at <http://www.envir.gov.cn/info/2012/20081184976.htm>. The project managers, the EA consultants and relevant contact persons are identified (see Fig.2.4).



**Fig. 2.4 Notice about the EA on Shanghai Environment Online**

The second public disclosure of the project information was made on June 6, 2012 at <http://www.envir.gov.cn/eia/annou.aspx.htm>. (see Fig.2.5).



### 金山种奶牛场奶牛粪尿处理环保工程环境影响评价第二次公示

发布单位: 上海市环境科学研究院  
 发布日期: 2012年06月06日  
 相关链接: [环评报告书简本](#) [环评第一次公示](#)

#### 1 说明

上海市环境科学研究院受上海光明荷斯坦牧业有限公司委托开展对“金山种奶牛场奶牛粪尿处理环保工程”进行环境影响评价。现根据国家及本市法规及规定, 并经上海光明荷斯坦牧业有限公司同意向公众公开环评内容。

本文本内容为现阶段环评成果, 下一阶段将在听取公众、专家等各方面意见的基础上, 进一步修改完善。

#### 2 建设项目概况

- (1) 项目名称: 金山种奶牛场奶牛粪尿处理环保工程
- (2) 建设地点: 金山区廊下镇现代农业园区内上海光明荷斯坦牧业有限公司金山种奶牛场场内
- (3) 所属行业: 畜牧业
- (4) 建设内容: 牛粪尿综合处理工程, 本工程建成后粪尿处理总量为280t/d, 污水处理量为347m<sup>3</sup>/d; 利用沼渣产有机肥2.92万t/a。
- (5) 项目环境影响评价结论

本工程为奶牛场配套环境改善工程, 符合国家产业政策, 其选址满足区域总体规划、环保规划、产业发展等其他相关规划、以及《规模化禽畜养殖场沼气工程设计规范》的要求。

项目的实施具有良好的经济效益和显著的环境、社会效益。同时从总体来说, 当地具备项目建设所需的自然环境、社会环境和环境质量条件。

项目建成运行后产生的各环境污染因素可控性较强。在通过合理布局、污染控制等措施后, 可以做到达标排放, 其对外界影响较小, 不会对当地环境产生明显影响。

综上, 本评价认为在通过采取必要的环境保护和污染控制措施后, 建设项目的环境影响能够控制在当地环境保护的规定要求之内, 在满足本评价中提出的污染防治措施的前提条件下, 建设项目在环境上是可行的。

**Fig. 2.5 The No.2 Notice about the EA on Shanghai Environment Online**

The texts of EA report and EMP of the Component A have been displayed to the public from June 6, 2012 at the following locations:

- (1) The Community Cultural Center Library of Langxia Town, Jinshan District  
Address: 228 Jingle Road, Langxia Town, Jinshan District
- (2) Shanghai Bright Holstan Jinshan Dairy Farm.  
Address: Wanyong Road, Langxia Town, Jinshan District
- (3) The Recreation Room of Villagers Committees of the Guangming Village, Langxia Town, Jinshan District  
Address: 985 Jinshi Bei Road, Langxia Town, Jinshan District

The public can go to above sites to understand and look up the full reports from June 6, 2012 in working hours.

## **(2) Public Participation**

Questionnaire surveys in this part were mainly targeted at people affected in the local area of the Project.

The research team conducted questionnaire surveys on February 10, 2012, covering employees of organizations adjacent to the project area as well as local residents. Totally 100 questionnaires were distributed and 100 returned, representing a questionnaire return rate of 100%.

In these surveys, a large proportion of respondents chose “OK” and “Satisfied” for the local ambient air quality, surface water quality and environmental sanitation, and only one respondent were dissatisfied with the local surface water quality.

The great majority of respondents were satisfied with measures taken in the Project, including enclosed production and storage workshops, use of exhaust gas treatment facilities. All of the respondents were satisfied with the wastewater treatment measures taken in the Project and wastewater discharge through municipal sewer system. 90% of respondents were satisfied with the noise control measures taken in the Project.

### **2.4.7 Resettlement and Immigrant**

The Component A is located at the existing site of Shanghai Bright Holstein Dairy Farm, and land acquisition can not be required, so the construction of Component A does not involve the issue of resettlement and immigrant.

## **2.5 Main Contents and Conclusions of EA Report for the Component B**

### **2.5.1 General Description of the Component B**

#### **(1) Project Location**

Component B is located at the Shuhe Village and Huimin Village of Shuxin Town, Chongming County.

#### **(2) Description of the Component B**

Component B consists of the following two aspects:

##### **① Rural domestic wastewater treatment system**

The rural domestic wastewater treatment system consists of 13 rural domestic wastewater treatment plants (WWTPs) and the design capacity of domestic wastewater for Huimin village and Shuhe village is 213m<sup>3</sup>/d and 47m<sup>3</sup>/d, respectively, and the design total capacity is 260m<sup>3</sup>/d. The covered area is 40~80m<sup>2</sup> for every plant including six parts: oil separation tank, digestion tank, anaerobic digestion, gravity-flow aeration ecological bed, constructed wetland and ecological drainage ditch. The 13 WWTPs cover a total area of 650 m<sup>2</sup> and the DN75~DN200 sewage

pipeline is constructed. According to the Project Feasibility Study Report of *Component B*, the locations of 13 rural domestic wastewater treatment plants (WWTPs) are shown in Fig. 2.6-2.7, the conditions of the Huimin village and Shuhe village are described in Table 2.19 below:

**Table 2.19 Conditions of the Huimin Village and Shuhe Village**

S/N	Village	No. of Households	Population	Design Total Capacity (m <sup>3</sup> /d)
1	Huimin	750	2250	213
2	Shuhe	167	501	47
Total		917	2751	260



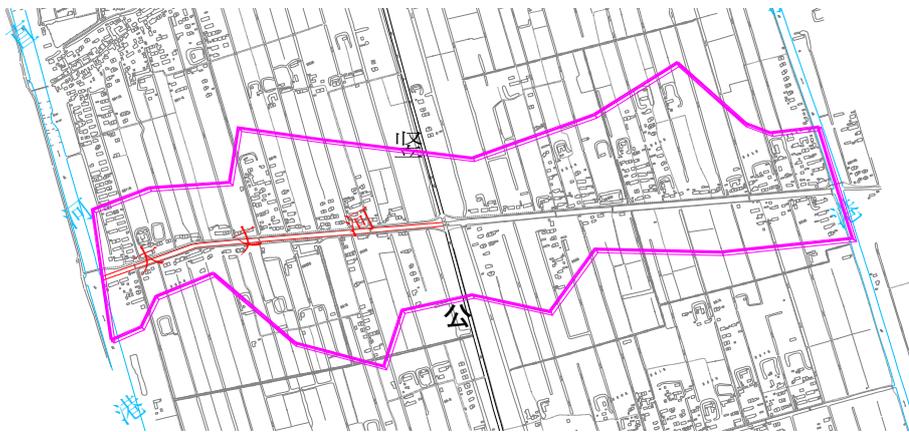
**Fig. 2. 6 the Locations of 10 Rural Domestic Wastewater Treatment Plants (WWTPs) in Huimin Village (Huimin 1#-- Huimin 10#)**



**Fig. 2.7 the Locations of 3 Rural Domestic Wastewater Treatment Plants (WWTPs) in Shuhe Village (Shuhe 1#- Shuhe 3#)**

**② Ecological Restoration of the River-network Wetland**

The length and area of eco-restoration of the Dazhang River are 1000m and 22000m<sup>2</sup> respectively. The location of eco-restoration of the Dazhang River is shown in Fig. 2.8.



**Fig. 2.8 The Location of Eco-restoration of the Dazhang River**

The main aspects of the ecological restoration are as follows:

**(i) Basement Repair**

Base repair mainly refer to dredge exist rivers. This project of river dredging and widening is to achieve the following objectives:

- to maintain the wetland function of the original river courses as far as possible, including reeds;
- to strengthen river dikes, improve soil and water conservation capacity of river bank, so as to conform with the requirements of stability of river side slope, and decrease silting-up resulting from collapse;

The design standard of the river substrate restoration works are as follows:

◆ **Ratio of River to Slope:**

According to geological data and based on the overall stability of the slope of the river, the ratio of river to slope is set to 1:1.5. Because rivers on the site are relatively small ones, construction of dredging sludge will generally be carried out by mechanical suction.

◆ **Standard of Flood Drainage:**

The standard of flood drainage: once every 20 years, based on the fact that maximum 24-hour rainfall is 209 mm locally, and max. 1-hour rainfall is 36 mm. So it is adapted to the drainage standard of “once a year” adopted in the urban drainage system;

◆ **Designed Water Level:**

The highest control water level: 3.9 m; the design lowest one: 2.0 m; and the normal one: 2.5 - 2.8 m.

◆ **Total Earthwork Volume of River Dredging**

According the estimation of the project feasibility study report, the total earthwork volume of the dredging will be 29,400 m<sup>3</sup>. The river sediment after compost and fermentation can be as manure to the farmland.

(ii) **Slope of the River:**

River slope of 2000m will be constructed, including 2000m within the vertical slope of the river by ecological wood pile. The ratio of river to natural slope is set to 1:1.5.

(iii) **Construction of Vegetation Buffer Zone:**

The vegetation buffer zones of 4-5 meters wide within the slope of the natural river will be constructed to hold back non-point farmland pollutants, filter out N and P organic fertilizer. Through retention, filtration and conversion by vegetation buffer zone, eutrophication of water caused by non-point pollutants could be reduced. The vegetation buffer zones of about 3 meters wide will be constructed within the slope of the river by wood pile.

