

China Anhui Province
Huainan City Coal Mining Subsidence
Area Rehabilitation Project

Environmental and Social Management
Plan

Hefei Design Research Institute for Coal
Industry
November 2014

Table of Contents

1. General	1
1.1 Background.....	1
1.2 Project Components.....	2
1.3 Purposes of Environmental Management Plan.....	5
1.4 Preparation of Environmental Management Plan	5
1.5 Designs of Environmental Management Plan.....	6
2. Environmental Quality Standards and Pollutant Discharge Standards	7
2.1 Environmental Influence Factors	7
2.2 Environmental Quality Standards	8
2.3 Pollutants Discharge Standards.....	12
2.4 Safeguard Policies of the World Bank	12
2.5 Environmental Protection Target.....	12
3. Environmental Management System	19
3.1 Environmental Management Organizations	19
3.2 Environmental Management Responsibilities and Contents	20
3.3 Environmental Protection Supervision Plan	26
4. Potential Environmental Impacts and Mitigation Measures	29
5. Environmental Monitoring Plan	67
5.1 Monitoring Purpose	67
5.2 Environmental Monitoring Organizations	67
5.3 Detailed Environmental Monitoring Plan.....	67
5.4 Types and Contents of Monitoring Reports.....	67
5.5 Submission Schedule and Receiving Agency.....	67
5.6 Requirements for Feedback to Monitoring Reports.....	67
6. Environmental Training Plan	75
6.1 Training requirements	75
6.2 Training objects	75
6.3 Training contents.....	75
6.4 Training plan and budget.....	75
7. Environmental Management Cost Estimate and Fund Source	78
7.1 Budget Distribution.....	78
7.2 Funding Source and Budget.....	78
8. Information Management of Environmental Management Plan	79

8.1 Information Exchange	79
8.2 Recording Mechanism.....	79
8.3 Reporting Mechanism	79
9. Arrangement for local people to Benefit from Land Appreciation and Monitoring Arrangement	
10. Continuous Public Participation Plan and Dispute Complaint Channel	81
10.1 Continuous Public Participation Plan	85
10.2 Grievance Redress Mechanism	85
10.3 Public Feedback.....	86

Attachment:

- Attachment 1: Construction Environment Standard
- Attachment 2: Social Management Plan
- Attachment 3: Disease and Pest Management Plan
- Attachment 4: Associated Facilities and Activities

1. General

1.1 Background

Huainan City is located in the midstream of Huaihe River, middle part of Anhui Province, which lies between 116°21'21"~117°11'59" east longitude and 32°32'45"~33°0'24" northern latitude. Huainan City is a new-type energy base in China, which was founded in 1950 relying on the mine; it has very rich coal resources, and is one of the 14 hundred-million ton coal bases in China. However, since 1960s, due to years of continuous coal resources mining, a large area of ground collapsed; such coal mining subsidence area affects five districts and one county of the whole city, including 27 towns; the total subsidence area is about 204.6 km², which occupies 7.9% of the whole city's area; and the population affected is about 311,000, which occupies 12.8% of the whole population.

The Twelfth Five-Year Planning Outline for National Economy and Social Development of Huainan City put forward explicit goals: at the end of the Twelfth Five-Year, make a significant progress for the comprehensive treatment of coal mining collapse area, gradually form a coal mining collapse area comprehensive treatment mode with Huainan characteristics, strive to realize the coal mining collapse area comprehensive treatment goals of "life urbanization, production diversification, and ecology reclamation". Strengthen the comprehensive treatment of coal mining collapse area, establish ecology compensation mechanism for the damages caused by coal mining collapse to agriculture, ecology and environment, and the resources compensation mechanism for resident moving resettlement, training, employment and social security caused by coal mining collapse, as well as repair the ecological environment and improve the living environment and living conditions of the local residents.

In Huainan, Jiulonggang and Datong mine lots had been exploited by earth kiln since the seventeenth century; mines were founded there in 1911, which were exhausted and scraped in 1982. Due to long-term and wide-range exploitation, the closed subsidence area reaches 1,352 hectares at present. With the exhausting of the coal resources, Datong District, which was the coal production base as well as political, economical and cultural center of Huainan, slows down its economic growth, and its financial situation also becomes difficult gradually. Moreover, the ground subsidence and collapse caused by the coal mining further destroy the rural infrastructure and farmers' houses, affect the agricultural production, and pollute the ecological environment; therefore, residents living in or around the subsidence area have been living in such an abominable residential environment for a long time. Except for these basic hazard factors, the coal mining collapse area of Datong District was far from the downtown, and the domestic rubbishes of Huainan were dumped into the collapse pit, and such area reached about 98,542m²; during the 25 years of service period from 1984 to 2009, the dumping volume reached 1,136,860m³; for some historical reasons, seepage-proofing or any other innocent treatment measures were not done to this dumpsite, and the landfill polluted the air and groundwater in the neighboring area to some extent, and the surrounding residents' health faces serious threat.

In order to completely change the ecological environment of the subsidence area, as well as provide more employment opportunities for the moved and resettled residents, Huainan Municipal Party Committee and Municipal Government declared the "Sustainable Development Engineering of Resource-Based City (Huainan City) -- World Bank Loan Project of Coal Mining Collapse Area Comprehensive Treatment and Utilization" to the World Bank organization, National Development and Reform Commission and Ministry of Finance at the end of 2011; they actively strive for the World Bank Project to use for the

complete control of the subsidence area. Through ecological environment modification, we can prevent the further deterioration of the ecological environment in this area, recover the ecology of the coal mining subsidence area, effectively improve the urban ecology functions and green land area, gradually improve the current situations of abominable ecological and living environments, and form a graceful human settlement where people and nature harmoniously mingling, thus providing an example of environmental modification and exploitation for the resource exhaustion mine lots in our country, and becoming a demonstration project for the livable environment of mining city.

This project covers an area of 9.3 km², which is located in the Jiulonggang-Datong (Jiuda) subsidence area, east urban area of Huainan, and is administered by Datong District. Graceful Shungeng Mountain lies in the south of this area, in the north, Linchang Road is connected to the old city; Hefei-Fuyang Railway lies in the east, and the South Huaishun Road in the west; it has a width of 0.9~2.0km (north-south), and a length of 8.4km (east-west); the No.206 national road runs through the subsidence area from north to south, and connects to Hefei-Xuzhou Highway, forming a distinct regional advantage here.

This project will use USD 100 million of World Bank loan. The implementation period of this project is 2016 to 2020.

1.2 Project Components

This project includes three components, i.e. environmental remediation and water management, infrastructure improvement and site utilization, and technical assistance and capacity building. There are six subcomponents: (a) environmental remediation; (2) water stream rehabilitation; (3) Datong landfill closure; (4) urban infrastructure improvement; (5) site utilization for community development; (6) consulting service, training and office equipment procurement. Details are shown in **Table 1-1**.

Table 1-1 Project Features

No.	Component and Subcomponent		Description
1	Environmental Remediation	Greening	Totally 411.91hm ² greening, including 12.27hm ² of stone sloping land; 10.92hm ² of closed landfill; 28.26hm ² of refuse stock dumpsite; 31.95hm ² of thick soil layer lowland; 220.84hm ² of thick soil layer sloping land; 69.73hm ² of low efficiency forest land repair. 37.94hm ² of ordinary forest land will maintain current situation.
		Greenway	The overall length of greenway is 16.4km, with a width of 3.5~4.5m; the total covered area of #1, #4 and #5 stages is 90 m ² .
2	Water Stream Rehabilitation		For the dredging and water system excavation works, the rehabilitated water system length is 7,740m, the dredging quantity is 7,680 m ³ , the excavated volume is 621,600 m ³ , and the backfilling volume is 429,100 m ³ . Current water surface area is 0.508km ² and after renovation is 0.56km ² .
			Ecological embankment 15197m in length and 137622m ² in area.
			Water retaining structures including two overflow weirs. One is 15m long and 10m wide and the other one is 16m long and 10.5m wide.
3	Datong Landfill Closure	Major Works	The total coverage area of the current waste heap in the old Datong wasteyard is 98,542m ² , and the

			<p>classification of closure engineering construction scale is Class III.</p> <p>Shaping of waste heap: 137,846m³ of rubbish turned over;</p> <p>Rubbish retaining wall. The retaining wall is built surrounding the waste heap. Elevation of the west retaining wall top is 38m and elevation of the east retaining wall top is 37m with a top width of 6m. The maximum height is about 3m; the length of the retaining wall center line is 1,470m.</p> <p>Landfill area seepage prevention structure. 19110m² of vertical seepage prevention wall;</p> <p>Landfill leachate collection system. 1,413m of collection pipes and 613m of conveying pipes laid, 21 connecting wells, 3 collecting wells and 400m³ of storage tank are constructed. 2 vehicles for landfill leachate transportation will be procured.</p> <p>Landfill gas collection and emission system. 2,993m of gas pipes are laid, 53 gas guiding gabions, 6 gas gathering stations, and 1 set of air exhaust and burning flare system with a processing capacity of 300Nm³/h are set;</p> <p>Surface runoff drainage system: 3,140m of drainage ditch, 1,456m of cover plate, and 2 water outlets;</p> <p>surface layer artificial material covering structure. The total thickness of covered structural layer is 120cm, which includes (from top to bottom): 15cm of nutrition vegetation stratum, 45cm of cover support soil layer, 6.3mm of soil engineering composite drainage network, 1mm of HDPE rough surface membrane, 25cm of clay protective layer under the membrane, 200g/m² of spun geotechnical cloth, 35cm of rubble gas guiding layer, and the old waste heap after being ground and levelled.</p> <p>monitoring well setting;</p>
		Ancillary Works	Maintain the existing management rooms, add 2 watering carts, and 2 project patrol vehicles.
		Water Supply and Drainage	The domestic water is supplied by the municipal water supply network; while the production water is supplied by the surrounding water systems. The rainwater will directly enter into the nearby surface water system after being collected by the drainage ditch, the leachate will be collected and sent to the storage tank, and then transported to the sanitary landfill leachate treatment station for treatment in accordance applicabla standard, and finally drained to Huainan No 1 Wastewater Treatment Plant. The domestic wastewater will directly enter municipal sewage network.
		Power Supply System	connect to the three-phase four-wire municipal electric supply nearby.
4	Urban Infrastructure Improvement	Road engineering	Include Zhongxing Road, Wanxiang Road, JiukongRoad and Yanshan Road, totally 8.334km. of which, Zhongxing Road is about 1,355m long, and the red line is 30m wide; Wanxiang Road is about

			1,520m long, and the red line is 25m wide; JiukongRoad is about 1,388m long, and the red line is 10m wide; and Yanshan Road is about 4,070m long, and the red line is 10m wide.
		Water supply engineering	This is the water supply pipe project under Zhongxing Road, JiukongRoad, Wanxiang Road and Yanshan Road; the overall length of water supply pipes is 8.574km (8.108km of main pipes), the pipe diameter is DN150~DN300.
		Rainwater engineering	The total length of the main rainwater pipes is 15,260m. For the neighbouring area and western part of No.206 National Road, the rainwater will be discharged into Huaihe River through the open trench at the intersection of the planned Jiukong Road and Linchang Road, the pipe diameter is d600~d800; for the eastern part, the rainwater will be eastward discharged into Gaotang Lake through the planned water body, the pipe diameter is d600~d1200.
		Sewage works	The pipe diameter is DN400 and the pipe length is 4.98Km, which is respectively laid along Zhongxing Road, Wanxiang Road and Yanshan Road;
5	Site Utilization for Community Development	Roadside Service Station	Totally 2 service stations will be constructed. Of which, the middle part roadside service station covers an area of 3621.9m ² , and the building area is 1200.0m ² , the bicycle renting area covers 40m ² , 25 parking spaces; the east part roadside service station covers an area of 4732.0m ² , and the building area is 419.4m ² , the bicycle renting area covers 73m ² , 32 parking spaces.
		Flowers and Trees Market	It covers an area of 83,539.85m ² , and the building area is 35,267.79m ² ; it mainly includes the steel structure greenhouse and solar greenhouse on the first floor, and the frame structure house building on the second and third floors. It contains administrative management rooms, electronic trade center, boutique flowers and trees exhibition and spot sale center, flowers and trees trading market, and the trading market for fish, bird, insect and stone; 200 parking spaces for sedan car, and 30 parking spaces for truck.
		Bonsai Garden	The total area of used land is 7.4hm ² , including open production area and greenhouse production area. Of which, the open production area covers 52,435m ² , the solar greenhouse covers 2,000m ² , the management rooms cover 1,200 m ² , and 110 parking spaces.
		Nursery	It covers an area of 54.06hm ² . of which, the production area includes greenhouse nursery garden, open breeding area, introduction and domestication area, nursery stock transplant area, large seedling breeding area, sunning ground, and comprehensive storeroom, etc., the building area is 30,495 m ² ; the non-production area includes garden affairs management area (including management

			center and tissue culture center) and garden roads and the building area is 1,638m ² .
--	--	--	---

1.3 Purposes of Environmental Management Plan

The purpose of environmental management plan is to formulate a set of technically feasible, financially sustainable and operable environment countermeasures aiming at the inevitable impact on the environment in the project, and clear the environmental impact mitigation, environmental management, and institution-building measures and arrangements conducted by the project contractor, supervisor party, operator, and the environmental management department during the project construction and operation period, so as to eliminate or compensate as much as possible the negative impact on society and environment caused by the project, and reduce the negative impact to the acceptable level.

The specific objectives of the Environmental Management Plan include:

1. Clear the environmental management obligations of contractor and operator

Conduct the detailed on-site check on environment protection targets, and put forward the effective environmental mitigation measures, which shall be included into the engineering design as the contractual obligation of the contractor and operator.

2. Operating instruction of environmental management

The environmental monitoring plan during the construction period and operation period proposed by the Environmental Management Plan can ensure the effective implementation of environmental mitigation measures, and it will be offered to the construction supervising unit, environmental supervision unit, and other related units during the construction period and operation period as the environmental protection text, to clear the responsibilities and roles of related functional departments and regulatory agencies, and propose the communication channels and ways between different departments.

3. Guarantee the expenditure of environmental management activities

The expenditure of environmental management, environmental supervision and capacity building shall be estimated in the Environmental Management Plan, and state the funding source, so as to ensure the implementation of all environmental management activities, among which, the administration expenses include personnel wages, office allowance, and travelling expenses.