(iv) **Aquatic Plant:**

The reed, an emerged plant, is planted in the river side slope below the 0.5m depth of water, and the hygrophyte is planted in the river side slope above the 0.5m depth of water, including wildrice stem, Vetiver zizanioides and Canna lily. The Water lilies are planted at the river bottom.

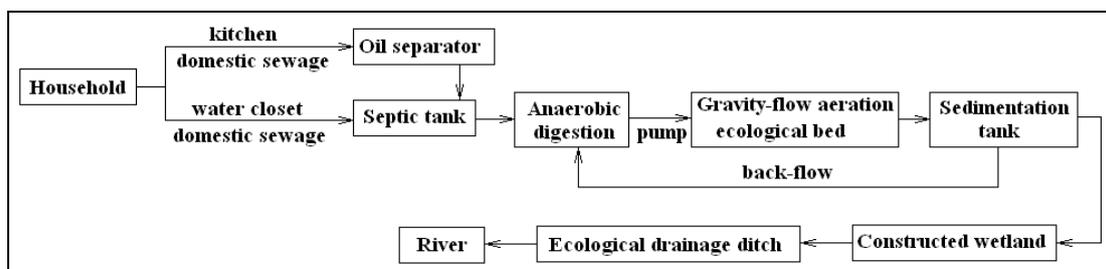
### ③ Economical Technical Index

**Table 2.20 The Main Economical Technical Indexes**

S/N	Item	Unit	Economical Technical Index
1	Earthwork dredging	m <sup>3</sup>	29,400
2	River length of eco-restoration	m	1,000
3	River area of eco-restoration	m <sup>2</sup>	22,000
4	Design total wastewater capacity	m <sup>3</sup> /d	260
5	Total works investment	Million RMB	15.916

### (3) Process Flow of Wastewater Treatment

For the process flow diagram of wastewater treatment, see Fig. 2.9.



**Fig.2.9 Process Flow Diagram of Sewage Treatment**

## 2.5.2 Project Alternative

### (1) With and Without the Component B

According to the analysis on environmental and social benefits of the project and requirements on local economic development, without the Component B, the farmers in Shuhe Village and Huimin Village of Shuxin Town, will discharge domestic wastewater directly or indirectly into the surface water, because it is impossible to build a local wastewater collection system, and the environmental quality of surface water will continue to worsen, which cannot help reduce pollution of water environment of Chongmin areas and the East China Sea, and also pose an adverse impact on local farmers. Therefore, the Project is necessary.

### (2) Alternative Locations for the Component B

To the extent as permitted by the State's land policies, according to local topography and distribution of residential houses, roads and rivers, the sites of the rural domestic wastewater treatment plants are selected under the following principles:

- ◇ Site selection will take into account the rational use of land, such as barren land

and remoteness from residential community.

- ◇ Avoid resettlement of local residents and environmentally sensitive points.
- ◇ Good conditions of receiving water bodies and compliance with drainage laws and regulations;
- ◇ Convenience of construction and maintenance;
- ◇ Saving investment for project construction;

The physical features of the areas served by 13 rural domestic wastewater treatment plants (WWTPs) in Huimin village and Shuhe village are flat. These WWTPs may be located in line with the landform and available vacant land in the villages.

### (3) Alternative Technical Process

In alternative process analysis for wastewater treatment, the following principles must be taken into account: place, treatment level, discharge standards, nature of wastewater, capital cost and operational cost. For decentralized domestic wastewater in rural areas, the treatment system with simple process, reliable treatment and simple operation and maintenance is the optimal technology, which has great significance in both wastewater treatment and resource conversion, focusing on decentralized and local treatment and recovery of nutrients. For conventional processes and technologies for rural wastewater treatment and their pros and cons, see Table 2.21.

**Table 2.21 Comparison of Rural Domestic Wastewater Treatment Processes and Technologies in China and Other Countries**

S/N	Processes Technologies	Pros/Cons	Processing Effect
1	A combination of anaerobic process - constructed wetland	The anaerobic process dramatically reduces organic matters in wastewater and eases the load of constructed wetland. The anaerobic process avoids large footprint of wetland, while wetland mitigate or eliminates strong odor present in the anaerobic process.	After treatment, the main water quality index can meet class II standard defined in discharge standard of pollutants for municipal wastewater treatment plant (GB 18918-2002)
2	A combination of anaerobic process - gravity-flow aeration and contact oxidation ditch -constructed wetland	Applicable to live relatively concentrated village, and for the removal of nitrogen and phosphorus having fixed requirements.	Under normal temperature the wastewater by treated, the main water quality index can meet class I B standard defined in discharge standard of pollutants for municipal wastewater treatment plant (GB 18918-2002), and under low-temperature, can meet class II standard.
3	A combination of	Applicable to live relatively	Under normal temperature the

	anaerobic process - waterfall aeration and contact oxidation-constructed wetland	concentrated village, and for the removal of nitrogen and phosphorus having higher requirements, the capacity of sewage treatment should not be more than 200t /d.	wastewater by treated, the main water quality index can meet class I B standard defined in discharge standard of pollutants for municipal wastewater treatment plant (GB 18918-2002), and under low-temperature, can meet class II standard.
4	A combination of anaerobic process - pulse filter - constructed wetland	Applicable to live relatively concentrated village, and for the removal of nitrogen and phosphorus having higher requirements, the capacity of sewage treatment should not be more than 200t /d.	Under normal temperature the wastewater by treated, the main water quality index can meet class I B standard defined in discharge standard of pollutants for municipal wastewater treatment plant (GB 18918-2002), and under low-temperature, can meet class II standard.
5	A combination of tower microbial-earthworm ecofilter	Convenient in operation and management, resistant to heavy impact load, resource/energy efficient and bio- friendly for the ecofilter; It can be applied to the village with the tail-water quality requirements of high, especially suitable for 3 ~ 4 meters topography gap in the hilly area.	Under normal temperature the wastewater by treated, the main water quality index can meet class I B standard defined in discharge standard of pollutants for municipal wastewater treatment plant (GB 18918-2002), and under low-temperature, can meet class II standard.
6	MBR Technology	A combination of membrane separation unit and bio-treatment unit that purifies wastewater through physical filtration and biological decomposition. Compact structure, modular design, integrated automatic control, high flexibility and adaptability in operation; short and easy construction. But membrane is vulnerable to blockage. It can be applied to the village with better economic conditions, the insecurity that use the land, the tailwater quality requirements of high.	High removal rate of pollutants; efficient in solid/liquid separation and removal of disease-causing microorganisms; After treatment, the main water quality index can meet Class I A standard defined in discharge standard of pollutants for municipal wastewater treatment plant (GB 18918-2002).
7	A combination of anaerobic process - gravity-flow aeration and contact oxidation-constructed wetland	Applicable to live relatively concentrated village, and for the removal of nitrogen and phosphorus having higher requirements, the capacity of sewage treatment should not be more than 20 t /d.	Under normal temperature the wastewater by treated, the main water quality index can meet class I B standard defined in discharge standard of pollutants for municipal wastewater treatment plant (GB18918-2002), and under low- temperature, can meet class II standard.

With the specific conditions of villages in Chongmin County being considered, after comparison, the combination of anaerobic process - gravity-flow aeration and contact oxidation ditch -constructed wetland and the combination of anaerobic process - waterfall aeration and contact oxidation- constructed wetland are recommended for wastewater treatment.

### 2.5.3 Analysis of Pollution Source

#### (1) Main Environmental Impacts in the Construction Period

According to field surveys, the main environmental impacts in the construction period are listed in table 2.22.

**Table 2.22 Main Environmental Impacts in the Construction Period**

No.	Main environmental Impacts	Environmental Element
1	Slurry and domestic wastewater generated in construction	Surface water pollution
2	Fugitive dust from construction and exhaust gas of machines	Ambient air pollution
3	Noises from construction equipments	Noise
4	Domestic wastes from construction personnel and decoration wastes	Solid wastes
5	Fugitive dust from storage of removed sediments; leakage of removed sediments during shipment;	Solid wastes, Ambient air
6	Temporary occupation of lands and roads during construction	Social environment
7	Transplant trees	Ecological Environment

Pollutants that affect ambient air in construction period are mainly fugitive dusts and exhaust gas emitted by construction machines and vehicles. Excavation surfaces, loading and unloading of construction materials, excavation spoils, construction wastes and vehicles entering and leaving site will all produce fugitive dusts; noises are principally from construction and moving vehicles. Impact on surface water environment in construction period is primarily from oil and SS contained in drainage from construction process.

#### (2) Main Environmental Impacts in the Operation Period

Main Environmental Impacts in the Operation Period are shown in the table 2.23.

**Table 2.23 Main Environmental Impacts in the Operation Period**

No.	Main environmental Impacts	Environmental Element
1	Surface runoff	Surface water
2	Foreign Plant Invading	Ecological environment
3	Discharging sewage or tail water into river	Surface water
4	Odor from wastewater treatment station and noise from its equipments	Ambient air pollution ,Noise

### (3) Analysis on Pollution Source

#### A. Sediment Pollution Investigation

The sediment analysis data from the feasibility study report of the project is shown in table 2.24.

**Table 2.24 Heavy metal contents in sediment of Dazhang River**

**Unit: mg/kg (except pH)**

pH	Cu	Ni	Zn	Cd	Pb	Hg	Cr	As
8.10~8.29	20.4~ 42.7	34.4~ 56.4	109~ 210	0.21~ 0.43	22.5~ 77.3	0.063~ 0.120	42.0~ 59.3	11.4~ 11.6
Quality standard for soils	II	II	II	II	II	I	I	I

The monitoring data in table 2.24 show that the heavy metal content of the removed sediments of Dazhang River does not exceed the II standards for Environmental quality standard for soils (GB 15618-1995), the contents of Hg, Cr and As in sediments meet the I standards of GB 15618-1995, and the other heavy metals meet the II standards. Therefore, these removed sediments are not hazardous solid waste and can be used for farming or forestry purposes.

#### 2.5.4 Environmental Impacts and Mitigation Measures

The construction of Component B would have a negative impact on the environment to some extent, but the impact is of temporary and local nature. If appropriate mitigation measures are adopted, this impact can be minimized or even eliminated. Possible potential impacts generated in the construction period include soil, air, noise, greening and surrounding communities. Environmental impacts and mitigation measures in the construction period are shown in the table 2.25.

Environmental impact produced in the project operation period mainly refers to noise generated by running of machinery, such as pump noise and so on, offensive smell from sewage treatment sites and solid wastes like sludge from sedimentation

tanks. Environmental impacts and mitigation measures in the operation period are shown in the table 2.26.

**Table 2.25 Environmental Impacts and Mitigation Measures during the Construction Period**

<b>Environment Impact</b>	<b>Related Mitigation Measures</b>	<b>Responsibility for Implementation</b>	<b>Responsibility for Supervision</b>
Dust	<p>Spoil would generate dust to pollute air in the process of handling and stacking, so that TSP is increased, in particular in windy days. Following measures shall be adopted:</p> <ul style="list-style-type: none"> <li>● "Shanghai Dust Pollution Control Management Methods" should be strictly enforced. Spoil generated in road excavation should be frequently watered in fine and windy days. Construction period shall be shortened as far as possible and dust shall be timely removed. In transportation, watering or covering shall be conducted to prevent dust.</li> <li>● Sand, cement and other building materials easy to produce dust should be put in appropriate places with wind boards and isolated wall installed; cement should be put in warehouse. Dust prevention bag shall be installed when unloading bulk cement.</li> <li>● Construction site management shall be strengthened. When choosing construction units PIA shall consider the quality of construction unit. Environmental impact mitigation measures shall be included in the contract, which shall be under strict supervision and inspection from the beginning to the end.</li> <li>● In transportation, spoil, building garbage, building materials (sand and cement) shall be covered</li> </ul>	Contractor	SEPB/ Chongming CEPB,
Greening and vegetation	<ul style="list-style-type: none"> <li>● If project buildings or structures are constructed on the original greening area, this will have impact on greening, which shall be addressed in accordance with provisions of the "Shanghai Municipal Afforestation and Green Land Administration Regulation". Trees within construction area should be transplanted. In order to ensure the survival rate of trees, the construction unit shall engage green professionals to be responsible for this work.</li> <li>● After the completion of the project, greening shall be restored as far as possible to minimize the adverse impact on green space and trees.</li> </ul>	Contractor	SEPB/ Chongming CEPB,

Solid waste	<ul style="list-style-type: none"> <li>● Construction of this project will produce a certain amount of spoil and building garbage. PIA should, in accordance with the requirements set in the "Management and Regulation of the Shanghai Municipality Regarding Disposal of Building Garbage and Engineering Spoil", apply to the Chongming County Municipal Spoil Management Department for approval of its building garbage and spoil disposal plan prior to the commencement of construction. Do accordingly after approval.</li> <li>● In case toxic and hazardous wastes are produced, construction should be suspended and the EP and health department contacted timely. Construction can be restarted after safety measures are adopted.</li> <li>● Contractor is required to carry out education for construction workers, who shall develop civilized construction, creating a clean and hygiene environment for work and living.</li> </ul>	Contractor	SEPB/ Chongming CEPB,
Noise	<ul style="list-style-type: none"> <li>● Low-noise construction machinery and equipment should be chosen as far as possible. Simple noise barriers should be set up when construction area is quite close to sensitive areas.</li> <li>● In the construction period, construction noise should be strictly controlled and it is required to meet the requirements in GB12523-2011. No high-noise operations could be performed from 22:00 to 6:00. In case night operation is required by technology, application to the local environmental protection department for approval shall be made before operation to be carried out. Prior-notice shall be given to gain forgiveness of the masses.</li> <li>● In order to reduce noise impact on the environment in the operation of equipment, sound insulation measures shall be adopted in civil works and surrounding environment shall be considered in the civil works design.</li> </ul>	Contractor	SEPB/ Chongming CEPB,
Wastewater	<ul style="list-style-type: none"> <li>● The construction process (such as land excavation, etc.) will produce a lot of mud water. Sedimentation tanks of different sizes shall be installed according to mud water volume. Water on the upper level of the tank can be discharged into rivers nearby as ordinary wastewater. Sediment shall be treated regularly as solid wastes and should not be put together with domestic garbage.</li> </ul>	Contractor	SEPB/ Chongming CEPB,
Residential wastes	<ul style="list-style-type: none"> <li>● Construction of the project requires a certain amount of construction staff. Contractors will often provide necessary facilities within the temporary work area for construction workers in order to complete the project on quality and time. Thus, a certain amount of domestic wastes will be</li> </ul>	Contractor	SEPB/ Chongming CEPB,

	<p>produced. PIA must contact with sanitation department for timely removal of wastes.</p> <ul style="list-style-type: none"> <li>● Contractor is required to carry out education for construction workers, who shall develop civilized construction, creating a clean and hygiene environment for work and living.</li> </ul>		
Waste gas	<ul style="list-style-type: none"> <li>● A certain amount of diesel machinery and vehicles will be employed in construction and tail gas emissions will cause air pollution. Good quality diesel machinery of sufficient combustion shall be chosen and operated in places as far as possible away from residential areas and other sensitive points.</li> <li>● Similar transport vehicle emission mitigation measures shall be adopted. Vehicles of inadequate combustion causing heavy pollution should be repaired before use.</li> </ul>	Contractor	SEPB/ Chongming CEPB,
Social impact (traffic and immigrant, etc.)	<ul style="list-style-type: none"> <li>● Road excavation shall have an impact on traffic. Excavation site shall set up isolation binder or board. Persons on duty shall be arranged at the crossroads to direct traffic to guard against the occurrence of traffic accidents.</li> <li>● Construction of this project does not involve the issue of resettlement and immigrant.</li> </ul>	Contractor	SEPB/ Chongming CEPB,
Cultural relics	<ul style="list-style-type: none"> <li>● No relics are found. If cultural relics are discovered in the construction, stop the construction and report the case promptly to the local cultural relics management department.</li> </ul>	Contractor	Chongmin County cultural relic bureau
Environmental Management	<ul style="list-style-type: none"> <li>● Independent environmental supervision engineers should supervise the whole process of the entire project.</li> <li>● Demand of civilized construction is asked for the contractor during the bidding process. When call for tender, auditing and manage the technique measures and non- technique measures of the contractor.</li> </ul>	Contractor	PMO
Staff Training	<ul style="list-style-type: none"> <li>● Civilized construction (contractor, workers). The training system includes training of professional health and safety regulations and contingency plan.</li> </ul>	Contractor	PIA/ PMO

**Table 2.26 Environmental Impacts and Mitigation Measures during the Operation Period**

Environment Impact	Related Mitigation Measures	Responsibility for Implementation	Responsibility for Supervision
Noise	<ul style="list-style-type: none"> <li>● Choose low-noise equipment with noise level being generally lower than 70 dB (A). Install them at suitable places.</li> <li>● Choose low-noise submersible pumps, whose noise level is less than ordinary water pumps. Noise level of water pump is an important parameter and should be taken into consideration.</li> <li>● Low-frequency noise produced when pump is operating can be absorbed by special materials.</li> <li>● Sound-insulation of pumping room can effectively reduce noise.</li> <li>● Noise generated by dynamic imbalance of rotating parts of machinery can be adjusted. Noise produced by mechanical and pipe vibration can be solved by adding vibro-damping mount, the use of damping materials and cladding measures. Noise silencers shall be installed to eliminate noise generated by inlet and outlet gas. Silence louvers shall be adopted at air ports. Lubricants and acoustic enclosures can be used to control noise generated by gear friction.</li> <li>● Noise at plant boundary shall meet Class 1 standard defined in <i>Emission Standard for Industrial Enterprises Noise at Boundary</i> GB12348-2008.</li> </ul>	Owner	SEPB/ Chongming CEPB,
Ambient air	<ul style="list-style-type: none"> <li>● Wastewater treatment stations shall be provided with sealing, odor collection and the odor shall be emitted at height.</li> <li>● The concentration of hydrogen sulfide, ammonia and odor at plant boundary shall meet Class II standard defined in <i>Emission standards for odor pollutants</i> GB14554-93.</li> </ul>	Owner	SEPB/ Chongming CEPB,
Surface water	<ul style="list-style-type: none"> <li>● Sewage treatment equipment should be strictly managed to ensure that devices are in normal working status and to ensure that the water discharged meets the standard.</li> <li>● Domestic sewage such as cloth-washing waste water can not be directly discharged into the river or dumped at will.</li> </ul>	Owner	SEPB/ Chongming CEPB,
Solid waste	<ul style="list-style-type: none"> <li>● Sludge from sedimentation tanks must be regularly collected. Solid wastes shall be treated by the sanitation department in time.</li> </ul>	Owner	SEPB/

	<ul style="list-style-type: none"> <li>● Domestic garbage shall be collected and treated in time by sanitation department.</li> </ul>		Chongming CEPB,
Staff Training	<ul style="list-style-type: none"> <li>● Production workers, management staff should receive necessary qualification inspection and pre-professional technical training. The training system includes training of professional health and safety regulations.</li> </ul>	Owner	PIA/ PMO
Environmental Management	<ul style="list-style-type: none"> <li>● To establish environmental management department, and to frame the environmental protection overall planning and implementation proposal of the project, and to be responsible for the implementation and summary.</li> <li>● To establish and implement the monitoring plan of pollution and environment, to make comprehensive understanding of the operation, statistics and monitoring data of wastewater treatment stations to ensure that emissions comply with the national, industry and local relevant standards.</li> </ul>	Owner	PMO