The Environmental Management Plan is used to avoid and control the environmental impact in the process of project implementation and operation; thereby put forward the supporting measures needing to be conducted that influence the mitigation measures, monitoring measures, legal supervision means, and the above-mentioned measures; meanwhile, it is also the key link of connecting the environmental impact and the mitigation measures and alternative measures detailed in the environmental impact assessment. As for each of the environmental management measures, the environmental management will stipulate its technical connotation, investment estimation, implementation plan, functions of the government institutions, sources of funding, and monitoring scheme.

1.4 Preparation of Environmental Management Plan

The environmental management plan of the Sustainable Development Engineering of Resource-Based City (Huainan City) -- World Bank Loan Project of Coal Mining Collapse Area Comprehensive Treatment and Utilization is prepared by Hefei Design Research Institute for Coal Industry. The information sources of this environmental management plan are as follows:

- (1) General Report of Project Environmental Assessment
- (2) Immigrant Resettlement Plan of Project
- (3) Feasibility Study Report of Project

1.5 Designs of Environmental Management Plan

In order to describe the environmental management, environmental supervision and environmental monitoring, etc. in detail, the established environmental management plan is the guidance document for environmental management during the project implementation, and the action plan mainly includes the following five parts:

1. Environmental influence and mitigation measures: environmental influences during the project construction period and operation period, and the engineering measures and management measures adopted to prevent or mitigate the adverse environmental influences caused by this project.

2. Environmental management and supervision plan: environmental supervision actions taken in order to guarantee the synchronous implementation of environmental protection measures and engineering construction.

3. Environmental monitoring plan: environmental monitoring actions adopted in order to eliminate the environmental pollution during the construction period and operation period, and guarantee the safe operation of the project and the improvement of the environmental conditions in the project area.

4. Ability building (personnel training) plan: knowledge and skill training for the managers, environmental supervision personnel, full time or part time environmental management personnel, and etc. launched during the project implementation period in order to guarantee the implementation of environmental management plan.

5. Expenses and institutional arrangement: certain fund support shall be guaranteed in order to guarantee the implementation of the environmental management plan, and shall be implemented by the corresponding institution.

2. Environmental Quality Standards and Pollutant Discharge Standards

2.1 Environmental Influence Factors

1. Environmental influence factors during construction period

See **Table 2-1** for common environmental influence factors of the subcomponents during construction period.

Table 2-1 Common Environmental Influence Factors during construction

Stage	Item	Main Pollution Sources	Main Environmental Influence Factors
Construction period	Ambient Air	Suspended dust, vehicle exhaust, sludge odor, odor generated when turning over the rubbish, asphalt fume	TSP, Odor
	Water Environment	Construction wastewater, domestic wastewater of workers, surface runoff, effluent of dredged material storage site	COD, BOD ₅ , SS, ammonia nitrogen
	Acoustic Environment	Construction machinery noise, transport vehicle noise	Noise
	Solid Waste	Construction waste, domestic waste of constructors, domestic waste floating on the water surface, dredged sediment	Solid Waste
	Ecological Environment	Construction excavation, transport vehicle	Land vegetation, wild animals and plants

2. Environmental Influence Factors during Operation

See **Table 2-2** for the environmental influence factors of subcomponents during operation.

Table 2-2 Environmental Influence Factors during Operation

Stage	Item	Main Pollution Sources	Main Environmental Influence Factors
Operation Period	Ambient Air	Cooking fume, landfill gas, vehicle exhaust	Cooking fume, H ₂ S, NH ₃ , CO, NO ₂
	Water Environment	Domestic sewage, leachate	COD, BOD ₅ , SS, ammonia nitrogen, oil and grease
	Acoustic Environment	Road traffic noise, equipment operating noise, transport vehicle noise	Noise
	Solid Waste	Domestic waste, production solid waste	Solid waste

	Ecological Environment	Use of insecticide	Insecticide
--	------------------------	--------------------	-------------

2.2 Environmental Quality Standards

- (1) *Ambient Air Quality Standard* (GB3095-1996)
- (2) *Design Sanitary Standards for Industrial Enterprises* (TJ36-79)
- (3) *Sanitary Standards for Methyl Mercaptan in the Atmosphere of Residence Zone* (GB 18056-2000)
- (4) *Quality Standards for Surface Water Environment* (GB3838-2002)
- (5) *Quality Standards for Acoustic Environment* (GB3096-2008)
- (6) *Quality Standards for Soil Environment* (GB15618-1995)
- (7) *Quality Standards for Underground Water* (GB/T14848-93)

See **Table 2.3** for standard values of environmental quality assessment of this project.

Table 2-3 Environmental Quality Standards (Extract)

Environmental Element	Standard Name and Class	Parameter	Standard Limit		
			Unit	Limit	
Ambient Atmosphere	<i>Ambient Air Quality Standard (GB3095-1996), and Class 2 in the modification list</i>	SO ₂	mg/m ³	Daily Mean	0.15
				Hour Mean	0.50
		NO ₂	mg/m ³	Daily Mean	0.12
				Hour Mean	0.24
	TSP	mg/m ³	Daily Mean	0.30	
	PM ₁₀	mg/m ³	Daily Mean	0.15	
	<i>Design Sanitary Standards for Industrial Enterprises (TJ36-79), maximum allowable concentration of the hazardous substances in the atmosphere of the residence zone</i>	Ammonia	mg/m ³	One Time	0.2
		Hydrogen Sulfide	mg/m ³	One Time	0.01
<i>Methyl Mercaptan Sanitary Standards in the Sanitary Standards for Methyl Mercaptan in the Atmosphere of Residence Zone (GB 18056-2000)</i>	Methyl Mercaptan	mg/m ³	Maximum Allowable Concentration at One Time	0.0007	
Surface Water Environment	<i>Class V Standard of the Quality Standards for Surface Water Environment (GB3838-2002)</i>	Parameter and Unit		Class V	
		pH	---	6~9	
		DO	mg/L	≥2.0	
		COD	mg/L	≤40	
		BOD ₅	mg/L	≤10	
		NH ₃ -N	mg/L	≤ 2.0	
		TP	mg/L	≤0.4 (lake, reservoir: 0.2)	
		TN	mg/L	≤2.0	
		As	mg/L	≤0.1	
		Total Lead	mg/L	≤0.1	
		Hexavalent Chromium	mg/L	≤0.1	
		Total Cadmium	mg/L	≤0.01	
Sulfide	mg/L	≤1.0			

Table 2-3 Environmental Quality Standards (Extract) (Continued)

Environmental Element	Standard Name and Class	Parameter	Standard Limit			
			Unit	Limit		
Quality Standards for Groundwater	Class III Standard of the <i>Quality Standards for Groundwater</i> (GB/T14848-93)	Parameter and Unit		Class III		
		pH	---	6.5~8.5		
		Total hardness	mg/L	≤450		
		Chromaticity	度	≤15		
		Total dissolved solids	mg/L	≤1000		
		Permanganate index	mg/L	≤3.0		
		Ammonia nitrogen	mg/L	≤0.2		
		Volatile phenol	mg/L	≤0.002		
		Chloride	mg/L	≤250		
		Chrome (hexavalent)	mg/L	≤0.05		
		Fluoride	mg/L	≤1.0		
		Sulfate	mg/L	≤250		
		Nitrate	mg/L	≤20		
		Nitrite	mg/L	≤0.02		
		Cu	mg/L	≤1.0		
		Zn	mg/L	≤1.0		
		As	mg/L	≤0.05		
		Hg	mg/L	≤0.001		
		Pb	mg/L	≤0.05		
		Cd	mg/L	≤0.01		
Se	mg/L	≤0.001				
Ni	mg/L	≤0.05				
		Total bacterial count	number/L	≤100		
		Total coliform group count	number/L	≤3.0		
Acoustic Environment	<i>Quality Standards for Acoustic Environment</i> (GB3096-2008)	Index and Unit		Region	Daytime	Nighttime
		equivalent sound level	dB(A)	Region of Class 2	60	50
		equivalent sound level	dB(A)	Region of Class 4a	70	55
Soil and Bottom Mud Environment	Class II Standard of the <i>Quality Standards for Soil Environment</i> (GB15618-1995)	Index	Unit	PH>7.5		6.5—7.5
		As	mg/kg	≤25		≤20
		Hg	mg/kg	≤1.0		≤0.5

		Pb	mg/kg	≤350	≤300
		Cu	mg/kg	≤100	≤100
		Cr	mg/kg	≤250	≤200
		Cd	mg/kg	≤0.60	≤0.30
		Ni	mg/kg	≤60	≤50
		benzene hexachloride	mg/kg	≤0.5	≤0.5
		DDT	mg/kg	≤0.5	≤0.5
		Pb	mg/kg	≤350	≤300
		Zn	mg/kg	≤300	≤250

2.3 Pollutants Discharge Standards

- (1) *The Integrated Emission Standards of Air Pollutants* (GB16297-1996);
- (2) *Emission Standards of Odor Pollutants* (GB14554—1993);
- (3) *Emission Standards of Boiler Air Pollutants* (GB13271-2001);
- (4) *The Integrated Discharge Standards of Wastewater* (GB8978-1996) and the takeover standards of Huainan No. 1 Wastewater Treatment Plant;
- (5) *Pollution Control Standards of Municipal Solid Waste Landfill* (GB16889-2008);
- (6) *Ambient Noise Emission Standards of Building Construction Field* (GB12523-2011);
- (7) *Social Activities Ambient Noise Mission Standards* (GB22337-2008);
- (8) *Pollution Control Standards of General Industrial Solid Wastes Storage and Dispose Yards* (GB18599-2001)

2.4 Safeguard Policies of the World Bank

- (1) *World Bank OP/BP4.01 and Its Attachment (Environmental Assessment)*
- (2) *World Health Organization: Technical Specification of Ecological Environment Conditions Evaluation (Trial)* HJ/T 192-2006
- (3) *World Bank OP/BP4.04 (Natural Habitat)*
- (4) *World Bank OP/BP4.11 (Cultural Relics)*
- (5) *World Bank OP4.09 Plant Diseases and Insect Pests Management*
- (6) *World Bank OP/BP4.12 (Involuntary Resettlement)*
- (7) *World Bank GP4.07 (Water Resource Management)*
- (8) *World Bank OP/BP4.36 Forestry*
- (9) *World Bank GP14.70 (Participation of NGOs in World Bank Funded Activities)*
- (10) *World Bank BP17.50 Information Disclosure Policies*
- (11) *Insecticide Classification Suggestions Established According to Perniciousness and Classification Guidelines* (Geneva, World Health Organization)

2.5 Environmental Protection Target

The environmental protection targets of each subcomponent are listed in **Table 2-4** to **Table 2-8**.

Table 2-4 Environmental Protection Targets of Subcomponent 1

No.	Environmental Element	Environmental Protection Target	Relative Location	Distance (m)	Scale (Persons)	Targeted Environmental Function
1	Surface water environment	Many subsidence area ponds and Datong discharge ditch, Chenxiang discharge ditch, Jiulonggang discharge ditch and Kongdian discharge ditch, four discharge channels			Small size ditch	<i>Quality Standards for Surface Water Environment</i> (GB3838-2002) V standard;
2	Acoustic environment, atmospheric environment	Datong social welfare institute (internal of the district)	W	153 (429)	410	The “secondary district” of Quality Standards for Acoustic Environment (GB3096-2008) ; Ambient Air Quality Standard (GB3095-1996), and the Class 2 standards in the modification list;
		Yuanyichang affordable housing project (internal of the district)	E	12 (110)	504	
		funeral parlor (internal of the district)	S	233 (373)	57	
		Kuangbei Village (internal of the district)	N	132 (502)	212	
		Yuannan Village (internal of the district)	N	54 (616)	120	
		Nanshan Christian church	N	47 (90)	400	
		Sanyou Village (internal of the district)	NW	168(259)	30	
		Chongwen Village (internal of the district)	N	244 (260)	60	
		Xinjian Community (internal of the district)	N	236 (723)	252	
		Chenxiang Village (outside of the district)	N	269 (614)	3250	
		Occupational Disease Prevention and Control Hospital of Mining Group (outside of the district)	W	247 (796)	240 beds	
Huainan Center for Disease Control and Prevention (outside of the district)	W	194 (325)	130 人			

		Eastern Group Tumor Hospital	N	185 (498)	710 beds	
--	--	------------------------------	---	-----------	----------	--

Note: 1. "For the sensitive targets of the acoustic environment and atmospheric environment protection, the targets within 200m are the targets of acoustic environment protection and all are the targets of atmospheric environment protection". 2. The distance outside of the bracket of the relative distance is the minimum distance to the construction area of environmental modification, and the data in the bracket is the minimum distance from the sensitive point to the greenway construction area.

Table 2-5 Environmental Protection Targets of Subcomponent 2

No.	Environmental Elements	Environmental Protection Target	Relative Location	Relative Distance (m)	Scale (Persons)	Targeted Environmental Function
1	Surface water environment	Many subsidence area ponds and Datong discharge ditch, Chenxiang discharge ditch, Jiulonggang discharge ditch and Kongdian discharge ditch, four discharge channels			Small size ditch	<i>Quality Standards for Surface Water Environment</i> (GB3838-2002) V standard;
		Gaotang Lake	W	5,300	Large lake	<i>GB3838-2002 Quality Standards for Surface Water Environment</i> III class water;
		Huai River	N	8,000	Large river	
2	Acoustic environment, atmospheric environment	Datong social welfare institute (internal of the district)	W	43	410	The "secondary district" of <i>Quality Standards for Acoustic Environment</i> (GB3096-2008) ; <i>Ambient Air Quality Standard</i> (GB3095-1996), and the
		Yuanyichang affordable housing project (internal of the district)	E	360	504	
		funeral parlor (internal of the district)	W	240	57	
		Kuangbei Village (internal of the district)	N	288	212	

	Yuannan Village (internal of the district)	N	209	120	secondary standards in the modification list;
	Nanshan Christian church (internal of the district)	N	208	400	
	Sanyou Village (internal of the district)	NW	463	60	
	Chongwen Village (internal of the district)	NW	481	600	
	Jiulonggang Primary School (internal of the district)	N	393	234	
	Huaishun Community (outside of the district)	N	339	252	
	Xinjian Community (outside of the district)	N	394	274	
	Chonghua Community (outside of the district)	N	236	3250	
	Chenxiang Village (outside of the district)	W	43	410	

Note: "For the sensitive targets of the acoustic environment and atmospheric environment protection, the targets within 200m are the targets of acoustic environment protection and all are the targets of atmospheric environment protection".