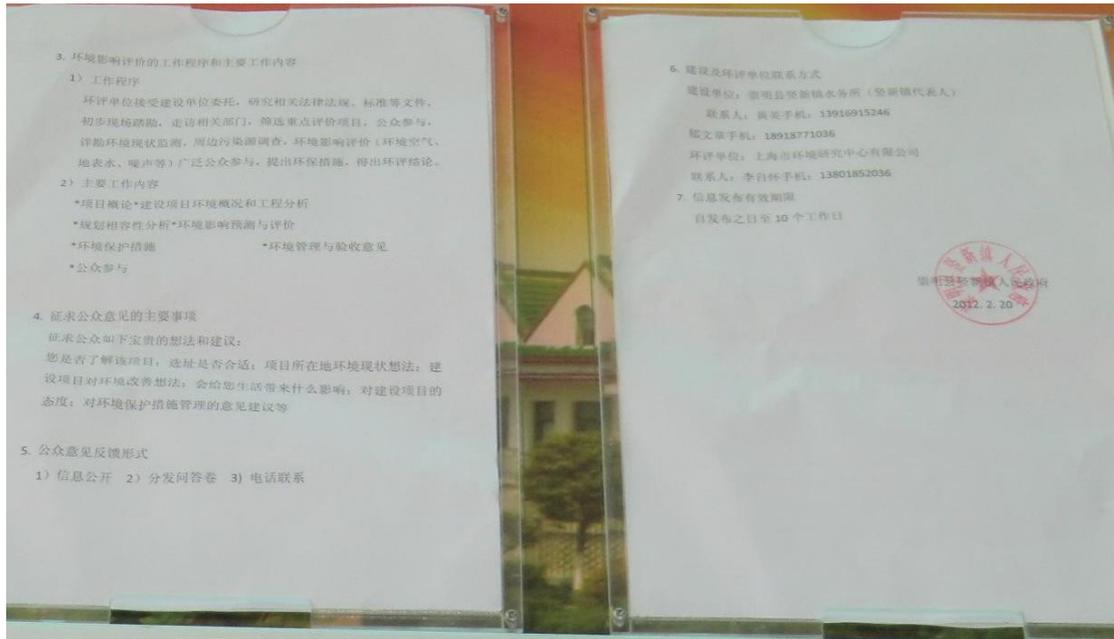
### 2.5.5 Public Consultation & Information Disclosure

According to the World Bank OP4.01, the public participation is needed and a relevant section should be prepared. Therefore, the public participation has been organized, with participants mainly being local people indirectly or directly affected by the Project.

#### (1) Information Disclosure

The first public disclosure of the *Component B* information was made in the Component-sited on Feb. 20, 2012. The major elements of the Component B were disclosed, and the project managers, the EA consultants and relevant contact persons are identified (see fig. 2.10).





**Fig.2.10 Announcement of Component B in the Component-sited**

Shuxin Town People Government made the second public disclosure of information of the Component B on Chongmin Daily on April 25, 2012, announcing to the public that the environmental impact assessment report and the environment management plan for the Component B had been completed and that anyone may contact the PMO or Shuxin Town People Government for detailed information (see fig. 2.11).



**Fig. 2.11 Notice about the EA & EMP for the Component B on Chongmin Daily**

The texts of EA report and EMP of the Component B have been displayed to the public from April 25, 2012 at the following locations:

- (1) Economic Office of Shuxin Town People's Government, Chongming County  
Address: 58 Xiangchun Road, Shuxin Town, Chongming County
- (2) The Recreation Room of Villagers Committees of the Huimin Village, Shuxin Town, Chongming County  
Address: 729 Shuxin Natural Village, Huimin Admin. Village, Shuxin Town
- (3) The Recreation Room of Villagers Committees of the Shuhe Village, Shuxin Town, Chongming County  
Address: 1443 Shuhe Village, Shuxin Town

The public can go to above sites to understand and look up the full reports from April 25, 2012 in working hours.

## **(2) Public Participation**

Questionnaire surveys in this part were mainly targeted at people affected in the local area of the Project.

The research team conducted questionnaire surveys on March 20, 2012, covering employees of organizations adjacent to the project area as well as local residents. Totally 50 questionnaires were distributed and 50 returned, representing a questionnaire return rate of 100%.

Below are main survey findings:

### **A. Public Awareness of the *Component B***

100% of respondents were aware of the Component B. According to survey results, the Project Owner has created a good public image by publicizing the Project via various channels at early stages, paving a smooth way for the Project.

### **B. Public satisfaction for surface water quality and environmental sanitation in the Project area**

In these surveys, 50% respondents chose "OK" and "Satisfied" for the local surface water quality and environmental sanitation, and 50% respondents were dissatisfied with the local environmental quality.

### **C. Improvement of environmental quality after completion of the Project.**

100% thought the environmental quality would be improved after the Project is completed.

#### D. Approval Rate for the Project

In general, respondents in the surveys provided a 100% approval rate for the Project.

#### **2.5.6 Resettlement and Immigrant**

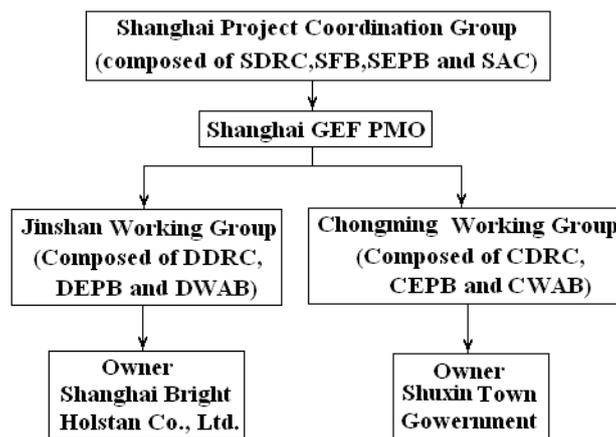
The wastewater treatment stations are located at the wilderness and not take up farmland in the Huimin Village and Shuhe Village, and land acquisition can not be required, so the construction of Component B does not involve the issue of resettlement and immigrant.

### 3 ENVIRONMENTAL MANAGEMENT PLAN

#### 3.1 Environmental Supervision Agency and Plan

##### 3.1.1 Environmental Supervision Institutional Arrangements and Responsibility

Project supervision institutional arrangements are shown in Fig.3.1.



**Fig.3.1 Project Supervision Institutional Arrangements**

The responsibility for the project supervision institution is as follows:

**(1) Shanghai Project Coordination Group:**

- Review and supervision the performance of Project annual work plans;
- Provide guidance on municipal policies;

**(2) Shanghai GEF PMO:**

- Serve as the secretariat of the Shanghai PCG in Project preparation and implementation;
- Act as a coordinating body with the Project's components and participatory supervision;

**(3) Jinshan Working Group and Chongming Working Group:**

- Supervise progress of project implementation specifically environmental monitoring;
- Compile annual work plan;
- Provide policy support and guidance;
- Coordinate and assist in resolutions to issues during project implementation ;

**(4) Participating Entity:**

- Responsible for implementation of project including environmental monitoring;
- Report to the higher authorities at regular intervals;

### 3.1.2 Environmental Supervision Plan

#### 3.1.2.1 Environmental Supervision Plan during Construction Phase

**Table 3.1 Environmental Supervision Plan for the Component A during Construction Phase**

Supervision Agency	Supervision Items
SEPBB, Jinshan DEPB Shanghai Bright Holstan Co., Ltd.	<ol style="list-style-type: none"> <li>1. To monitor and inspect restoration of the environment and the land &amp; vegetation temporary occupied in construction.</li> <li>2. Oversee and inspect implementation of dust and noise control measures;</li> <li>3. To monitor and inspect if the treatment and discharge of domestic sewage and oil-bearing sewage produced in construction sites are in line with environmental protection requirements;</li> <li>4. To monitor and inspect the implementation of environmental protection measures to mitigate disturbances caused by project construction.</li> <li>5. To monitor and inspect if construction machinery and equipment comply with environmental protection requirement.</li> <li>6. Check whether warnings are erected at working sites.</li> <li>7. To monitor and inspect the implementation of mitigation measures put forward in the EIA form and the Environmental Protection Agency approval document.</li> </ol>

**Table 3.2 Environmental Supervision Plan for the Component B during Construction Phase**

Supervision Agency	Supervision Items
SEPB, Chongming CEPB, Shuxin Town Government.	<ol style="list-style-type: none"> <li>1. To monitor and inspect bed mud dredging, if sedimentation tanks are installed and if it reaches discharge standard.</li> <li>2. To monitor and inspect if the cleaning, transporting and piling of sludge are in line with the environmental protection requirement</li> <li>3. To monitor and inspect the realization of measures to protect water environment on the project construction site.</li> <li>4. To monitor and inspect the protection of natural wetland on the project construction site.</li> <li>5. To monitor and inspect the implementation of environmental protection measures to mitigate disturbances caused by project construction;</li> <li>6. To monitor and inspect if construction machinery and equipment comply with environmental protection requirement.</li> <li>7. To monitor and inspect greening, vegetation and water plant and if there is a risk of foreign water plant invading.</li> <li>8. To monitor and inspect restoration of the environment and the land &amp;</li> </ol>

	vegetation temporary occupied in construction.
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### 3.1.2.2 Environmental Supervision Plan during Operation Phase