Table 2-6 Environmental Protection Targets of Subcomponent 3

No.	Environmental Elements	Environmental Protection Target	Relative Location	Relative Distance (m)	Scale (Persons)	Environmental Function Target
1	Surface water environment	Many subsidence area ponds and Datong discharge ditch, Chenxiang discharge ditch, two discharge channels			Small size ditch	<i>Quality Standards for Surface Water Environment</i> (GB3838-2002) V standard;
2	Acoustic environment, atmospheric	Yuanyichang affordable housing project (internal of the district)	S	894	504	The "secondary district" of <i>Quality Standards for Acoustic Environment</i> (GB3096-2008) ;
		Chengxiang Village (outside of the district)	N	367	3250	

	environment	Shunfa Runzeyuan (outside of the district)	N	778	26000	<i>Ambient Air Quality Standard</i> (GB3095-1996), and the secondary standards in the modification list;
3	Underground water	Civil wells in the region				<i>Quality Standard for Ground Water</i> III standard

Note: "For the sensitive targets of the acoustic environment and atmospheric environment protection, the targets within 200m are the targets of acoustic environment protection and all are the targets of atmospheric environment protection".

Table 2-7 Environmental Protection Targets of Subcomponent 4

No.	Environmental Elements	Environmental Protection Target	Relative Location	Relative Distance (m)	Scale (Persons)	Environmental Function Target
1	Surface water environment	Many subsidence area ponds and Datong discharge ditch, Chenxiang discharge ditch, Jiulonggang discharge ditch and Kongdian discharge ditch, four discharge channels			Small size ditch	<i>Quality Standards for Surface Water Environment</i> (GB3838-2002) V standard;
2	Acoustic environment, atmospheric environment	Datong social welfare institute (internal of the district)	W	212	410	The "secondary district" of <i>Quality Standards for Acoustic Environment</i> (GB3096-2008) ; <i>Ambient Air Quality Standard</i> (GB3095-1996), and the secondary standards in the modification list;
		Yuanyichang affordable housing project (internal of the district)	E	61	504	
		Kuangbei Village (internal of the district)	E	214	212	
		Nanshan Christian church (internal of the district)	N	100	400	

	Chongwen Village (internal of the district)	NE	186	60	
	Jiulonggang Primary School (internal of the district)	NE	355	600	
	Jiefang Village (internal of the district)	NE	353	200	
	Chenxiang Village (outside of the district)	N	245	3250	

Note: "For the sensitive targets of the acoustic environment and atmospheric environment protection, the targets within 200m are the targets of acoustic environment protection and all are the targets of atmospheric environment protection".

Table 2-8 Environmental Protection Targets of Subcomponent 5

No.	Environmental Elements	Environmental Protection Target	Relative Location	Relative Distance (m)	Scale (person)	Environmental Function Target
1	Surface water environment	Many subsidence area ponds and Datong discharge ditch, Chenxiang discharge ditch, Jiulonggang discharge ditch and Kongdian discharge ditch, four discharge channels			Small size ditch	<i>Quality Standards for Surface Water Environment</i> (GB3838-2002) V standard;
2	Acoustic environment, atmospheric environment	Yuanyichang affordable housing project (internal of the district)	W	220	504	
		Chenxiang Village (outside of the district)	N	367	3250	
		Nanshan Christian church (internal of the district)	N	51	400	
		Chongwen Village (internal of the district)	E	148	60	
		Jiulonggang Primary School (internal of the district)	E	321	600	

	Jiefang Village (internal of the district)	E	313	200	
--	--	---	-----	-----	--

Note: "For the sensitive targets of the acoustic environment and atmospheric environment protection, the targets within 200m are the targets of acoustic environment protection and all are the targets of atmospheric environment protection".

3. Environmental Management System

According to the administration authority stated in the *Environmental Protection Law of the People's Republic of China*, and *Regulations on the Administration of Construction Project Environmental Protection*, Anhui Department of Environmental Protection shall be responsible for approving the environmental impact assessment report of this project. The Department of Environmental Protection of Anhui Province is the environmental management institution of this project, and it is mainly responsible for proposing the environmental protection requirements, and coordinating the environmental protection administration between different departments according to the contents of the environmental impact assessment report of this project; it is also responsible for organizing the acceptance work of environmental protection facilities.

Huainan Environmental Protection Bureau is mainly responsible for monitoring and supervising the implementation of the environmental protection measures of this project.

The construction unit shall set up an environmental protection department for undertaking the environmental management and monitoring work of this project in different phases. It shall implement the environmental protection laws and regulations; check the executive situation of the environmental measures; promote the advanced technology and experience on environmental protection; and organize the training of environmental protection technology around this project to improve the personnel quality.

3.1 Environmental Management Organizations

Owing to the large differences between the contents of environmental management in construction period and operation period, as well as the difference of provisionality and persistence of the work time, the separate organization shall be set up respectively, and the method of taking charge by phases shall be adopted. When the construction period is finished, the corresponding management agencies shall be revoked, and the management agencies of the operation period shall be started; the intersection of a certain period of time is allowed according to the specific situation of the work. See **Figure 3-1** and **Figure 3-2** for the environmental management organizations setting of this project.

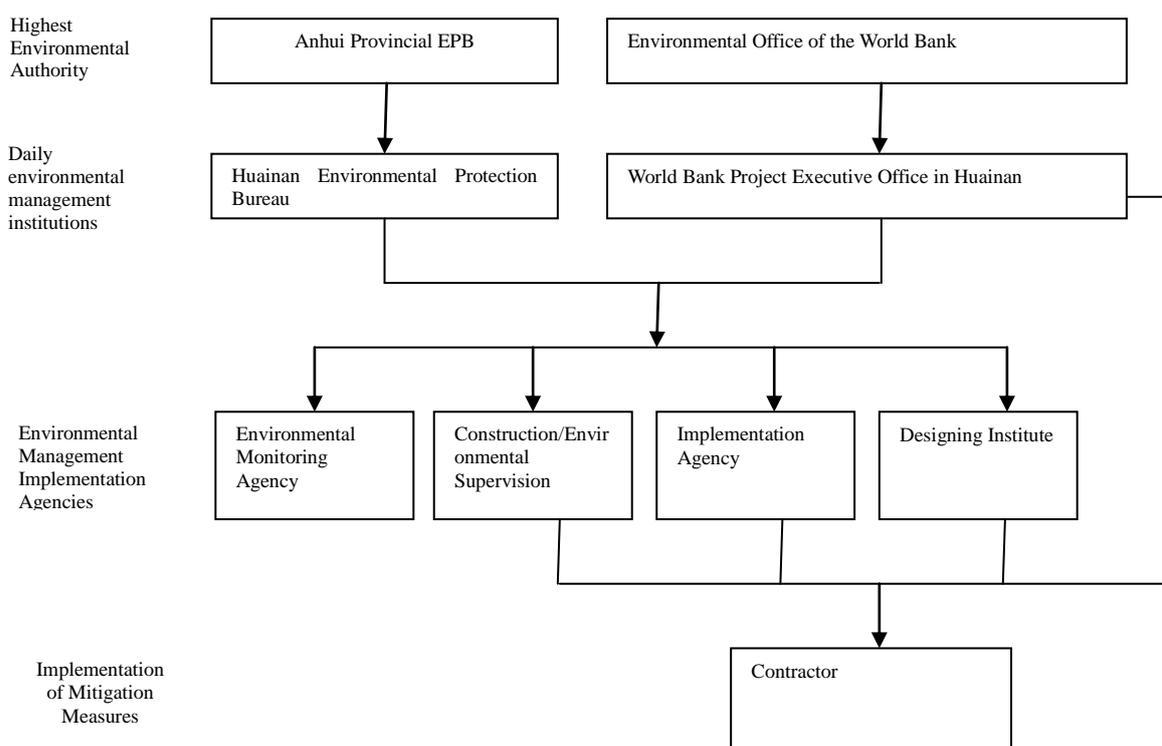


Figure 3-1 Environmental Management Organization in Construction Period

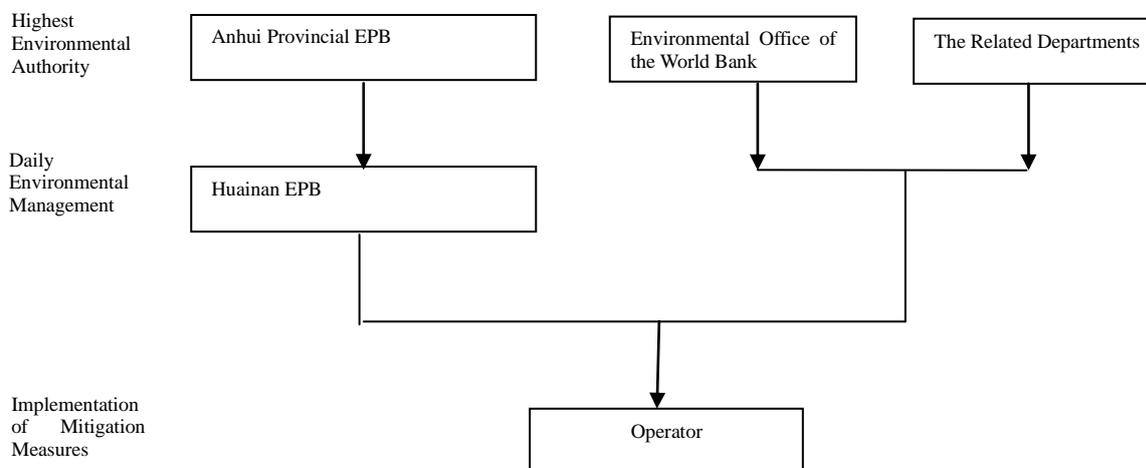


Figure 3-2 Environmental Management Organization in Operation Period

During the operation period of this project, the operator of the environmental modification and regional land exploitation and utilization subprojects is Huainan Agricultural Water Conservancy Investment Development Co., Ltd., the operator of the water system comprehensive improvement subproject is Huainan Water Conservancy Bureau, the operator of the closure of the old Datong refuse landfill is the Environmental Sanitation Department subordinate to Huainan City Appearance Bureau, and the operator of the regional infrastructures after being constructed is Huainan Municipal Administration Department.

3.2 Environmental Management Responsibilities and Contents

3.2.1 Responsibilities

The main responsibilities of the each related environmental management organization are as follows:

1. Project Office

Assist the Environmental Department of the World Bank in the environment supervision of this project.

2. Huainan Environmental Protection Bureau

According to the requirements of the related domestic laws and regulations, Huainan Environmental Protection Bureau shall be responsible for supervising the whole process of this project, put forward requirements for the environmental protection of this project, and shall be responsible for the “three-simultaneity” completion acceptance of this project.

3. Environmental Supervisor

Assist the owner in the supervision of the environmental protection measures implementation in the construction site, and raising remedial measures for the environmental problems generated during the construction period.

Formulate detailed management plan according to the construction plan of this project, inspect and revise (if necessary) this plan monthly. The head shall report such work to the project leader, report the environmental management and inspection results at regular

intervals every month, and put forward targeted solutions for the potential environmental problems found in the inspection.

4. Designing and Environmental Assessment Units

Compile environmental management plan and the implementation plan for each environmental protection measure, and guide the execution of the environmental management plan.

5. Huainan Agriculture Water Conservancy Investment and Development Co., Ltd.

Guarantee the implementation of the related environmental management measures taken by the environmental management department and the environment division of World Bank, and at the same time, assist the environmental management department in the daily environment inspection. In addition, set specialized agency (Environmental Protection Section) and full-time personnel in charge of environmental management.

6. Construction Contractor

Specifically carry out each environmental protection measure and job.

7. Operating Agency

Be responsible for executing the environmental protection measures during the operation period.

3.2.2 Contents

See **Table 3-1** for the phased environmental management contents and personnel allocation conditions of each environmental management organization.

Table 3-1 Phased Environmental Management Responsibilities

Phase	Responsible Party	Main Environmental Management Responsibilities	Staffing
Design and Preparation	Project Management Office	Liaison with environmental authorities.	1
	Huainan Agricultural Investment Company	1. Be responsible for a series of environmental protection and management work in project design and preparation period; 2. Finance for environmental protection budget; 3. Coordinate with environmental authorities.	2
	Design Institute	1. Incorporate the environmental protection measures into the design scheme and budget; 2. Incorporate the mitigation measures in environmental management plan into technical specification of the bidding documents and construction contracts.	2
	EIA Institute	1. Provide technical support for the environmental protection work of the engineering design; 2. Prepare environmental impact assessment report; 3. Develop environmental management plan.	4
Construction Period	Project Management Office	Be responsible for contacting and coordinating the implementation of environmental management issues with the government competent department for environment.	1
	Huainan Agricultural Investment Company	1. Be responsible for a series of environmental protection and management work in construction period, and make sure budget for mitigation measures and monitoring; 2. Manage and supervise the environmental protection work during the construction period, investigate and settle disturbance to the public or pollution problems generated during construction; 3. Be responsible for coordinating with environmental authorities with regard to environmental management matters; 4. Track implementation of environmental management plan, and report to the competent department at the same level, provincial project management office and World Bank regularly. 5. Settlement of public complaints.	2
	Contractor	1. Implement environmental protection measures according to the bidding documents, contract agreement and this environmental management plan; 2. Accept the guidance and supervision of the IA's environmental managers, environmental supervising engineers and the related government authorities. 3. Accept the technical support provided by the environmental protection consultation agency;	2

		<p>4. Take safety protection measures, such as setting informatory signs in the construction site and enclosing the boundary of the construction site; establish communication channel with the public, and guarantee safe construction.</p> <p>5. Implement the environmental management plan.</p>	
	Project/ Environment Supervisor	<p>1. Supervise the contractor to execute the environmental management plan, perform the environment mitigation measures specified in the contract agreement;</p> <p>2. Supervise the implementation of the contractor on the site;</p> <p>3. Cooperate with the IA to execute the environmental management;</p> <p>4. Record the implementation of the environmental management plan, form a report and submit to the IA periodically.</p>	5
	Environmental Monitoring Unit	<p>1. Accomplish the environmental monitoring work during the project construction period according to the delegation of the IA and the environmental monitoring plan;</p> <p>2. If abnormality is found during the construction period, monitor as entrusted by the owner.</p>	To be determined according to the entrusted task scope
	Local EPB	<p>1. Supervise and inspect the environmental protection measures of the IA and contractor;</p> <p>2. Receive the environmental management plan executing condition report submitted by the IA and project office, and carry out administrative management according to the report;</p> <p>3. Arrange emergency-response measures if abnormal environmental conditions arise during construction;</p> <p>4. Accept the public complaints, and coordinate and dispose such complaints.</p>	1
	Technical Assistance/ Consultant	<p>1. Provide technical support to the environmental protection work during the project construction period according to the delegation of the owner, this environmental impact statement and environmental protection designing achievements;</p> <p>2. Provide technical guidance for the contractor's environmental protection work, and accomplish the environmental protection training work during the project construction period.</p> <p>3. Report on the implementation of the environmental management measures.</p>	Unlimited