**Table 3.3 Environmental Supervision Plan for the Component A during Operation Phase**

Supervision Agency	Supervision Items
SEP/B/ Jinshan DEPB	<ol style="list-style-type: none"> <li>1. To monitor and inspect implementation of control measures on offensive smell and noise pollution during the operation phase;</li> <li>2. To monitor and inspect if the production and application of organic fertilizers are in line with environmental protection requirements;</li> <li>3. The focus of monitoring and inspection shall be put on the water quality from the wastewater treatment station to see if it meets the Discharge Standard for Municipal Sewerage System (DB31/425-2009).</li> <li>4. To monitor and inspect the implementation of mitigation measures put forward in the EIA form and the Environmental Protection Agency approval document. Emphasis shall be put on the inspection of the implementation of measures on protecting Hongqiao Port.</li> </ol>

**Table 3.4 Environmental Supervision Plan for the Component B during Operation Phase**

Supervision Agency	Supervision Items
SEP/B, Chongming CEPB, Shuxin Town Government.	<ol style="list-style-type: none"> <li>1. To monitor and inspect if water quality of rivers meets the state stipulated standard.</li> <li>2. To monitor and inspect if the measures to protect river network wetland and landscape along rivers are finalized.</li> <li>3. To monitor and inspect if the water out of the constructed wetland meets the state stipulated standard.</li> <li>4. To monitor and inspect the variation of biological diversity including plant diversity and animal diversity on the river network wetland area.</li> <li>5. To monitor and inspect if there are biological invading on water plant and slope vegetation.</li> </ol>

## 3.2 Environmental Management Arrangement & Management Plan

### 3.2.1 Environmental Management Institutions Arrangement and Responsibility

Environment management items in the construction phase are greatly different from that in the operation phase. The former is temporary and will be ended upon acceptance check of the project, while the latter is of long-term nature and is

complicated, and so long as the project is operating, it is necessary to continue management. Therefore, independent organizations should be separately set up for each phase to be responsible for due management. After the end of the construction phase, the corresponding management institution shall be revoked and the management institutions for the operation phase shall start to work. According to the specific circumstances of the work, there will be a transition phase. Table 3.5 and Table 3.6 list the environmental management institutions in construction phase and operation phase respectively.

**Table 3.5 List of Environmental Management Institutions in Construction Phase**

Nature of Management Institution	Persons & Quality Requirements	Responsibility
No conflict of interest with the project and independent of the construction unit	2 ~ 3 persons with appropriate qualifications and experience	1. According to project plans, draw up detailed management plans. Inspect according to the plan and make necessary amendments in accordance with the progress of the project; 2. The person in charge of management shall report to the project leader weekly on the results of environmental management and put forward solutions targeted to the potential environmental issues found in the inspection; 3. According to the plan, tour and check the implementation of mitigation measures regarding environmental impact and be responsible for arrangement of monitoring items to be performed according to the plan; 4. Report to higher authorities on a monthly basis inspection and monitoring results and opinions about issues settled on the spot.

**Table 3.6 List of Environmental Management Institutions in Operation Phase**

Nature of Management Institution	Persons & Quality Requirements	Responsibility
An environmental management institution mainly composed of environment management representatives	2-4 persons, including at least one full-time person.	① To frame the environmental protection overall planning and implementation proposal of the project, and to be responsible for the implementation and summary. ② To carry out the environmental protection regulations and emission standards. ③ To develop and fulfill the emergency plans and measures about pollution incidents. ④ To establish and implement the monitoring plan of pollution and environment, to make comprehensive understanding of the operation, statistics and monitoring data of processing units to ensure that emissions comply with the national, industry and

		<p>local relevant standards.</p> <p>⑤ To improve staff awareness of environmental protection by various forms of environmental protection education.</p> <p>⑥ Environmental protection staff must receive training of engineering expertise and job skills prior to operation, cannot go to work until passed relevant examination and must receive regular assessment after on work.</p> <p>⑦ To establish and strengthen environmental management rules and regulations, to develop the management system of production, and to build environmental protection objectives index-responsible system, to clarify and implement the responsibilities of all staff and positions linked to reward and punishment system.</p> <p>⑧ To prepare operating procedures of all operation positions, to specify operation contents, methods, control targets, safety notices, fault handling.</p> <p>⑨ To establish the environmental management archives system, to summarize regularly the implementation of the plan, and to file routine environmental testing data.</p>
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### 3.2.2 Environmental Management Plan

In the phase of construction and operation, these Components will give rise to some adverse effects to the environment. Corresponding measures shall be adopted respectively according to the characteristics of the environmental impacts in the construction and operation phases to minimize these impacts to an acceptable level. In order to ensure environmental mitigation measures can effectively play their roles, it is necessary to prepare environmental management plans for the construction and operation phase respectively.

#### (1) Management of Project Contractors:

- Select qualified contractor with good reputation to ensure that the environmental management plan can be effectively implemented;
- Contractor and construction supervision unit must receive training on environmental protection and environmental management;
- Measures to mitigate environmental impact during construction must be included in the bidding documents of contractor. Related agreements and commitments shall be written in the construction contract.
- Contractor is required to monitor its environmental activities and record the same in files. Project Management Office and the construction supervision group

shall monitor and review these records.

- Contractor shall have job posts for environment staff. The staff shall undertake environmental management task after receiving training.
- During the construction phase, contractors shall communicate and negotiate with local masses where the project is located. Every construction unit shall set up a notice board to make open the project overview and construction activities, and contact person and phone number. They shall accept public monitoring, complaints and suggestions about the construction activities.

## **(2) Environmental Management during the Construction Phase**

An independent environmental supervisor should be recruited by the PMO to supervise the whole process of the project, especially on the implementation of pollution control measures.

The construction company should have a staff managing the environmental issues such as the implementation of pollution control measures and coordination with neighborhoods, in contact with owner and environmental supervision engineer.

## **(3) Environmental Management during the Operation Phase**

The main environmental management contents of the project may include the following aspects:

- Develop the operation management system, establish the environmental goal and index responsible system; clarify and implement the responsibilities of all shifts and positions and link them with the reward and punishment system.
- Compile the operation specification of all operation positions, and specify the operation contents, operation methods, control indexes, safety notices, failure treatment, etc.
- The environmental protection management must receive the pre-job training of professional technologies and skills before the project is started, and can get on duty only after they pass the exams, and are regularly assessed.
- To ensure the normal operation of the treatment project, establish the equipment regular maintenance and repairing system.
- Establish the environmental management archives system, regularly summarize the implementation of the environmental management plan, arrange and file the daily environmental monitoring and analysis data for the convenience of review and assessment, and find new problems, sum up experience and better embody the performance of environmental management.
- Environmental greening and beautification should be enhanced.

## **4 ENVIRONMENTAL MONITORING PLAN**

### **4.1 Purpose of Environmental Monitoring**

For comprehensive and timely mastery of trend of pollution in the project construction and operation period, understanding of the impact arising from the project construction on the environmental quality changes and influence range on the place where the project is located, it is a must to conduct environment monitoring and report facts in time to the competent departments, thus providing a scientific basis for environmental management.

### **4.2 Monitoring Institutions**

Environmental monitoring in the construction and operation phase involves air, noise and surface water, etc. It is suggested to ask qualified institutions within districts concerned to do the job.

### **4.3 Monitoring Program**

According to the results of predicated environmental impact and the characteristics of pollutants emission of the demonstration projects, sound environment, ambient air, surface water environment and soil shall be monitored respectively. Monitoring factors shall be decided based on the pollution characteristic factors adopted in the engineering analysis. Monitoring and analysis shall adopt methods set in the "Environmental Monitoring Technical Specifications" issued by the Ministry of Environmental Protection of the PRC with assessment standard following the national standard identified in the EIA. Environmental monitoring programs for the construction phase and operation phase are as shown in the following.

**Table4.1 Environmental Monitoring Program for the Component A during Construction Phase**

Environmental Element		Monitoring Points and Quantity	Monitoring Parameters	Monitoring Frequency	Unit Price (RMB/Time)	EMP Budget in RMB	Responsibility for Implementation	Monitoring Agency	Responsibility of Supervision
Noise		Factory Boundary, two points	Leq	1 time/quarter, 1day/time, 2 times/day, two years	120	3840	PMO	A licensed monitoring unit	SEP/ Jinshan DEPB,
Dust		Construction site, two points	TSP	1 time/quarter, 1day/time, 2 times/day, two years	140	4480			
Water quality	Surface water	Hongqiao Port Moat three points,	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	1 times/ quarter , 1day/time, Two years	550	13200			
	Construction wastewater	Outlet of sedimentation tank, one points,	SS, Petroleum,	1 time/quarter, 1day/time, 1time /day, Two years	140	1120			
Traffic and sampling				Two years	10000/year	20000			
Total						42,640			

**Table4.2 Environmental Monitoring Program for the Component B during Construction Phase**

Environmental Element		Monitoring Points and Quantity	Monitoring Parameters	Monitoring Frequency	Unit Price (RMB/Time)	EMP Budget in RMB	Responsibility for Implementation	Monitoring Agency	Responsibility of Supervision
Noise		Factory Boundary, 2 points	Leq	1 time/quarter, 1 day/time, 2 times/day, one year	120	1920	PMO	A licensed monitoring unit	SEP/ Chongming CEPB,
Dust		Construction site, two points	TSP	1 time/quarter, 1 day/time, 2 times/day, 1 years	140	2240			
Water quality	Surface water	River accepting water, two points,	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	2 times/year, 1 day/time, 1 years	550	2200			
	Construction wastewater	Outlet of sedimentation tank, two points,	SS, Petroleum,	1 time/quarter, 1 day/time, once/day, one year	140	1120			
Sediments		Sedimentation tank	Pb, Cd, Cu, Zn, Hg	2 time/year, one year	1000	2000			
Traffic and sampling				one year	10000/year	10000			
Total						19,480			