Operation Period	Agricultural Investment Company, Environmental Sanitation Administration Agency, Forestry Bureau and Municipal Infrastructure Department	<ol style="list-style-type: none"> 1. Be responsible for the environmental protection and management work after operating, implement the mitigation measures and monitoring work during the environmental management plan operation period; 2. Be responsible for contacting and coordinating the implementation of environmental management issues with the government competent department for environment; 3. Emergency treatment for environmental accidents; 4. Train the workers periodically to improve their abilities, and in the meantime, actively carry out environmental protection technology and experience exchange activities to further improve the environmental management work. 	2
	Environmental Monitoring Agency	<ol style="list-style-type: none"> 1. Accomplish the environmental monitoring work during the project operation period according to the delegation of the project IA and the environmental monitoring plan; 2. Carry out routine monitoring related to this project. 	To be determined according to the entrusted task scope
	Local EPB	<ol style="list-style-type: none"> 1. Inspect the environmental protection engineering for acceptance; 2. Manage and supervise the environmental protection compliance during the operation period; 3. Supervise and inspect the running conditions of the built environmental protection facilities. 	2

3.2.3 Environmental Supervision Measures

Environmental supervision is a new requirement for environmental protection. The environmental supervision work runs through the entire process of the engineering construction, so as to guarantee the successful launch of environmental protection work and the effective implementation of environmental protection measures during the project period. In order to guarantee the on-schedule completion of the project's environmental protection measures and the quality of the environmental project, the supervisors shall be entrusted by the owner and shall be of environmental project supervision qualification; based on the sectionalized and phased characteristics of this project's construction, it is preliminarily considered to arrange 2 full time environmental supervisors; the other environmental managers can be concurrently held by the staff from other departments as needed, and the number can be decided according to the job demand.

3.2.3.1 Environmental supervision work modes

1. Put environmental supervision into the category of engineering supervision, which shall be managed by the supervision and management departments of the project headquarters. Participate in monthly meeting of the project director and report the weekly and monthly reports to the director office, etc.

2. Regularly hold environmental supervision work meeting, solve the existing problems and put forward work plans for the next phase according to the recent environmental supervision work.

3. Each environmental supervision division shall hold regular monthly meetings of environmental supervision.

4. Form a sound spot environmental protection management system. Set up environmental protection leading group in each construction project department in charge of the environmental protection leading work. Organization extends to each construction team and group. Divide the responsible area and arrange the responsible person.

3.2.3.2 The environment supervision work content

1. The environment supervision in the period of construction preparation

Examine the environment protective provisions in the Project Construction Organization Plan formulated and submitted by the construction unit, examine whether the environmental protection system built by the construction organization is rational, participate in the examination and approval of the submitted application the Commencement Report of Unit Project, and supervise the construction and implement of the construction of each pollutant disposal project.

2. The environment supervision in construction period

Compile Key Jobs of Environmental Protection according to the construction organization design of each section, and publicize the environmental protection work to the construction unit, point out the environmental pollution sensitive points for the construction unit, put forward specific environmental protection measures according to the major pollutants exist in the construction process, review the Engineering Construction Environmental Protection Scheme submitted by the construction unit, inspect whether the construction unit's environmental protection system operates normally, and inspect the implementing conditions of the environmental protection measures, etc.; as well as supervise the construction of water and soil conservation measures. Supervise the implementing conditions of the environmental monitoring plan, as well as the monitoring results.

3. Environmental supervision during the project operation stage: review the Final

Report of Project Construction Environmental Protection Work formulated and submitted by the construction unit, settle the environmental protection completion documents, engineering project environmental protection acceptance inspection, and compile the Final Report of Environmental Supervision Work, etc.

3.2.3.3 Responsibilities of environmental supervision work

1. The supervisory personnel shall strictly perform the supervision responsibilities, practically exert the role of supervision and management, effectively execute all the environmental protection measures which shall be taken for each construction technology on site, and guarantee the effective execution of the environmental protection work.

2. Accomplish the publicizing and implementing work of the environmental protection laws and regulations, enhance the environmental protection awareness of all the participating personnel, and make such personnel conscientiously participate in and accomplish the environmental protection work.

3. Formulate staged environmental supervision acceptance inspection planning, inspect and accept the environmental supervision work for the completion of unit project, thus guaranteeing that the project possesses complete environmental protection procedures and intact data after completion.

4. For the construction projects which do not invite tenders, conclude and sign environmental protection terms in the contract, check the environmental protection contents in the construction organization design; the construction organization design shall be added with environmental protection section and the related content shall be specific.

5. Record in detail the implementing conditions of the project environmental management, compile weekly report and monthly report, and timely submit to the local project office and environmental protection agency.

3.2.3.4 Environment supervision during the construction period

During the construction process, the project engineer will supervise the implementing conditions of this specification; in case multiple terms are not executed, the project engineer will require the construction unit to stop construction or take other punitive measures, until the illegal behaviors being solved. In the meantime, the project engineer will also require the construction unit to observe the relevant national or local environment, public health and safety rules and regulations during the construction period.

3.3 Environmental Protection Supervision Plan

Based on the characteristics of this project, the environmental protection implementation of this project shall accept the supervision of Environmental Protection Department of Anhui Province and Huainan Environmental Protection, as well as the supervision of the related departments of the World Bank; therefore, during the project construction period, set environmental supervisors to assist the construction party in the site supervision, and set Environmental Protection Section to supervise the project during the operation period.

See **Table 3-2** for the project environmental protection supervision plan.

Table 3-2 Project Environmental Protection Supervision Plan

Phase	Organization	Supervision Contents	Supervision Purposes
Feasibility Study Phase	Municipal environmental protection bureau, World Bank	<ol style="list-style-type: none"> 1. Check the environmental assessment outline 2. Check the environmental impact statement 3. Check the EMP 	<ol style="list-style-type: none"> 1. Guarantee that the environmental assessment is of comprehensive contents, proper subjects setting, and prominent key points 2. Guarantee that the significant and potential problems which may generate in this project have been reflected 3. Guarantee that measures which mitigate the environmental influence have been provided with specific and feasible implementation plan
Design and Construction Phase	Municipal government Municipal environmental protection bureau Municipal culture and tourism bureau	<ol style="list-style-type: none"> 1. Check the environmental protection preliminary design and EMP 2. Inspect the restoration of the temporarily occupied land for construction, the restoration of vegetation, and the recovery of the environment 3. Inspect the dust and noise pollution control measures, and determine the construction time 4. Inspect the emission of air pollutants 5. Inspect the discharge and dispose of domestic wastewater and used oil in the construction site 6. Recovery and dispose of the borrowing area and spoil ground 7. Inspect the disposing conditions of the sludge 	<ol style="list-style-type: none"> 1. Strictly execute the “Three Simultaneities” 2. Guarantee that such sites satisfy the environmental protection requirements 3. Reduce the influences of the construction on the surrounding environment, and execute the relevant environmental protection laws, regulations and standards 4. Guarantee that the water qualities of the inland rivers are not polluted 5. Guarantee that landscapes and land resources are not badly damaged, so as to avoid water and soil loss 6. Guarantee that the sludge has been properly disposed 7. Protect the cultural relic resources from being damaged
Operation Phase	Municipal environmental protection bureau Municipal public security and fire department	<ol style="list-style-type: none"> 1. Inspect the implementation of EMP during the operation period 2. Inspect the implementation of monitoring plan 3. Inspect the sensitive spots which require further environmental protection measures (environmental problems which are not estimated may occur) 4. Inspect whether the environmental quality of the sensitive spot satisfies the corresponding quality standard requirements 5. Strengthen the supervision to avoid sudden accidents, formulate emergency accident treatment scheme in advance, timely eliminate the dangers once an accident 	<ol style="list-style-type: none"> 1. Implement the environmental management plan 2. Implement the monitoring plan 3. Faithfully protect the environment 4. Strengthen the environmental management, faithfully protect people’s health 5. Guarantee that the pollutant emission satisfies the emission standards

		occurs	
--	--	--------	--

4. Potential Environmental Impacts and Mitigation Measures

Environmental impacts introduced by this project will concentrate in construction period, and the influencing factors mainly include construction layout, external transportation, construction machinery, land occupation, construction personnel activities, and solid waste. Construction activities will generate wastewater, noise, exhaust gas, and solid waste, which will have adverse impact on water environment, acoustic environment, ambient air, water and soil loss, health, and ecological environment in the construction area and the surrounding areas. This project is improvement of regional environment, which will have insignificant impact on ecological stability in this area. After project completion, the regional ecological environment affected in the construction period will be gradually restored. Environmental mitigation measures considered in feasibility study/design stage are summarized in **Table 4-1**. Environmental mitigation measures for waste dump clean-up and demolition of industries are given in **Table 4-2**. Quantity and disposal approach of the waste dumps are shown in **Table 4-3**. Common environmental impacts in construction period and mitigation measures are included in **Table 4-4** and particular environmental impacts of each subcomponent in construction period and mitigation measures are listed in **Table 4-5**, **Table 4-6**, **Table 4-7**, **Table 4-8** and **Table 4-9**.

Influencing factors of operation period mainly include domestic sewage and solid waste from construction workers. Domestic sewage will be collected through municipal sewage pipes and sent to WWTP for treatment, and solid waste will be collected and disposed by the environmental sanitation department, which will have insignificant environmental impact. Potential environmental impacts and mitigation measures for each subcomponent are summarized in **Table 4-10**, **Table 4-11**, **Table 4-12**, and **Table 4-13**.

Table 4-1 Environmental Mitigation Measures in FSR/Design Stage

Subcomponent	Measures Considered in Feasibility Study/Design Measures
Environmental Remediation	(1) Selection of vegetation species: choose local species to prevent effects of alien species invasion. The species chosen in this project are all from Huainan City and its surrounding cities, which are local species. (2) Choose the species with strong disease and insect pest-resistant ability to prevent the risk of large-scale plant diseases. (3) Consideration for inundation impact: trees to be planted around the No.3 lake shall be the types with inundation-resistant ability and size of the trees will be selected based on calculated water depth and inundated range. (4) Landfill greening: choose tree species with shallow root system to avoid damage to landfill covering layer.
Water Stream Rehabilitation	(1) Considering insufficient downstream drainage ability, flood retention demand shall be taken into account in design and water level will be designed appropriately; (2) The dredged sediment has good quality, and will be considered to fill lowland and further for greening instead of disposal as waste soil.
Datong Landfill Closure	(1) Heap shaping: compact, control slope gradient, increase the stability of the heap and leave enough safe distance to the above high-voltage cable; reduce the heap size to avoid the mined-out area to the north and the karst area to the south so as to prevent groundwater pollution by landfill leachate. (2) Retaining wall: guarantee the stability of the heap and prevent rainwater entering into the rubbish heap.

	<p>(3) Vertical impervious wall: prevent the leachate leaking around the heap. Build the border dike at the border of the landfill area, and then build a vertical barrier wall, so as to prevent the leachate from leaking to outside of the landfill. The barrier wall shall include a layer of high-density polyethylene liner with the minimum thickness of 600mm and a layer of compound clay impermeable layer, which can extend to 3m under the impermeable layer of the landfill base. the total area of the vertical barrier wall is about 19,110 square meters.</p> <p>(4) Leachate collecting and storage system.</p> <p>(5) Landfill gas collecting and combustion system.</p> <p>(6) Surface rainwater diversion system: prevent rainwater entering into the heap and keep stability of the heap.</p> <p>(7) Covering system: prevent rainwater entering into the heap and divert overflow of landfill gas.</p>
Urban Infrastructure Improvement	<p>(1) Consider the sedimentation risk: although the sedimentation is basically stable, insignificant sedimentation may occur under the load of vehicles. Bituminous concrete is adopted for road structure, which is convenient for the road repair and reinforcement in the future.</p> <p>(2) Road safety design: the design of “separating pedestrians and vehicles” in road intersection.</p>
Site Utilization for Community Development	<p>(1) Protection of Shungeng Mountain scenic area: design service station to provide service to the scenic area and reduce destruction to the environment.</p> <p>(2) Choose local plant species to avoid the invasion of alien species.</p>

Table 4-2 Mitigation Measures for Waste Dump Clean-up and Industry Demolition

Sub-Component	Mitigation Measures
Waste Dump Clean-up	<p>(1) Provide all workers with protective equipments, such as protective goggles, face guard, helmet and safety shoes.</p> <p>(2) Keep cleanliness in the process of transportation and prevent road surface and air pollution caused by waste slipping off from over-loaded vehicle;</p> <p>(3) Construct casing around the dump site before clean-up and set drainage ditch and settlement tank to prevent water and soil loss and polluting nearby water; cover the waste dump in windy weather to prevent dust suspension.</p> <p>(4) Utilization/disposal of the waste by appropriate receiving parties, see Table 4-3.</p> <p>(5) Anti-seepage measures should be taken for general industrial solid waste under Category II in accordance with “Pollution Control Standard to General Industrial Solid Waste Storage and Disposal Site” (GB 18599-2001).</p>
Industry Demolition	<p>(1) Field investigation by professionals before demolition and professional monitoring institute will be employed once existence of hazardous waste is suspected.</p> <p>(2) Collect recyclable waste in the process of demolition and send to reclamation facility; transport construction waste to Huainan Jinke Renewable Resources Using Co., Ltd.</p> <p>(3) Existence of hazardous solid waste (if any) shall be reported to the PMO and then be transported to Wushan Hazardous Waste Disposal Center;</p> <p>(4) PMO carries out demolition of factory and makes the overall plan and arrangements of expense;</p> <p>(5) Pay attention to construction safety and provide all workers with</p>

	<p>protective equipments, such as protective goggles, edge shield, face guard, helmet and safety shoes, etc.</p> <p>(6) Keep cleanliness in the process of transportation and prevent road surface and air pollution caused by waste slipping off from overloaded vehicle.</p>
--	--

Table 4-3 Waste Quantities and Disposal Approach

No.	Waste Quantity (m³)				Subtotal (m³)	Disposal Approach	Cost
	Flyash	Coal Gangue	Construction Waste	Domestic Solid Waste			
1	10,080	2,800	0	/	12,880	<p>1. Huainan Angrui New Type Wall Co., Ltd. is responsible for the transportation and utilization of flyash and coal gangue as raw materials; commitment letter for receiving the waste has been provided;</p> <p>2. Huainan Jinke Renewable Resources Using Co., Ltd. is responsible for the transportation and disposal of the flyash and coal gangue as raw materials; commitment letter for receiving the waste has been provided;</p> <p>3. Domestic solid waste scattered in the field is transported to Datong Landfill for disposal before landfill closure.</p>	<p>1. The clearing expense of flyash and coal gangue is RMB 4,811,000;</p> <p>2. The clearing expense of construction waste is RMB 39,279,000;</p> <p>3. The clearing expense of scattered domestic solid waste is RMB 164,000.</p>
2	650	100	0	/	750		
3	9,500	1,500	1,140	/	12,140		
4	0	14,000	0	/	14,000		
5	0	0	3,643	/	3,643		
6	0	0	201,560	/	201,560		
7	1,500	0	0	/	1,500		
8	1,700	400	0	/	2,100		
9	0	0	2,600	/	2,600		
10	7,826	0	0	/	7,826		
11	12,530	1,150	0	/	13,680		
12	11,550	2,200	0	/	13,750		
13	0	0	20,000	/	20,000		
14	23,100	5,070	5,000	/	33,170		
15	0	1,100	0	/	1,100		
16	0	0	52,000	/	52,000		
17	0	0	80,557	/	80,557		
18	0	0	124,492	/	124,492		
19	3,300	535	0	/	3,835		
20	3,100	1,200	0	/	4,300		
21	4,540	850	0	/	5,390		

22	/	/	/	4,120	4,120		
Total	89,376	30,905	490,992	4,120	615,393		

Note: 1. Investigation indicates waste dumps include fly ash, coal gangue, construction waste and domestic solid waste; lab test results indicate fly ash and coal gangue are general industrial solid waste under Category II.

2. Clearing of waste will be organized and completed by Datong District Government as a separate task supported by counterpart fund.

3. Scattered domestic solid waste is dispersed in project the land for environmental remediation, so quantity and cost is summarized in total under Item 22.

Table 4-4 Common Environmental Impact and Mitigation Measures in Construction Period

Affecting Factor	Pollution Source	Major Environmental Impacts	Mitigation Measures	Implementer	Supervisor	Budget RMB 10,000
Water Environment	Construction wastewater	Surface Water Pollution	(1) Set collection drain at construction equipment and vehicle maintenance site, set the oil separation tank for treatment of oil-containing wastewater. After oil removal and sedimentation, the wastewater will be reused for construction activities.	Contractor	Project Supervision Company and IA	19.1
	Domestic sewage of construction workers		(2) Earthwork leaching waste water, drainage of foundation pit and waste water from washing construction materials can also increase the concentration of suspended matter in the water body. Therefore, in order to prevent the surface water pollution, the temporary sedimentation tanks will be set on construction site, and reuse the water for construction purpose after sedimentation treatment. (3) Rent farmhouses or hotels for construction workers as possible, so the sanitary sewage can be discharged through the existing discharging facilities or the urban sewage pipe network. If there is no sewage pipe network, the sanitary sewage shall be discharged to the wastewater equalization tank after pretreatment in the oil separation tank and septic tank, and then transported to WWTP for treatment. The pit			

			toilets are adopted, so there is no fecal sewage.			
	Surface runoff		(4) Set up retaining wall, drainage ditches, and sedimentation tanks around construction site, and reuse the water for construction purpose after sedimentation.			
Atmospheric Environment	Dust Suspension	Impacts to air quality in construction area, as well as to construction personnel, residents and plants and animals along the road.	(1) Avoid open storage of materials, if the open storage is needed, the materials shall be covered. (2)The excavated earthwork shall be timely backfilled, if not, the measures of surface compaction, regular water spray, and coverage shall be adopted. Construction debris should be moved away in a timely manner and covering or solidifying measures should be taken for centralized storage. (3) Closed transportation of residue and gravel; when the vehicles leave the site, they must be flushed, set the necessary vehicle cleaning area, and the ground of the cleaning area shall be treated with the hardening measures, so as to prevent the carrying of sediment by wheels and polluting urban roads. The earth and building material transportation vehicles shall be covered for avoiding falling, and the vehicles shall not be over loaded; the earth that falls on the road in the process of transportation shall be timely cleaned, so as to reduce the dust suspension. (4) Plan the routes and time for transport vehicles to reduce the impact of dust on the environment. Spray water to the road on a regular basis to reduce dust suspension.			101.1
	Exhaust of Vehicles	Influences the environmental air quality in the construction area	If diesel oil is used as the fuel for construction machineries and transport vehicles, the contractor must choose construction machineries and transport vehicles conforming to applicable national environmental protection standard, so as to ensure that the exhaust emission meet the relevant national standards, and ensure that the vehicle exhaust completely meet the standard.			

	Life stoves at the construction camp	Influences the surrounding atmospheric environment	Small coal-fired boilers without any smoke control measures shall not be used in construction camps, and the clean energy shall be used in all construction camps. All construction camps shall use liquefied petroleum gas or electricity for cooking and heating. The application of clean energy can basically eliminate the influence of the construction camps on the atmospheric environment.			
Acoustic Environment	Noise of construction machineries	It increases the noise level in the construction area and the surrounding area, and influences people's auditory sense	<p>(1) Reduce the sound level of equipments, and choose the equipments and process with low noise to radically reduce the noise intensity; meanwhile, strengthen the inspection, maintain the equipments to reduce the operation noise.</p> <p>(2) Adopt the personal protective measures, and reasonably arrange the staff to operate the construction equipments by turns to reduce the duration of exposure, and standard the operation as required. The staff of operating the high noise equipments shall wear the earmuffs and other protective equipments to reduce the harm of noise.</p> <p>(3) Reasonably arrange the site and working hours, and make the construction plan to avoid the simultaneous construction of lots of high noise equipments as far as possible, so as to avoid the excessive noise level in some areas, and the high noise equipments shall be used in the daytime.</p> <p>(4) When contractor constructs in the area near the sensitive points, it shall set up the mobile sound barriers to reduce the noise effect; meanwhile, prohibit the nighttime construction; if the continuous operation is needed under special circumstances, the contractor shall adopt noise reduction measures, inform the surrounding residents of the specific construction time and place, and the construction can be conducted after submitting to the Huainan Environmental Protection Bureau for filing.</p>			21

			(5) During the construction process, the high-noise equipments such as paver and concrete vibrator shall not be used at night. The construction units shall strictly follow the standard of <i>Emission Standard of Environment Noise for Boundary of Construction Site</i> (GB12523-2011), namely 70 dB (A) in the day, and 55 dB (A) at night.			
	Noise of transport vehicles		The vehicles shall slow down and shall not whistle when passing the residential areas.			
Solid Waste	Construction waste	Affect the surrounding landscape	<p>(1) Recycle the leftovers of building materials, broken bar head, broken steel pipes, packing tape, and waste equipments, etc.; waste soil, sand and stone are sent to the nearby villages for road construction; the construction waste in the construction period shall be intensively stacked and timely collected to be the filling materials of the foundation; the packing boxes and packages shall be stored by classification by responsible personnel, and then they shall be sent to the salvage station for recycling. The disposal method of the construction waste shall be conducted after reporting to the relevant department in Huainan, and the construction waste shall be timely carried out of the construction site as soon as possible. The sediment transport shall strictly follow the relevant provisions to adopt the enclosure and covering measures, so as to avoid or reduce the impact of spilled soil on the environment; in addition, the vehicles shall not take the main roads, and they shall choose the secondary roads for transportation.</p> <p>(2) After construction, the temporary facilities in the construction area shall be removed, and the parking area of construction machinery, charge make-up area, integrated warehouse, office and living areas shall be cleaned, construction waste and all kinds of</p>	Contractor	Project supervisor and IA	20

			debris shall be cleaned; the surrounding household garbage, portable toilets, and sewage pit must be cleaned and filled, and disinfected with carbolic acid and quick lime; and the recovery work of the construction site shall be taken.			
	Domestic solid waste of construction personnel	Affect the human health	Domestic solid waste shall not be randomly thrown; the construction units shall strengthen the management of household garbage in the construction area, set trash cans by classification, and entrust the local sanitation department to make the disposal of garbage. Spray liquid medicine to the cans regularly to prevent the breeding of flies and other pests, and then reduce the adverse effect of household garbage on the water environment in the construction area and the sanitation of the construction personnel.			5
Ecological Environment	Construction and excavation, transport vehicles	Affect the animals and plants	<p>(1) Absolutely prohibit the exploitation and construction or the building of roads damaging the mountains, water bodies' natural environment in the project area, protect the natural environment, the artificial structures shall be uniformly planned, well designed and scientifically constructed, and they shall coordinate with the surrounding mountain environment, so as not to damage the overall environment.</p> <p>(2) The short-term closed system shall be taken to the area whose ecological environment is seriously damaged in the project area for natural recovery, and make it recover to the good ecological environment quality before damage.</p> <p>(3) If there is any valuable geological landscape and environment, it shall be protected by setting signs and protective fence, and other measures.</p> <p>(4) Properly handle the relationship between the construction and development of the project and the water quality protection; the construction shall not increase the pollution of the water body. The</p>			

			<p>construction waste water to the water body must be treated with necessary measures, so as to prevent the pollution, and protect the water environment.</p> <p>(5) During the construction period, set the ecological environmental protection publicity column or exhibition room to educate the construction personnel and increase their ecological protection consciousness, to better protect the ecological environment in the area.</p> <p>(6) Resolutely hit the unlawful acts of excessive digging, picking, and selling rare medicinal plants.</p> <p>(7) Optimize the engineering design: The engineering design shall conform to the topography as far as possible to avoid the large volume of excavation and filling, the existing trees and grass that can be maintained shall be maintained; on non-engineering decorate surface, either during construction or after construction, the original vegetation shall not be damaged, so as not to cause the water and soil loss.</p> <p>(8) Optimize the earthwork construction plan: Adopt the construction way of excavating while filling; reduce the damage to vegetation and water and soil loss through reducing the excavated volume, stacking volume and the traffic volume of earthwork. Reasonably arrange the construction period. The schedule of the ground and main construction shall be appropriately arranged to reduce the earthwork construction strength; the earthwork construction shall be conducted taking advantage of the dry season, so as to reduce the water and soil loss through reducing the washing of surface runoff formed by rain.</p> <p>(9) Strengthen the management of earthwork and vegetation recovery: Select the appropriate site to set the temporary earthwork stacking yard, and do well the temporary water protection measures such as the setting of sand-hinder bank; after the construction, do well the work of vegetation recovery at the temporary</p>			
--	--	--	--	--	--	--

			<p>earthwork stacking yard.</p> <p>(10) Strengthen the earthwork construction management: Before the ground works, the construction of temporary drainage ditches and desilting basins shall first be conducted, so as to reduce the washout of surface runoff to the exposed surface of the construction area. The wall or boards shall first be set at the surrounding low-lying areas, which are used to collect the surface runoff within the construction area; the water shall be discharged in a centralized manner to prevent the flowing of the silt from the construction area into the water bodies. The terrace and roadbed construction shall be filled and pressed timely to prevent the loss of loose topsoil.</p> <p>(11) According to the design requirements, plants and grass shall be timely planted at the ecological recovery land and land use for greening, and all plant measure indicators must meet the design requirements.</p> <p>(12) Animal protection measures: There are no national and provincial level wild protected animals, but the Project Office shall warn the construction unit that the wild animals met during the construction period shall be strictly protected, personnel are prohibited to kill any wild animal, and all wild animals shall be protected.</p>			
Cultural Relics	Construction and excavation	Find cultural relics	In the excavation or construction period, if the cultural relics and historic sites are found or suspected, the construction unit shall protect the scene immediately according to the requirements of <i>Cultural Relics Protection Law of the People's Republic of China (December 29, 2007)</i> . And it shall report the situation to the local Bureau of Cultural Relics for identification and processing, and the construction can only be restarted after the approval of the local Bureau of Cultural Relics.			/
	Construction activities	Influence of equipment noise to Nanshan Christian	Construction site is prohibited to use strong noise equipment, which shall mainly not affect the church activities when there are performing Salat or other			/

		Church	important activities in Nanshan Christian Church.			
Social Environment	Construction activities	Affected people's dissatisfaction and complaints	Persistent public participation project implementation period.	PMO	Project Leading Group	/

Table 4-5 Particular Environmental Impact and Mitigation Measures of Subcomponent 1 in Construction Period

Affecting Factors	Pollution Source	Major Environmental Impacts	Mitigation Measures	Implementer	Supervisor	Budget RMB 10.000
Atmospheric Environment	Dust suspension caused by construction activities	Affect the surrounding atmospheric environment	(1)First construct by sections in greenway construction. Use rollers to compact the soft ground except pipes and ditches and compact each period to minimize dust emission; equip with watering cart before construction, sprinkle water on the bare ground of the construction site and maintain a certain humidity to reduce dust; (2) Use purchased asphalt concrete or concrete and don't manufacture or produce asphalt concrete or concrete at the construction site to eliminate the effects on the atmospheric environment in the process of producing and manufacturing the pavement materials; (3) Humidify the mixed materials of the roadbed materials until there is no dust suspension when mixing. Don't mix the loose and dry roadbed materials up directly to reduce the dust effects on the atmospheric environment when mixing the materials; (4) Use purchased asphalt concrete to build service station buildings and don't set concrete mixing station.	Contractor	Project supervisor and IA	
Ecological environment (afforestation)	Forest land clearing	Improper methods may result in water and soil loss or damaging natural vegetation of fragile areas	(1)Clear away the shrub and herbaceous plant obstructing forest planting activities in bulk or strip, pile up for natural decomposition; (2) Keep well the native vegetation			30