**Table4.3 Environmental Monitoring Program for the Component A during Operation Phase**

Environmental Element		Monitoring Points and Quantity	Monitoring Parameters	Monitoring Frequency	Unit Price (RMB/Time)	EMP Budget in RMB	Responsibility for Implementation	Monitoring Agency	Responsibility of Supervision
Noise		Factory Boundary, 2 points	Leq	2 time/year, 1 day/time, 2 times/day, one year	120	480	PMO	A licensed monitoring unit	SEP/ Jinshan DEPB,
Waste gas	Oder and Dust	Factory Boundary, 1 points	Oder H <sub>2</sub> S, NH <sub>3</sub> TSP	1 time/summer, 1 day/time, 4 samples/day, one year	1200	4800			
	Burning biogas	Outlet of fuel biogas exhaust stack	Smoke, SO <sub>2</sub> , NO <sub>2</sub>	1 time/ quarter , 1 day/time, 4 samples/day, one year	1500	24000			
Water quality	Surface water	Hongqiao Port Moat, 3 points,	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	1 time/ year , 1 day/time, 1 time/day, one year	550	3300			
	Tail water	Outlet of the wastewater treatment station Raw wastewater,	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	1 time/quarter, 1 day/time, 1 time /day, one year	550	4400			
Traffic and sampling				One year	10000/year	10000			
Total						46,980			

**Table4.4 Environmental Monitoring Program for the Component B during Operation Phase**

Environmental Element	Monitoring Points and Quantity	Monitoring Parameters	Monitoring Frequency	Unit Price (RMB/Time)	EMP Budget in RMB	Responsibility for Implementation	Monitoring Agency	Responsibility of Supervision
Surface water	Dazhang river, Huimin river Two points	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	2 times/year, 1 day/time Two years	550	4400	PMO	A licensed monitoring unit	SEP/Chongming CEPB,
Tail water	Outlet of tail water, Thirteen points	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	2 times/year, 1 day/time Two years	550	28600			
Noise	Factory Boundary, 13 points	Leq	2 times/year, two years	120	6240			
Odor	Factory Boundary, 13 points	Odor concentration	1 time/summer, two years	700	18200			
Sediments	Dazhang river, one point	Pb, Cd, Cu, Zn, Hg, Concentration	1 time/year, two years	1000	2000			
Traffic and sampling			2 年, two years	10000	20000			
Total					79,440			

## 5 BUDGET ESTIMATE AND SOURCE OF FUNDS

### 5.1 Project Total Investment

According to estimation, the total investment of the Component A is RMB 15.82 million, or USD 2.5111 million converted on the basis of the exchange rate of 1: 6.3 between US dollar and RMB. The total investment of the Component B is RMB 15.916 million, or USD 2.5263 million.

### 5.2 Project Environmental Protection Investment

The investment of project environmental protection includes two parts of environment project measures investment and the environmental management cost.

Mitigation measures of environmental impacts in construction phase mainly include the establishment of the dust board, the sound absorbing baffler. The investments of environmental protection measures are mainly used for rebuilding sewage treatment stations, purchasing low noise equipments, devices of desulfurization, greening within the project region, constructing the vegetation buffer zone and so on. The concrete investments are shown in Table 5.1.

**Table 5.1 Estimate of Environment Project Measures Investment**

Project	Content		Cost (RMB Yuan)
Component A	The noise and dust during construction phase	The dust board, the sound absorbing baffler	10,000
	Wastegas	Airtight measures for the discharging workshop and pretreatment workshop	300,000
		Desulfurization devices	55,000
	Wastewater	Reconstruction of the wastewater treatment plant	1,150,000
	Equipment noise	Low noise equipments	50,000
	Greening	Greening and supporting measures	13,500
	Total		1,578,500
Component B	The noise and dust during construction phase	The dust board, the sound absorbing baffler	10,000
	Tail water	Further purification of the tail water by gravity-flow aeration ecological bed;	149,619
	Greening	Greening and supporting measures	63,600
	Construction of vegetation buffer	Green within the slope of the river	182,000
		Wetland within the slope of the	50200

	zone	river	
	Loss of water and soil erosion	Slope of the river by wood pile	2,625,000
	Plant	Aquatic plant	115,000
	Total		3,195,419

The environmental management cost of the project is brought into the project total expense budget as the special expense of environmental management.

Environmental management costs for the Component A and Component B are estimated as RMB 93,750 and 98,950 respectively.

## 6 STAFF TRAINING

To assure smooth and efficient environment management, trainings should be provided for employees on relevant expertise and skills. In addition to introducing importance of the Projects to all employees, the trainings specific to working positions should be provided. Environment management training and experience exchange are recommended once a year. Table 6.1 lists the training plan for environment protection personnel.

**Table 6.1 Training Program for Environmental Protection Staff**

Component	Stage	Classes	Staff	Training Time	Cost RMB/time	Total Cost RMB
Component A	Construction phase	Environmental management	3	Before project start, 1 time	5000	5000
	Operation phase	Environmental management, Environment protection and monitoring	3	Once/a year, 1 day/time	5000	5000
	Total					10000
Component B	Construction phase	Environmental management	3	Before project start, 1 time	5000	5000
	Operation phase	Environmental management, Environment protection and monitoring	4	Once/a year, 1 day/time	5000	5000
	Total					10000

## **7 INFORMATION MANAGEMENT**

### **7.1 Information Exchange**

The EMP requires that there are necessary information exchanges among the departments and posts instituted by the PMO, owner, contractor, and operator. Meanwhile, it requires that relevant information should be reported to the outside (such as the related sides, the publics, etc.).

Internal information exchanges can be conducted through various means like meetings, internal reports, but there must be one formal meeting every month and all the information exchanges should be recorded and put into files. External information exchanges should be conducted once every half year or every one year and the information exchanges with the coordinating units must be recorded and put into files.

### **7.2 Information Recording**

A perfect recording system must be established to ensure the effective operation of the environmental management system and recording on the following aspects must be kept:

- Requirements of laws and regulations;
- Environmental pollutant parameter and relevant environmental impact;
- Training ;
- Examining, checking and maintaining activities ;
- Data monitoring ;
- Effectiveness of rectifying and preventive measures ;
- Examination and approval ;
- Assessment ;
- Other important information;

### 7.3 Reporting Mechanism

The contractor, operator, monitoring unit, environmental supervision engineers and the PMO should record the progress the implementation of the project, the implementation of EMP, and the result of monitoring and report it on time to the relevant departments. The reporting consists of the following aspects:

- The project environmental supervision engineer will record in great detail on a monthly basis the implementation of EMP and submit the weekly and monthly records in time to the project owner and the PMO. The weekly and monthly reports should contain the implementation of the environmental protection measures, and progress of environmental monitoring and the data monitored.
- The contractor and operator will record in great detail the progress of the project and the implementation of EMP on a quarterly basis and report it in time to the PMO and the Chongming County EPB.
- The monitoring unit, after completing the entrusted monitoring tasks, will submit in time the monitoring report to the contractor (operator) and environmental supervision engineer.
- The PMO will send the project progress report to Shanghai EPB in time. The project progress report prepared by the PMO (such as the monthly, quarterly and annual reports) must contain the content of the progress of EMP, such as the progress and effect of the implementation of EMP, in particular, the results of environmental monitoring.
- In case incidents in serious violation of regulations on environmental protection should occur, the environmental supervision engineer and the project office will report them to the local competent department of environmental protection. If necessary, the incidents will be reported to higher authorities.
- The EMP implementation report of the project must be submitted to the World Bank before March 31, the next year. The report may contain generally the following aspects:
  - a. The implementation of the training plan;
  - b. The progress of the project;
  - c. The implementation of the environmental protection measures of the project;
  - d. The progress of environmental monitoring and the major monitored results;
  - e. If there are complaints from the public, the content of the complaints, the ways

to solve the problems and the degree of satisfactions of the public will be recorded.

f. EMP implementation plan for next year;

## 8 SUMMARY OF EMP

### 8.1 Abstract of EMP

**Table 8.1 EMP Summary Table for the Component A**

Construction Phase						
Potential Impact	Mitigation Measures	EMP Budget in RMB	Responsibility for Implementation	Responsibility for Supervision	Monitoring Indicators/Parameters	Monitoring Frequency
Dust	<p>Spoil would generate dust to pollute air in the process of handling and stacking, so that TSP is increased, in particular in windy days. Following measures shall be adopted:</p> <ul style="list-style-type: none"> <li>● "Shanghai Dust Pollution Control Management Methods" should be strictly enforced. Spoil generated in road excavation should be frequently watered in fine and windy days. Construction period shall be shortened as far as possible and dust shall be timely removed. In transportation, watering or covering shall be conducted to prevent dust.</li> <li>● Sand, cement and other building materials easy to produce dust should be put in appropriate places with wind boards and isolated wall installed; cement should be put in warehouse. Dust prevention bag shall be installed when unloading bulk cement.</li> <li>● Vehicles entered on to the construction site should have their speed limited. Road surface shall be maintained clean and wet to reduce dust.</li> <li>● Construction site management shall be strengthened. When choosing construction units PIA shall consider the quality of construction unit. Environmental impact mitigation measures shall be included in the</li> </ul>	4480	Contractor	SEPB/Jinshan DEPB	TSP	1 time/quarter, two years