	Soil preparation	Improper methods of slope soil preparation may lead to local soil and water loss	(1)Select the cave cultivation, strip cultivation and full cultivation according to gradient of the planted land and control the break ground within 25%; (2)Reserve vegetation protection zone with a width of 10m between planted land edge and the farmland; (3)Cover the land surface with deadwood and grass timely after soil preparation to prevent surface soil being exposed.			
	Tending of young growth	Disturbing surface soil and result in new water and soil loss, which will affect the environment in and around the project area.	(1)Adopt local nurturing method in slope land and reserve the natural vegetation in young growth land; the residues of vegetation after weeding shall be left in the land as coverings; (2)Forbid collecting dry branches and fallen leaves of understory.			
	Layout of forest management road	For example, excessive excavation surface will lead to certain water and soil loss	(1)Make use of the existing forest path to lay forest management road as far as possible; (2)Conduct the construction of forest management road along the contour line as far as possible; (3)The width of the forest road is 0.8~1m to reduce break ground to the greatest extent.			
	Construction activities	Occupation of land and vegetation deterioration	(1)Greenway and stage construction shall be strictly controlled within the construction site and the vegetation outside of the construction site is forbidden to be damaged; the waste materials in waste heap shall be hauled away timely and properly handled without occupying vegetation. (2)For the rocky slope land, wasteyard shall be consolidated and recovered with blocking, and the naked land surface shall not be exposed without vegetation recovery. When the weather is dry or the wind speed is fast, water the exposed ground to prevent dust; water the exposed ground in good time to keep certain humidity in the soil surface.			
Shungeng Mountain Scenic Area	Construction activities	Construction activities may have influence to	(1)Construction activities within Shungeng Mountain scenic area shall take effective measures according to relevant regulation of safe and civilized construction and strictly			

		the vegetation and landscape in Shungeng Mountain scenic area	protect the scenery, vegetation, water body and landscape environment around the construction site. After the approval of management organization of Shungeng Mountain scenic area, the construction unit shall take approval process with related departments. Recover the damaged scenery, vegetation, water body and landscape environment according to requirements after construction completion. (2)Before the project implementation, the Project Office shall print and issue the <i>Huainan Shungeng Mount Scenic Area Management Regulations</i> to the construction unit, closely restrict to construct within the planned bed line and requires the construction unit to make propaganda to its staff, strictly protect the scenery, vegetation, water body and landscape environment and any unit or individual shall not damage the vegetation or scenery in Shungeng Mountain scenic area that outside of the construction area.			
--	--	---	--	--	--	--

Table 4-6 List of Characteristic Environmental Impact and Mitigation Measures in the Construction Period of Sub-project 2 Drainage Comprehensive Improvement

Affecting factors	Source of pollution	Main environmental impacts	Mitigation measures	Implementer	Supervisor	Budget (ten thousand yuan)

Water environment	Residual water in the sludge storage yard	Affect the surrounding water environment	<p>(1)The sludge storage yard shall take some anti-seepage measures before piling up the bottom mud, fill the bottom with clay and pun and build cofferdam all around. In design and construction of the cofferdam, it is recommended to set anti-sliding pile and use different construction materials to improve the overall stability of the cofferdam. Build the sedimentation basins and the flocculating agent can be appropriately added to speed up the sedimentation, the mainly pollutants emission concentrations shall satisfy the Level I emission standard requirements specified in Integrated Wastewater Discharge Standard. The residual water after sedimentation will be drained to the surrounding channels.</p> <p>(2)Take soil and water conservation measures in sludge storage yard, including engineering measures, vegetation measure, land reclamation measures and temporary measure. Cover earth and afforest immediately after sludge piling up to prevent and control water and soil loss</p>	Contractor	Project supervisor and executing agency	4.4
	Sediment dredging	Affect water body	Avoid excavation in rainy day, and if the project must be excavated in rainy day, the working surface shall not be too excessive and shall be completed by stages. Earth excavation shall be successively conducted from top to bottom in separate layers and segments, made certain slope to discharge water and shall not affect water gathering within slope stability.			/
	Ground excavation	Affect water body	The surface gradient of ground grading shall meet the design requirement, in case of no requirement; make a slope not less than 0.2% toward the drainage ditch direction. The leveled ground surface shall be checked one by one, and the interval between check points shall not more than 20m.			/
Atmospheric environment	Stink in dredging	Affect the Construction personnel	Construction personnel shall wear masks when dredging.			0.5

nt	road dust	Affect the surrounding air environment	<p>(1) All transportation roads shall be compacted, and add sand bedding to the road section with long transportation distance, so as to prevent muddy road in rainy days, and much dust in sunny days of the transportation road, reduce the dust quantity of the road, and prevent the road dust from affecting the atmospheric environment.</p> <p>(2) Watering cart shall be equipped to appropriately water the road in due time. At the same time, spray water on bare earth surface and fill, so as to reduce the road raise dust, and dust at bare earth surface and fill.</p>			2
	construction dust		<p>(1) Slope protection and bank protection during comprehensive improvement of water system will need bulk materials such as sand. Bulk materials such as sand piled up at the construction site shall be covered, compacted and filled timely.</p> <p>(2) The excavation shall be backfilled timely; the backfill soil shall be compacted timely; after removing the goosing grass from the slope, compact the bare surface timely; when it is dry and windy, spray water on the bare surface and backfill soil site.</p>			
Acoustic environment	Construction noise	Affect the surrounding acoustic environment	When three ditch sections are near environmental sensitive sites, construction at night is prohibited,			/
Solid waste	Household garbage floating on the water	Affect the surrounding landscape	Uniformly collect with the household garbage after picking up from water, and then is transported to Datong old refuse landfill.			2

	Sludge		<p>(1) Transport the sludge outward timely after dredging with enclosed carrier vehicle to prevent scattering along the road; the construction unit shall consult with the environmental sanitation department to add sanitation workers in the sludge transporting road segment to clean up the sludge fell on the road and reduce its influence to the road and landscape.</p> <p>(2) The sludge shall be transported to the nearby bottom land in the environmental modification project area, and be used in the environmental modification sub-project.</p>			4
	Spoil		<p>162,500 m³ spoil will not be stacked, instead, it will be used in environmental modification and Closure of Datong Old Landfill sub-projects. Avoid sprinkling during the transportation process, timely clean and water on time.</p>			1
	Waste slag		<p>Pay attention to environmental protection during waster slag piling and disposal, and do not affect the surrounding landscape and traffic. After transporting to the slag pit, level and compact the slag. In the later period of construction, take relevant vegetation measure. Repair and resume the environmental influence and vegetation destruction brought by waste slag. Reduce the bare time of the pit, and reduce water and soil loss.</p>			
Solid waste	Construction activities	Occupation of land, vegetation deterioration	<p>(1) Construct in strict accordance with the red lines planned in the trench renovation. Transplant the trees within the scope of excavation as far as possible, and do not fell trees outside the excavation scope at will.</p> <p>(2) During the trench comprehensive improvement construction, construct and protect the slopes by section as far as possible according to the construction situations, and timely recover the ecological vegetation environment around the trench embankment and lake region sides.</p>			/

Table 4-7 Particular Environmental Impact and Mitigation Measures of Subcomponent 3 in Construction Period

Affecting Factors	Pollution Source	Major Environmental Impacts	Mitigation Measures	Implementer	Supervisor	Budget RMB 10,000
Surface Water	Leachate in drainage channel	Affect surface water environment	Before engineering construction, leachate volume of water in the ditches around Datong landfill is about 10 m ³ . The IA will transport the leachate to Chengdong Leachate Treatment Station with suction-type sewer scavenger for treatment. Then it will be disposed in the first sewage treatment plant of Huainan and then will be discharged after meet applicable discharge standard.	Contractor	Project supervisor and IA	1.0
Atmospheric Environment	Odor from solid waste turn-over	Affect the construction personnel	When turning over the solid waste, the construction personnel shall wear masks or other protection devices.			0.5
	dust	Affect the atmospheric environment around it	Dust mostly comes from shaping the pile body, compacting, and covering. In the process of overturning the solid waste, the naturally grown grass and crops on the landfill will be removed. In this case, the surface of the landfill will be exposed. When it is dry and has heavy wind, dust will rise. Thus the surrounding air environmental quality will be affected. Hence, the surface must be covered and the construction progress must be accelerated so as to decrease the amount of dust.			

Table 4-8 Particular Environmental Impact and Mitigation Measures of Subcomponent 4 in Construction Period

Affecting Factors	Pollution Source	Major Environmental Impacts	Mitigation Measures	Implementer	Supervisor	Budget RMB 10,000
Atmospheric Environment	Asphalt fume	Affect the atmospheric environment around the site and the health	Use the purchased asphalt; when paving the asphalt, the construction personnel shall wear masks or other protection devices.	Contractor	Project supervisor and IA	0.5

	Dust suspension	of the construction personnel	<p>(1) The optimizing construction plan makes construction excavation and the engineering soil residue be backfilled on the spot or be outward transported in time, so as to reduce the volume of muck deposit and the raise dust output. If there is clay court, it shall be covered with plastic cloth or dust screen to reduce the raise dust. The road materials in bulk shall not be piled up massively. If it is needed to pile up, there shall be plastic cloth or dust screen to cover it. It is forbidden to pile up it permanently in the open air without any preventive measures.</p> <p>(2) First construct in sections in road construction. Use rollers to compact the soft ground except pipes and ditches and compact each period to minimize dust emission; equip with watering cart before construction, sprinkle water on the bare ground of the construction site and maintain a certain humidity to avoid dust produced by vehicles and wind to pollute the surrounding environment;</p> <p>(3) Asphalt concrete or concrete which is used in the pavement construction materials of these four roads must be asphalt concrete goods or concrete. It is not allowed that asphalt concrete or concrete is manufactured or produced at the scene of the construction of road so as to eliminate the impact on atmospheric environment in the process of producing and manufacturing pavement materials.</p> <p>(4) The mixing operation of the roadbed materials first requires humidifying materials which will be mixed to ensure that the humidified materials have no dust when to be mixed. Thus it can reduce the dust which is generated in the process of mixing.</p> <p>(5) Mixing operation of roadbed materials shall make a humidifying treatment to mixing materials firstly. It cannot be mixed until materials are humidified to a dust-free degree. When mixing roadbed materials of Zhongxing Road and Yanshan Road, the distance shall be beyond 300m from residential areas. Deliver mixed roadbed materials to road segments near residential areas by using vehicles so that it can reduce the raise dust caused by the material mixing.</p>			
--	-----------------	-------------------------------	---	--	--	--

Social Environment	Road safety	Influence to public safety	<p>(1)Construction by section, complete excavation and backfill as soon as possible;</p> <p>(2)Set casing and temporary shortcut when constructing, inform the public with the construction time and segment and set traffic warning signs;</p> <p>(3)In traffic peak time, dredged and dispatched by traffic police to ensure flow of pedestrian and vehicle and reduce urban traffic pressure;</p> <p>(4)The transport of building materials and abandoned earth and stone shall avoid the traffic peak time, or conducted at night to reduce traffic congestion and influence to residents.</p>			1
Ecological Environment	Construction activities	Occupation of land, vegetation deterioration	<p>(1)Carry out construction strictly according to boundary lines of roads and planning red line, transport the unnecessary earth and stone away timely and not allowed to occupy the land outside of the boundary lines of roads and planning red line, at the same time, vegetation outside of the boundary lines of roads and planning red line shall not be cut to result in vegetation loss. The camp buildings shall be set in the city or nearby village rather than in the project area as far as possible. Make balance calculation of excavation and fill and reach the balance as far as possible; for the lacking, it shall use the excavation earth and stone of water system repair, and set the excavation soil field in the project area is forbidden to protect the ecological vegetation in the project area;</p> <p>(2)Set green belt in Zhongxing Road with a width of 4m, plant at least one line border trees in Wanxiang Road and Jiukong Road, and Yanshan Road shall depend on the particular facts. The road whose vegetation is relatively poor can be set with border trees and the road whose vegetation is relatively good may not be set with border trees. The flood ditch shall be constructed synchronously with Yanshan Road to reduce the ecological and environmental impact brought by synchronous construction.</p>			30

Table 4-9 Particular Environmental Impact and Mitigation Measures of Subcomponent 5 in Construction Period

Affecting Factors	Pollution Source	Major Environmental Impacts	Mitigation Measures	Implementer	Supervisor	Budget RMB 10,000
Atmospheric Environment	Land leveling or trim	To effect the around atmospheric environment.	<p>The land leveling is mainly in the wood trading market, the nursery garden and the roadside service points in the middle and east part. The evaluation requirement: in the land leveling of the nursery garden, we shall try to use the existing landform to prevent the great scale of excavation and backfill. We should divide the land into blocks to implement the measures and after leveling a block of land we shall plant it by the plants in the nursery garden. The area of each land shall not be more than 1-2 hectare, so as to prevent the large area of bareness to result in the ground raise dust and affect the around ambient air quality. To the integral need of the flowering wood trading market building, there may be some whole plan consideration for the land leveling. The evaluation requirement: to the leveled land, we shall take the compaction measures to laminate and after leveling a land we shall laminate one to prevent the occurrence of a large area of bare intensive earth surface and resulting in the flowing dust pollution.</p> <p>To take the measure of watering to eliminate the dust. There can be temporary water pipeline in the flowering wood trading market and use the city tap water to watering for dust suppression. If there is water supply engineering before the land leveling in the nursery garden we can use the water supply pipe network for watering; if the nursery garden will take the water supply engineering after the trim or leveling of the land, there shall be a watering cart for dust suppression in the construction of the nursery garden. The watering shall be in accordance with the physical</p>	Contractor	Project supervisor and IA	/

			condition of the area and take no raise dust as the principle to water in good time.			
	Pipeline construction		The water supply pipeline in the nursery garden should be constructed in section, after constructing one section we should backfill it. It is not allowed to dig all the pipe ditches in one time. All the pipe ditches shall be backfilled and then can we begin next dig. Because of the pipelines in the nursery garden are mainly water supply pipeline, the work amount of the excavation is relatively lesser, so as long as we construct in sections and backfill in time, the construction will not have any influence to the atmospheric environment in this area. The water supplying, water draining and the rain water pipeline in the flowering wood trading market shall also be constructed in section and after constructing a section we shall backfill it to reduce the dust mound besides the pipeline ditch and the output of the raise dust. The clay piled up in the both sides of the pipe ditch shall take the watering measure or the plastic cloth or the dust screen covering measure in terms of the physical condition. To the mounds that have been exposed for too much time and are on both sides of the pipe ditch, we must take the covering measure, which will have the least effect to the atmospheric environment in this area. The quantities of the water supply and drainage pipeline in the garden displaying potted landscape are relatively lesser so we will take the appropriate watering measure and will also take the covering measure in necessary, which will not have any effect to the atmospheric environment in this area.			
	Dust suspension		(1) The pile time of the piled dust in the base slot excavation shall be shortened as far as possible. In the dry weather we shall water the mound in good time to keep the surface of the dust is humid for dust			