	<p>contract, which shall be under strict supervision and inspection from the beginning to the end.</p> <ul style="list-style-type: none"> <li>● In transportation, spoil, building garbage, building materials (sand and cement) shall be covered</li> </ul>					
Waste gas	<ul style="list-style-type: none"> <li>● A certain amount of diesel machinery and vehicles will be employed in construction and tail gas emissions will cause air pollution. Good quality diesel machinery of sufficient combustion shall be chosen and operated in places as far as possible away from residential areas and other sensitive points.</li> <li>● Similar transport vehicle emission mitigation measures shall be adopted. Vehicles of inadequate combustion causing heavy pollution should be repaired before use.</li> </ul>	-	Contractor	SEPB/Jinshan DEPB	-	-
Wastewater	<ul style="list-style-type: none"> <li>● The construction process (such as land excavation, etc.) will produce a lot of mud water. Sedimentation tanks of different sizes shall be installed according to mud water volume. Water on the upper level of the tank can be discharged into rivers nearby as ordinary wastewater. Sediment shall be treated regularly as solid wastes and should not be put together with domestic garbage.</li> </ul>	1120	Contractor	SEPB/Jinshan DEPB	SS, 石油类 petroleum,	1 time/quarter, two years
Surface water	<ul style="list-style-type: none"> <li>● Regularly monitor surface waters;</li> </ul>	13200	Contractor	SEPB/Jinshan DEPB	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	1 time/quarter, two years
Noise	<ul style="list-style-type: none"> <li>● Low-noise construction machinery and equipment should be chosen as far as possible. Simple noise barriers should be set up when construction area is quite close to sensitive areas.</li> <li>● In the construction period, construction noise should be strictly controlled and it is required to meet the requirements in GB12523-2008. No high-noise</li> </ul>	3840	Contractor	SEPB/Jinshan DEPB	Leq	1 time/quarter, two years

	<p>operations could be performed from 22:00 to 6:00. In case night operation is required by technology, application to the local environmental protection department for approval shall be made before operation to be carried out. Prior-notice shall be given to gain forgiveness of the masses.</p> <ul style="list-style-type: none"> <li>In order to reduce noise impact on the environment in the operation of equipment, sound insulation measures shall be adopted in civil works and surrounding environment shall be considered in the civil works design.</li> </ul>					
Greening and vegetation	<ul style="list-style-type: none"> <li>If project buildings or structures are constructed on the original greening area, this will have impact on greening, which shall be addressed in accordance with provisions of the "Shanghai Municipal Afforestation and Green Land Administration Regulation". Trees within construction area should be transplanted. In order to ensure the survival rate of trees, the construction unit shall engage green professionals to be responsible for this work.</li> <li>After the completion of the project, greening shall be restored as far as possible to minimize the adverse impact on green space and trees.</li> </ul>	-	Contractor	SEPB/Jinshan DEPB	-	-
Solid waste	<ul style="list-style-type: none"> <li>Construction of this project will produce a certain amount of spoil and building garbage. PIA should, in accordance with the requirements set in the "Management and Regulation of the Shanghai Municipality Regarding Disposal of Building Garbage and Engineering Spoil", apply to the Shanghai Municipal Spoil Management Department for approval of its building garbage and spoil disposal plan prior to the commencement of construction. Do accordingly after approval.</li> <li>In case toxic and hazardous wastes are produced,</li> </ul>	-	Contractor	SEPB/Jinshan DEPB	-	-

	<p>construction should be suspended and the EP and health department contacted timely. Construction can be restarted after safety measures are adopted.</p> <ul style="list-style-type: none"> <li>● Construction of the project requires a certain amount of construction staff. Contractors will often provide necessary facilities within the temporary work area for construction workers in order to complete the project on quality and time. Thus, a certain amount of domestic wastes will be produced. PIA must contact with sanitation department for timely removal of wastes.</li> <li>● Contractor is required to carry out education for construction workers, who shall develop civilized construction, creating a clean and hygiene environment for work and living.</li> </ul>					
Public Health and Safety	<ul style="list-style-type: none"> <li>● Strengthen hygiene and safety of dormitories of construction workers and provide simple medical conditions;</li> <li>● Strengthen education and training on prevention of infectious diseases.</li> </ul>	-	Contractor	Shanghai Health Bureau/ Jinshan District Health Bureau	-	-
Social Impact	<ul style="list-style-type: none"> <li>● Construction activities shall be well planned to reduce impact on public service facilities and residents.</li> </ul>	-	Contractor	SEP/Jinshan DEPB	-	-
Cultural Relics	<ul style="list-style-type: none"> <li>● In case cultural relics are found, protect the site and report the case to the local department concerned.</li> </ul>	-	Contractor	Jinshan cultural relic bureau	-	-
Environmental Management	<ul style="list-style-type: none"> <li>● Independent environmental supervision engineers should supervise the whole process of the entire project.</li> <li>● Demand of civilized construction is asked for the contractor during the bidding process. When call for tender, auditing and manage the technique measures and non- technique measures of the contractor.</li> </ul>	-	Contractor	PMO	-	-

Staff Training	<ul style="list-style-type: none"> <li>Civilized construction (contractor, workers). The training system includes training of professional health and safety regulations and contingency plan.</li> </ul>	5000	Contractor	PIA/ PMO	-	1 time /one year, 1 day/time
<b>Operation Phase</b>						
Potential Impact	Mitigation Measures	EMP Budget in RMB	Responsibility for Implementation	Responsibility for Supervision	Monitoring Indicators/ Parameters	Monitoring Frequency
Noise	<ul style="list-style-type: none"> <li>Choose low-noise equipment with noise level being generally lower than 70 dB (A). Install them at suitable places.</li> <li>Choose low-noise submersible pumps, whose noise level is less than ordinary water pumps. Noise level of water pump is an important parameter and should be taken into consideration.</li> <li>Low-frequency noise produced when pump is operating can be absorbed by special materials.</li> <li>Sound-insulation of pumping room can effectively reduce noise.</li> <li>Noise generated by dynamic imbalance of rotating parts of machinery can be adjusted. Noise produced by mechanical and pipe vibration can be solved by adding vibro-damping mount, the use of damping materials and cladding measures. Noise silencers shall be installed to eliminate noise generated by inlet and outlet gas. Silence louvers shall be adopted at air ports. Lubricants and acoustic enclosures can be used to control noise generated by gear friction.</li> <li>Noise at plant boundary shall meet Class 2 standard defined in <i>Emission Standard for Industrial Enterprises Noise at Boundary</i> GB12348-2008.</li> </ul>	480	Owner	SEPB/Jinshan DEPB	Leq	2 times/year, one year
Surface water	<ul style="list-style-type: none"> <li>Sewage treatment equipment should be strictly</li> </ul>	3300	Owner	SEPB/Jinshan	COD <sub>Cr</sub> , BOD <sub>5</sub> ,	2 times /year,

	<p>managed to ensure that devices are in normal working status and to ensure that the water discharged meets the standard.</p> <ul style="list-style-type: none"> <li>● Domestic sewage such as cloth-washing waste water can not be directly discharged into the river or dumped at will.</li> <li>● Discharging Sewage and livestock wastes in to farm moat is strictly prohibited.</li> <li>● Rain water after sedimentation can be discharged into the farm moat.</li> </ul>			DEPB	NH <sub>3</sub> -N, TP, Coliform	one year
Tail water	<ul style="list-style-type: none"> <li>● After expansion of capacity, the wastewater treatment facilities shall suffice to treat liquid fraction from bio-digester and other wastewater produced in the Project, with pollutants contained in the effluent to comply with the Discharge Standard for Municipal Sewerage System. Wastewater is treated by Jinshan Langxi Wastewater Treatment Plant (WWTP).</li> </ul>	4400	Owner	SEPB/Jinshan DEPB	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	1 time/quarter, one year
Ambient air	<ul style="list-style-type: none"> <li>● Dust produced in the cut of feed, dry of residues and organic fertilizers could be collected by dust collection devices.</li> <li>● Follow the "livestock Emission Standards" to control the concentration of odor and plant trees in the factory boundary to insulate sound and adsorb odor.</li> <li>● Preventive separation shall be arranged in accordance with the requirements of EIA. Protective area shall be fully greened and set up greenbelt. Planning and construction of houses, schools, hospitals and other sensitive buildings within in the health preventive area are strictly prohibited.</li> <li>● Stacking, transporting and processing must be strictly managed. Small volume of offensive smell generated</li> </ul>	4800	Owner	SEPB/Jinshan DEPB	Oder H <sub>2</sub> S, NH <sub>3</sub> TSP	1 time/summer, one year

	<p>from rural sewage treatment stations shall be emitted by means of deodorization devices.</p> <ul style="list-style-type: none"> <li>● Dust-removal measures must be adopted in the workshop producing dust. Operators there must have preventive devices.</li> <li>● Pretreatment workshops and other odor sources shall be provided with sealing, odor collection and other measures. The extracted odor shall be emitted at height after deodorization.</li> <li>● The concentration of hydrogen sulfide, ammonia and odor at plant boundary shall meet Class II standard defined in <i>Emission standards for odor pollutants GB14554-93</i>.</li> </ul>					
Burning biogas	<ul style="list-style-type: none"> <li>● Hydrogen sulfide contained in biogas can be purified by desulfurization devices.</li> </ul>	24000	Owner	SEPB/Jinshan DEPB	Smoke, SO <sub>2</sub> , NO <sub>2</sub>	1 time/quarter, one year
Solid waste	<ul style="list-style-type: none"> <li>● Residues of grill and sludge from sedimentation tanks must be regularly collected. Solid wastes shall be treated by the sanitation department in time.</li> <li>● Domestic garbage shall be collected and treated in time by sanitation department.</li> <li>● Sulfur from biogas desulfurization devices and discarded desulfuration agent must be collected for disposal by a qualified organization.</li> <li>● It is prohibited to stack livestock wastes at any place in the pasture and disposed in sewage pit.</li> </ul>	-	Owner	SEPB/Jinshan DEPB	-	-
Staff Training	Production workers, management staff should receive necessary qualification inspection and pre-professional technical training. The training system includes training of professional health and safety regulations and contingency plan.	5000	Owner	PIA/ PMO	-	1 time / year, 1 day/time