			<p>suppression. If the groove is exposed for too much time in the air, we shall take the covering measure for dust prevention. To all the bulk materials that the building needed we shall take the covering measure through the plastic cloth or the dust screen and we can also put up a simple shack for the store of the bulk materials so as to reduce the output amount of the raise dust. The cement concrete in the construction shall be merchandise cement concrete and people cannot make and prepare the cement concrete in the construction site.</p> <p>(2) The mixing of the roadbed materials in the road construction shall keep a certain amount of humidity. The construction of the roadbed and the harden site shall be laminated at any moment and the condition of extensive inattentive soil layer on the road and the harden site shall not occur. Meanwhile, it is necessary to water so as to reduce the occurrence of the road raise dust. The road surface and the harden site materials in road construction, such as the cement concrete or the bituminous concrete, shall be the merchandise cement concrete or the bituminous concrete and people cannot build the cement concrete or the bituminous concrete preparation station on the spot for road construction or site harden.</p>			
Ecological Environment	Construction activities	Occupation of land, vegetation deterioration	<p>(1) Shall not destroy the ecological environment beyond the scope of the red line and set temporary site and camp buildings outside of the project area. All construction activities shall be carried out within the land occupation red line to prevent affecting surrounding ecological environment;</p> <p>(2) The land occupation indexes of afforestation in construction area are all over 30%.</p>			

Table 4-10 Environmental Impact and Mitigation Measures of Subcomponent 1 in Operation Period

Affecting Factors	Pollution Source	Major Environmental Impacts	Mitigation Measures	Implementer	Supervisor	Budget RMB 10,000
Ecological Environment	Plant diseases and insect pests	Use of insecticide affects the surrounding ecological environment, surface water and environment human health	<p>Execute <i>Pest Management Plan</i></p> <p>(1) Establish plant diseases and insect pests management center in the project area, which will conduct periodical inspection to the pesticide used in the project area to ensure the production, packaging, labels, transportation, storage, use and processing of the chemicals used by the project beneficiaries are all conforming to the world bank's standard; avoid the prepared pesticide to be the IA or IB products of the World Health Organization, or the active ingredients in II pesticide exceeds the standard regulated by the World Health Organization;</p> <p>(2) Purchase of any pesticide by the project beneficiaries shall pass the following examination and approval: types and level of danger resulted from method of application and users; The reliability of the method of use and the user's application level; examine the grade and preparation of the pesticide according to <i>Pesticide Classification Method and Classification Rules Regulated According to Risks</i> (Geneva:WHO2009) and the latest categorical data;</p> <p>(3) Choice of the pesticide must meet the standard of the world bank business policy (OP 4.09). These pesticides: The damage to human body health must be minimal; must prove its effectiveness in prevention and control of target; the influence to non-target species and natural environment must be minimal. The choice of the pesticide application method, time and frequency shall have the minimum damage to natural enemy. The pesticide used in public health plan must be proven safe to the residents, local species and users in the</p>	Huainan Agricultural Water Conservancy Investment Development Co., Ltd.	Huainan Environmental Protection Bureau	7

Affecting Factors	Pollution Source	Major Environmental Impacts	Mitigation Measures	Implementer	Supervisor	Budget RMB 10,000
			application areas.			
	Pesticide /fertilizer application	<p>1.Unreasonable use of pesticides may kill the natural enemy of the injurious insect, resulting in biodiversity loss and imbalance of species in the forest region;</p> <p>2. Improper application methods of pesticides or fertilizers may result in pollution of nearby water body;</p> <p>3. Long-term application of chemical fertilizer will lead to the change of physicochemical property, soil hardening, soil degradation and soil fertility decline;</p> <p>4. If the pesticide container is improperly cleaned and handled, water body and soil will be affected.</p>	<p>(1)Depend on prevention and biological control method and use as less chemical insecticide as possible;</p> <p>(2)Use the III and U type insecticide regulated by the World Health Organization;</p> <p>(3)Use the scientific and reasonable formula fertilization and the fertilizer shall be applied in the uphill direction of the cave and cover with soil immediately; spreading fertilizer over the fields is forbidden;</p> <p>(4)Container of pesticide and fertilizer shall be collected uniformly and cleaning container in source of water is forbidden;</p> <p>(5)Train the forest farmers or workers on safe use of pesticides and fertilizers.</p>			2

Affecting Factors	Pollution Source	Major Environmental Impacts	Mitigation Measures	Implementer	Supervisor	Budget RMB 10,000
	Forest fire prevention	Endanger the safety of state property and people	Set fire barrier; send specially-assigned person to patrol to completely eradicate various fire hazards and put out the fire with the help of Huainan City fire brigade if there is a forest fire.			0.5
	Submerged area		On the tree species of the submerged area, we should consider water resistance plants, such as weeping willow, salix matsudana (commonly known as salix magnifica), dawn redwood, salt stress, etc.. At the same time, in the submerged area, we should give priority to arbors, and decrease shrub cultivation as far as possible. In the meanwhile, after water recession, the skew trees caused by water immersion should be centralized and necessary measures should be taken to avoid tree lodging and doing harm to the forest land.			
	Forestry management	Guarantee the effect of ecological restoration and reach the index requirements of the designed ecological restoration	Strengthen the scientific management, reasonable development and utilization of forestry resources, manage and protect the forest land by full-time staff, which mainly includes the management and protection of nursery-grown plant and afforestation for ecological restoration and ensures that all kinds of nursery-grown plants are not damaged due to water shortage and human disturbance; Ecological vegetation damaged by natural cause or human factor shall be replanted timely.			
Solid waste	Domestic waste	Harm the human health	Arrange trash cans on both sides of the greenway with the interval 50m, and alternately arrange trash cans on both sides of the greenway to collect garbage of tourists. The sanitation department clears the garbage at fixed period.			
Water environment		Irrigation water	The available storage water of the environmental water system is used for vegetation irrigation.			

Table 4-11 Environmental Impact and Mitigation Measures of Subcomponent 3 in Operation Period

Affecting Factors	Pollution Source	Major Environmental Impacts	Mitigation Measures	Implementer	Supervisor	Budget RMB 10,000
Water Environment	Leachate	Groundwater pollution by untreated leachate	<p>(1)Release the surface rainfall into the flood intercepting trench as much as possible. Decrease the rainfall capacity of the garbage reservoir so that the amount of percolate will be much decreased.</p> <p>(2)The collected percolate shall be sent to the existing percolate treatment station of the landfill in the east of the city with the suction-type sewer scavenger for processing, and then drained to Huainan No.1 sewage treatment plant. .</p> <p>(3)To master the conditions of groundwater quality change of the evaluation area precisely, groundwater monitoring system is set up. There are 5 groundwater monitoring wells which can help to notice the pollution of groundwater in time.</p> <p>(4)Strengthen the dynamic monitoring of water resources and provide fundamental data for the dynamic management of groundwater environment. Coordinate with relevant departments; build system of dynamic monitoring land subsidence; provide fundamental data for the timely implementation of the safety precautions for the project building. Build up the report to the competent administrative department for environmental protection system.</p> <p>(5)Based on the quality of pollutants, the area can be divided into the key pollution control area and general pollution control area. As to the key pollution control area, perform the ground seepage control design referring to Safety Requirements of Hazardous Waste Landfill Disposal Engineering Construction Technology (Issued on a trial basis by</p>	Huainan Environmental Sanitation Department	Huainan Environmental Protection Bureau	18

			the National Environment Protection Agency April 30, 2004) and Hazardous Waste Landfill Pollution Control Standards (GB18598-2001). As to the general pollution control area, design based on the second type referring to General Industrial Solid Waste Storage and Disposal Site Pollution Control Standards (GB18599—2001) (6)The measures of partition of seepage, monitoring management, and making contingency plans that construction unit has promoted in the evaluation of strengthening management, improving the environmental protection consciousness and strict enforcement.		
	Domestic sewage	Surface water pollution by untreated domestic sewage	Collect the sanitary sewage through the municipal sewage pipe network to Huainan No.1 sewage treatment plant, and then rain the water after treatment		2
Atmospheric Environment	Landfill gas	Explosion will occur if the concentration is too high	No consideration of landfill gas' comprehensive use , After collected with pipes, light it for combustion		10
	Odor from leachate storage tank	Affect the surrounding atmosphere	Take covering measures and lead the gas to the gas combustion device.		1
	Cooking fumes	Affect the surrounding atmospheric environment	A smoke exhaust ventilator shall be equipped for each gas stove		1
Acoustic Environment	Noise of transport vehicles	Affect the acoustic environment of People living along the road for transportation	The vehicles shall slow down and shall not whistle when passing the residential areas.		/
	Exhaust fan	The noise affects the surrounding environment	Stalled in the wall built of brick; use the maintenance structure sound insulation; ensure that the factory bound up to standard when the fan working		1
Solid Waste	Domestic waste	Harm the human health	Arrange the trash cans to collect the garbage, and then entrust the local sanitation department		0.2

		for uniform processing.		
--	--	-------------------------	--	--

Table 4-12 Environmental Impact and Mitigation Measures of Subcomponent 4 in Operation Period

Affecting Factors	Pollution Source	Major Environmental Impacts	Mitigation Measures	Implementer	Supervisor	Budget RMB 10,000		
Water Environment	Domestic sewage	Affect the surface water environment	This subcomponent will not produce industrial wastewater during the operation period. Set up sewer lines in the area to collect the domestic sewage of residents to enter the service area of Huainan pioneered the first sewage treatment plant (formerly the first sewage treatment plant of Huainan City).					
Atmospheric Environment	Vehicle exhaust	Affect the atmospheric environment along the road	All vehicles used by the project during the operation period are social vehicles. Motor-vehicle department controls vehicle exhaust according to the automobile exhaust emission standard enacted by the state, and resolutely stop the exhaust overweight vehicles on the road. The exhaust emissions of all kinds of vehicles should meet the national standards. The exhaust of vehicle on the road should meet the national standards.	Huainan Municipal Administration Department	Huainan Environmental Protection Bureau	/		
	Road dust suspension		Clear the roads every day, use sprinkler when the weather is dry, and make sure roads clean.					
Acoustic Environment	Traffic noise	Affect the acoustic environment of People living along the road for transportation	The vehicles shall not whistle when passing the residential areas.					/
Social Environment	Road safety	Affect the public safety	Four roads are designed with road safety sign system				Huainan Transport Administration	/

Table 4-13 Environmental Impact and Mitigation Measures of Subcomponent 5 in Operation Period

Affecting Factors	Pollution Source	Major Environmental Impacts	Mitigation Measures	Implementer	Supervisor	Budget RMB 10,000
Acoustic Environment	Equipment noise	Affect the people living in the project area	All equipments adopt the normal noise elimination and sound insulation measures.			5
Water Environment	Domestic sewage	The discharge of sanitary sewage without processing will affect the quality of surface water	Collect the sanitary sewage through the municipal sewage pipe network to Huainan No.1 sewage treatment plant, and then rain the water after treatment	Huainan Agricultural Water Conservancy Investment Development Co., Ltd.	Huainan Environmental Protection Bureau	8
	Use of nursery fertilizer and insecticide	Affect the surface water environment	The nursery uses organic fertilizer. There are various kinds of insecticides, and they are mainly used according to the degree of insects and diseases. Spray seedlings when insect and disease happens. Insecticides are not used at ordinary times. The project will use insecticide of low toxicity and medium toxicity but not the highly-toxic insecticide as per the World Bank's <i>Regulated Insecticide Classification Advise According to the Harmfulness And Classification Guides</i> (Geneva, world Health Organization). Irrigation is not carried out immediately after fertilization and insecticide spraying at the same time, and it usually stays for 3-4 days.			
Atmospheric Environment	Cooking fumes	Affect the surrounding atmospheric environment	A smoke exhaust ventilator shall be equipped for each gas stove			9
Solid Waste	Domestic waste	Harm the human health	Arrange the trash cans to collect the garbage, and then entrust the local sanitation department for uniform processing.			12

	Production solid waste	Affect the surrounding ecological environment	Smash the residue produced in the process of vegetation processing and the dead stems and leaves, and then put them back to the field; the packaging bag (bottle) production of fertilizers and pesticides is 0.1 t/a; they should be collected separately; recycle the fertilizer packaging bag (bottle) for use; pesticide packaging bag (bottle) is hazardous waste and it should be disposed together in the waste disposal center after collection.			
Ecological Environment	plant diseases and insect pests	Use of insecticide will affect the surrounding ecological environment, the surface water environment, and human health	Execute <i>Pest Management Plan</i> (1) establish project area plant diseases and insect pests management center, which will periodically inspect the pesticides used in the project area, guarantee that the chemicals used by project beneficiary: production, packaging, label, transportation, storage, application and treatment all meet the standards of world bank; avoid that the prepared pesticides are IA and IB products specified by WHO, or the concentration of active ingredients in the Class II pesticides exceeds standard specified by WHO. (2) any pesticide purchased by the project beneficiary shall pass the following examinations and verifications: types and degrees of dangers caused by application method and users; reliability of application method, and application level of user; examine and verify the grade and preparation of pesticides based on <i>Pesticides Classification Method and Classification Regulation by Risk Suggestion</i> (Geneva: WHO2004-05) and the latest categorical			12

			<p>data;</p> <p>(3) Selection of pesticides must satisfy the standards of the World Bank business policies (OP 4.09). These pesticides: shall have very little damage to human health; must be proved to be effective for the objective control; must have smallest influence on the non-target species and natural environment. The selection of application method, time and frequency of pesticide must have smallest injury to the natural enemy. Pesticides used for public health plan must be proved to be safe for the residents, local species and applicator in the application area.</p>			
	Use of insecticide and chemical fertilizer	<p>1. improper use of pesticides may kill the natural enemy of the injurious insects, resulting in reduction of biodiversity and species imbalance in forest region;</p> <p>2. improper application method of pesticides or chemical fertilizers, which may cause pollution of the surrounding water body;</p> <p>3. long-term application of chemical fertilizer may result in physicochemical property changes of the soil, causing soil</p>	<p>(1) Rely on prevention and biological control methods and minimize the use of chemical insecticides.</p> <p>(2) Use Class III and Class U pesticides specified by WHO.</p> <p>(3) adopt scientific and reasonable formula fertilization, the fertilizer should be applied to the upslope direction of the hole, cover with soil after applying; broadcasting fertilizer is strictly prohibited;</p> <p>(4) vessels of pesticides and fertilizers shall be collected uniformly, and cleaning the vessels in the source of water is strictly prohibited;</p> <p>(5) Train the foresters or workers on the safe use of pesticides and chemical fertilizer.</p>			6

		hardening, soil property degeneration and soil fertility decline; 4. Improper cleaning and treatment of pesticides vessels will influence the water body and soil.				
--	--	---	--	--	--	--

The environmental risks and precautionary measures of this project in the operation period are shown in Table 4-14.