<p>Environmental Management</p>	<ul style="list-style-type: none"> <li>● To establish environmental management department, and to frame the environmental protection overall planning and implementation proposal of the project, and to be responsible for the implementation and summary.</li> <li>● To develop and fulfill the emergency plans and measures about pollution incidents.</li> <li>● To establish and implement the monitoring plan of pollution and environment, to make comprehensive understanding of the operation, statistics and monitoring data of processing units to ensure that emissions comply with the national, industry and local relevant standards.</li> </ul>	<p>-</p>	<p>Owner</p>	<p>PMO</p>	<p>-</p>	<p>-</p>
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**Table 8.2 EMP Summary Table for the Component B**

Construction Phase						
Potential Impact	Mitigation Measures	EMP Budget in RMB	Responsibility for Implementation	Responsibility for Supervision	Monitoring Indicators/Parameters	Monitoring Frequency
Dust	<ul style="list-style-type: none"> <li>Materials should be put in appropriate places with covers or shall be watered to reduce dust;</li> <li>In transportation, covering shall be conducted to prevent overflow or dust.</li> </ul>	2240	Contractor	SEP/ Chongming CEPB,	TSP	Once/quarter
Wastewater	<ul style="list-style-type: none"> <li>Sedimentation tank shall be set up for sludge waste water in dredging area. Water on the upper level can be discharged after sedimentation of slurry.</li> </ul>	1120	Contractor	SEP/ Chongming CEPB,	SS, petroleum,	Once/quarter
Surface water	<ul style="list-style-type: none"> <li>Regularly monitor surface waters;</li> </ul>	2200	Contractor	SEP/ Chongming CEPB,	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	2 times/year
Bed mud in dredging	<ul style="list-style-type: none"> <li>Sedimentation tanks shall be installed. Water on the upper level of the tank can be discharged into rivers, while the sediment mud can be used as farmland or for greening if the bed mud shows that it is in conformity with the agricultural use standard.</li> </ul>	2000	Contractor	SEP/ Chongming CEPB,	Contents of Pb, Cd, Cu, Zn, Hg in bed mud	2 times/year
Noise	<ul style="list-style-type: none"> <li>Vehicles and equipment needs maintenance and repair to make them reach related standard;</li> <li>Simple sound barrier shall be installed when construction is taking nearby residential area.</li> </ul>	1920	Contractor	SEP/ Chongming CEPB,	Leq	Once/quarter
Ecological	<ul style="list-style-type: none"> <li>Wanton felling of trees shall be prohibited in</li> </ul>	-	Contractor	SEP/	-	-

Impact	the construction phase; ● Adopt soil and water conservation mitigation measures; ● Restore vegetation and plant trees after the completion of project.			Chongming CEPB,		
Public Health and Safety	● Strengthen hygiene and safety of dormitories of construction workers and provide simple medical conditions; ● Strengthen education and training on prevention of infectious diseases.	-	Contractor	Shanghai Health Bureau/ Chongming county Health Bureau	-	-
Social Impact	● Construction activities shall be well planned to reduce impact on public service facilities and residents.	-	Contractor	SEP/ Chongming CEPB,	-	-
Cultural Relics	● In case cultural relics are found, protect the site and report the case to the local department concerned.	-	Contractor	SEP/ Chongming CEPB,	-	-
<b>Operation Phase</b>						
Potential Impact	Mitigation Measures	EMP Budget in RMB	Responsibility for Implementation	Responsibility for Supervision	Monitoring Indicators/Parameters	Monitoring Frequency
Surface Water	● Be sure to keep smooth current of rivers. ● Discharging untreated sewage into river is strictly prohibited. ● Be sure that water plant is under orderly control. ● Regularly monitor water quality of rivers accepting tail water.	4400	Shuxin Town Government.	SEP/ Chongming CEPB,	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	2 times /year
Water Plant	● Strengthen management and prevent foreign plant invading.	-	Shuxin Town Government.	SEP/ Chongming CEPB,	-	-
Slope Greening and	● Strengthen protection of greening landscape along the rivers.	-	Shuxin Town Government.	SEP/ Chongming	-	-

vegetation	<ul style="list-style-type: none"> <li>● Finalize measures of soil and water conservation.</li> <li>● Protect vegetation such as reed on wetland.</li> </ul>			CEPB,		
Tail water	<ul style="list-style-type: none"> <li>● Sewage treatment equipment should be strictly managed to ensure that devices are in normal working status and to ensure that water discharged meets the standard.</li> <li>● Regularly monitor water quality of tail water.</li> </ul>	28600	Shuxin Town Government.	SEP/ Chongming CEPB,	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	2 times /year

## 8.2 Abstract of Monitoring Plan

**Table 8.3: Summary of Monitoring Plan for the Component A**

Construction Phase								
Environmental Element	Monitoring Points and Quantity	Monitoring Parameters	Monitoring Frequency	Unit Price (RMB/Time)	EMP Budget in RMB	Responsibility for Implementation	Monitoring Agency	Responsibility of Supervision
Noise	Factory Boundary, 2 points	Leq	1 time/quarter, 1 day/time, 2 times/day, two years	120	3840	PMO	A licensed monitoring unit	SEP/ Jinshan DEPB,
Dust	Construction site, two points	TSP	1 time/quarter, 1 day/time, 2 times/day, two years	140	4480			
Water quality	Surface water Hongqiao Port Moat 3 points,	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	1 times/ quarter, 1 day/time, Two years	550	13200			
	Construction wastewater Outlet of sedimentation tank, one points,	SS, Petroleum,	1 time/quarter, 1 day/time, 1 time /day, Two years	140	1120			
Traffic and sampling			Two years	10000/year	20000			
Total					42,640			
Operation Phase								
Environmental Element	Monitoring Points and Quantity	Monitoring Parameters	Monitoring Frequency	Unit Price (RMB/Time)	EMP Budget in RMB	Responsibility for Implementation	Monitoring Agency	Responsibility of Supervision
Noise	Factory Boundary, 2 points	Leq	2 time/year, 1 day/time, 2 times/day, one year	120	480	PMO	A licensed monitoring unit	SEP/ Jinshan DEPB,
Waste gas	Oder and Dust Factory Boundary, 1 points	,Oder H <sub>2</sub> S, NH <sub>3</sub> TSP	1 time/summer, 1 day/time, 4 samples/day, one year	1200	4800			
	Burning biogas Outlet of fuel biogas exhaust	Smoke, SO <sub>2</sub> , NO <sub>2</sub>	1 time/ quarter, 1 day/time, 4 samples/day, one year	1500	24000			

		stack						
Water quality	Surface water	Hongqiao Port Moat, 3 points,	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	1 time/ yearr ,1day/time, 1 time/day, one year	550	3300		
	Tail water	Outlet of the wastewater treatment station Raw wastewater,	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	1 time/quarter,1day/time, 1time /day, one year	550	4400		
Traffic and sampling				One year	10000/year	10000		
Total						46,980		

**Table 8.4 Summary of Monitoring Plan for the Component B**

Construction Phase								
Environmental Element	Monitoring Points and Quantity	Monitoring Parameters	Monitoring Frequency	Unit Price (RMB/Time)	EMP Budget in RMB	Responsibility for Implementation	Monitoring Agency	Responsibility of Supervision
Noise	Factory Boundary, 2 points	Leq	1 time/quarter, 1 day/time, 2 times/day, one year	120	1920	PMO	A licensed monitoring unit	SEP/ Chongming CEPB,
Dust	Construction site, two points	TSP	1 time/quarter, 1 day/time, 2 times/day, 1 years	140	2240			
Water quality	Surface water	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	2 times/year, 1 day/time, 1 years	550	2200			
	Construction wastewater	Outlet of sedimentation tank, two points, SS, Petroleum,	1 time/quarter, 1 day/time, once/day, one year	140	1120			
Sediments	Sedimentation tank	Contents of Pb, Cd, Cu, Zn and Hg in sediments	2 time/year, one year	1000	2000			
Traffic and sampling			one year	10000/year	10000			
Total					19,480			
Operation Phase								
Environmental Element	Monitoring Points and Quantity	Monitoring Parameters	Monitoring Frequency	Unit price (RMB/Time)	EMP Budget in RMB	Responsibility for Implementation	Monitoring Agency	Responsibility of Supervision
Surface water	Dazhang river, Huimin river Two points	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	2 times/year, 1 day/time Two years	550	4400	PMO	A licensed monitoring unit	SEP/Chongming CEPB,
Tail water	Outlet of tail water, Thirteen points	COD <sub>Cr</sub> , BOD <sub>5</sub> , NH <sub>3</sub> -N, TP, Coliform	2 times/year, 1 day/time Two years	550	28600			
Noise	Factory Boundary, 13 points	Leq	2 times/year, two years	120	6240			
Odor	Factory Boundary, 13 points	Odor concentration	1 time/summer, two years	700	18200			
Sediments	Dazhang river, one point	Contents of Pb, Cd, Cu, Zn and Hg in sediments	1 time/year, two years	1000	2000			
Traffic and sampling			Two years	10000	20000			
Total					79,440			