Table 4-14 environmental risks and mitigation measures

No.	Subproject Composition	Precautionary Measure
1	Landfill leachate leakage	<p>Water pollution is mainly caused by percolate from the landfill. In order to prevent water pollution, landfill area has taken manual seepage-proofing, rain sewage diversion, percolate collecting, guiding and draining, etc.</p> <p>(1) manual seepage-proofing: use HDPE membrane on the landfill area top to intercept the seepage, the entire original landfill area surface is covered with manual impervious bed.</p> <p>(2) rain sewage diversion: drain the earth surface rain into the flood intercepting trench to the greatest extent, reduce the rainfall capacity received by the rubbish storage area, thus dramatically reducing the percolate quantity.</p> <p>(3)percolate collecting, guiding and draining: collect the percolate and then convey in to the percolate regulating reservoir through percolate transmission pipes; transport to the percolate treatment station in the sanitary landfill through suction-type sewer scavenger, drain after reaching the standards. After collecting, guiding and draining, the percolate will enter into the percolate regulating reservoir, and then be transported to the percolate treatment station in the eastern household garbage sanitary landfill through suction-type sewer scavenger for disposing. This percolate treatment station is designed with a daily treatment scale of 200m³/d, the treatment process adopts “coagulating sedimentation+ MBR membrane bioreactor + nanofiltration (NF) + reverse osmosis (RO)”, the effluent will implement <i>Pollution Control Standards for Household Garbage Landfill</i> (GB 16889-2008), Table 2: Water Pollutants Discharge Mass Concentration Limits For Existing And Newly Built Household Garbage Landfill.</p> <p>(4) strengthen rainwater discharge capacity; complete the renovation of flood intercepting trench before the flood season each year, and guarantee it is unobstructed;</p>
2	Collapse of Retaining Wall	<p>In order to prevent water and soil loss of covering soil due to erosion of rainwater, wind, and ice and snow, which will further impact the stability of refuse dump, this project finishes the slope of the refuse dumps which has not been operated according to the sanitary landfill standard originally, which satisfies the side slope control value of 1: 3.5~1:4. The peak of the reservoir area slopes down to all directions, and the average gradient is not less than 5%. After being finished, the refuse dump slopes down from the middle to all directions by 5% of gradient; due to such a small gradient, the refuse dump is unlikely to slip, so that the refuse dump is stable.</p>
3	Landfill Fire and Explosion	<p>(1) Set up isolation belt, provide emergency fire extinguishing system: in consideration that the main source of fire occurring in the landfill operating area is landfill gas, water is not suitable for extinguishment; therefore, set up a fire barrier with a width of 8 meters, surrounding the landfill reservoir area, and provide a certain number of fire prevention sandy soil and 2 watering carts, so as to meet emergencies.</p> <p>(2) No Open Flames, provide monitoring facilities: no smoking or open fire in the landfill reservoir area. Provide combustible gas detection and alarming apparatus; pay attention to the calibration and maintenance of the apparatus at ordinary times, and periodically monitor the gas concentrations (such as methane) in and around the wasteyard. Provide</p>

		<p>dry powder extinguisher for the vehicles and other operation machines operating in the landfill reservoir area.</p> <p>(3) gas guiding and exhausting, long-term monitoring: in order to prevent the explosion and fire accidents of methane gas, in this project, the landfill is designed with complete gas educating and processing system. Totally 65 landfill gas collecting shafts and 6 gas gathering stations are planned to be set up in this project; DN 90 HDPE gas transmission branch pipe 1742m, DN 110 HDPE gas transmission branch pipe 1014m, DN 200 HDPE gas transmission main pipe 630m; in the meantime, there is also a set of air exhaust and torch combustion system with a processing capacity of 500Nm³/h. It is also equipped with methane gas concentration automatic monitoring and alarming system, which can effectively prevent the occurrence of explosion and fire accidents.</p> <p>(4) personnel training: it is suggested that the workers in the landfill should be trained with the fire protection knowledge and operation, and manoeuvre should be periodically launched.</p> <p>(5) Strictly follow the rules and regulations: the landfill shall formulate fire protection rules and regulations, which shall be inspected by specially-assigned person. Fire prohibition area, fire zone, and emergency exit marks, as well as schematic diagram plate , etc, are set up in the landfill.</p>
4	Geological Disaster	<p>In this project, the rubbish shaping construction fully condisers the danger boundary of project area, the limestone boundaries on the south of refuse dump all locate outside the refuse dump; rubbishes in the karst collapse are reversed and shaped, thereby guaranteeing that no karst collapse wind direction exists in the refuse dump. Keep away from dangerous zone boundaries of air shaft, main shaft and emergency exit shaft on the north of the refuse dump.</p>
5	Plant diseases and insect pests	<p>Apply the advanced concepts and methods of plant diseases and insect pests integrated management to the control work guidance, use the national and local complete plant diseases and insect pests monitoring network to correctly forecast the plant diseases and insect pests of the forest land and nursery in this project. Always use improved variety of strong seedling without quarantine objects, select and breed good indigenous tree species, varieties and fine clones with strong disease resistance for afforestation; strengthen the forest culture and management measures, improve the disease resistance of forests themselves, energetically popularize physical control and biological control methods, strictly use efficient, and low-toxicity pesticides for chemical control, and realize the prevention and control of plant diseases and insect pests in this project.</p>
6	Forest Fire	<p>(1) Build the fire barrier in strict accordance with the regulation.</p> <p>(2) Enhance the forest fire prevention publicity effort, implement the forest fire prevention system, effectively protect the forests and prevent fire.</p> <p>(3) Each afforestation entity must formulate forest protection and fire prevention plans, village regulation and agreement, and designate fire prevention zone of responsibility; and shall equip forest protection personnel according to the forest area, and report to the Forestry Bureau and forest protection and fire prevention organization on time.</p>

Formulate underground water risk accident emergency response plan, define the closing and interception measures which shall be taken under risk accident state, and put forward specific schemes for polluted underground water diffusion prevention and polluted

underground water control.

I. Emergency plan

On the basis of formulating factory-wide safety management system, formulate emergency measures for specialized underground water pollution accident, and coordinate with the other emergency plans. See Table 4-15 for the contents of underground water emergency plan.

- (1) Daily coordination and command organization of emergency plan;
- (2) Responsibilities and division of labor of relevant departments in the emergency plan;
- (3) Determination of underground water environment protection objectives, emergency treatment measures taken, and assessment of potential source of pollution;
- (4) Organization conditions, personnel and equipment conditions of extra serious accident emergency rescue, regular training and manoeuvre;
- (5) Social support and assistance of extra serious accident, fund guarantee of emergency rescue.

II. Emergency disposal

Once abnormal conditions of underground water are found, emergency measures must be taken according to the emergency plan immediately:

- (1) when abnormal condition of underground water is confirmed, based on the formulated underground water emergency plan, report to the company's competent leaders as soon as possible, inform the neighboring underground water users, and pay close attention to the underground water quality change conditions.
- (2) organize specialized personnel to investigate and monitor the accident site, search the accident location, analyze the accident reason, localize the emergency to the greatest extent, eliminate if possible; take all measures, including cutting off production equipments or facilities, to prevent accident diffusion, spread and chain reaction, and minimize the influences of underground water pollution accident to people and properties to the greatest extent.
- (3) when the surrounding underground water is found polluted through monitoring, based on the feedback information of the observation well, manually extract the underground water in the polluted area and form underground water depression cone, control the underground water flow field in the polluted area, and prevent the pollutants diffusion.
- (4) Evaluate the accident consequence, and formulate the measures which can prevent similar events from occurring.
- (5) Request the social emergency forces to assist and dispose if necessary.

Table 4-15 Underground water pollution emergency plan contents

No.	Item	Contents and requirements
1	general rules	
2	Overview of pollution sources	Detail the type, quantity and distribution of pollution sources, including production equipments, auxiliary facilities and public works

No.	Item	Contents and requirements
3	contingency plan area	List the dangerous objectives: production equipments area, auxiliary facilities, public works area, and environmental protection objectives; mark the positions in the general drawing of factory.
4	emergency organization	Factory: the factory emergency headquarters-- be responsible for onsite comprehensive commanding; professional rescue team-- be responsible for accident control, rescue and rehabilitation treatment; Region: headquarters-- be responsible for the comprehensive commanding, rescue, control and evacuation of the neighborhood of the factory; professional rescue team--be responsible for supporting the factory's professional rescue team; professional monitoring team, be responsible for supporting the factory's monitoring station; local hospitals, be responsible for receiving and curing the injured and poisoned personnel;
5	Emergency state classification and emergency response procedures	Specify the levels of underground water pollution accidents, and the corresponding emergency classification response procedures
6	Emergency facilities, equipments and materials	Emergency facilities, equipments and materials which can prevent poisonous and harmful substances from overflowing or diffusing
7	emergency communication, communication and traffic	Stipulate the communication mode, notification mode, traffic management support and control under emergency state
8	Emergency environmental monitoring and post-accident evaluation	The environmental monitoring station will monitor underground water environment. Evaluate the accident nature and consequence, and provide decision basis for the commanding department.
9	Emergency protective measures, leakage eliminating measures, methods, and equipments	Accident site: control accident, prevent enlargement, spreading and chain reaction. Eliminate the onsite leakage substance; reduce harm; the corresponding facilities and equipments provided. Adjacent area: control the polluted area, control and eliminate pollution measures and the corresponding equipments.
10	Emergency concentration discharge control, evacuation organizing plan, medical aid and public health	Accident site: accident disposing personnel shall formulate the emergency control concentration and discharge of pollutants, as well as the evacuation organization planning and rescue for the personnel onsite and near the equipment. Environmentally sensitive objectives: personnel and general public in the adjacent area of the accident affected area stipulate the pollutant emergency control concentration and discharge, and evacuation organization planning and rescue.
11	Emergency state termination and restoration measures	Stipulate the termination procedures of emergency state. Accident site rehabilitation, dispose, and restoration measures. Accident alert termination, and rehabilitation and restoration measures for the adjacent area.

No.	Item	Contents and requirements
12	personnel training and manoeuvre	After formulating the emergency plan, arrange relevant personnel to train and manoeuvre at ordinary times
13	public education and information	Launch public education, training, and release relevant information to the neighborhood.
14	Record and report	Set up specialized records of emergency accident, establish file and special report system, and arrange special department to manage.
15	Attachment	Preparation and formation of various kinds of appurtenant materials related to the emergency accident.

5. Environmental Monitoring Plan

5.1 Monitoring Purpose

Environmental monitoring includes two periods: the construction period and operation period. Its purpose is to comprehensively and timely master the dynamic condition of pollution of the project to be constructed, understand the degree of changing the environment quality in the construction area, the sphere of influence and the dynamic condition of environment quality in the operation period, and timely submit the feedback to the competent authorities for providing scientific basis for the environmental management of the project.

5.2 Environmental Monitoring Organizations

The environment monitoring in the construction period and operation period shall be undertaken by the environmental monitoring station of Huainan or other qualified monitoring agencies entrusted by the contractor or operator of the project. The monitoring agencies shall be those with the national environmental quality monitoring certification, complete equipments, and strong technical strength that can finish better the task of environmental monitoring.

Predict the result according to environmental impact, and regard the sensitive points that may be obviously polluted as the monitoring points, to track the pollution situation of the project in the construction period and operation period; the monitoring contents include noise, air environment, surface water environment and underground water environment with larger environmental impact. The monitoring factors shall be determined according to the engineering pollution characteristic factors. The monitoring and analyzing methods shall adopt those of the corresponding projects in the *Technical Specifications for Environmental Monitoring* issued by the State Environmental Protection Administration. The evaluation criterion executes the national standard determined by the environmental impact assessment of each sub-project.

5.3 Detailed Environmental Monitoring Plan

See the detailed environmental monitoring plan and expense budget of the sub-projects in Table 5-1, Table 5-2, Table 5-3, Table 5-4, Table 5-5 and Table 5-6. See water and soil conservation monitoring plan and expense budget in Table 5-7.

5.4 Types and Contents of Monitoring Reports

Monitoring reports are divided into the construction period monitoring reports and operation period monitoring reports.

The contents include: Monitoring points, sampling time, description of monitoring factors; the analysis and evaluation of the monitoring results in the corresponding construction period and operation period in comparison with the relevant standards.

5.5 Submission Schedule and Receiving Agency

Submit staged monitoring reports during the construction period, and submit a report once a year during the operation period. The receiving units of the monitoring reports are the municipal project office, the superior competent departments, and the relevant departments of the World Bank.

5.6 Requirements for Feedback to Monitoring Reports

The receiving units shall make the feedback within one month after receiving the monitoring reports. The receiving units shall analyze and evaluate the contents of the monitoring reports; confirm whether the environmental mitigation measures are reasonable and effective; make arrangements for the next step work, and put forward the corresponding requirements.

Table 5-1 Monitoring Plan for Subcomponent 1

Monitoring period	Environmental Elements	Monitoring Location	Parameter	Frequency	Expenses (yuan/a)	Total (yuan)	Monitoring agencies
Construction Period (43 months)	Atmosphere	One monitoring point at each construction site	TSP	twice/year, 2 days/time, once/day	9,400	183,600	Qualified monitoring agencies
	Water Quality	One monitoring point at construction site domestic sewage discharge outlet	pH, COD, BOD ₅ , suspended solids, petroleum oil	twice/year, 1 day/time, once/day	4,500		
	Noise	One monitoring point at each of the locations at east, south, west and north	LeqdB(A)	twice/year, 1 day/time, 2 times/day, one in the daytime and the other in the night	32,000		

Table 5-2 Monitoring Plan for Subcomponent 2

Monitoring Period	Environmental Elements	Monitoring Location	Parameter	Frequency	Expenses (yuan/a)	Total (yuan)	Monitoring Agencies
Construction Period (36 months)	Water quality	Arrange the corresponding water quality monitoring sections at Datong discharge ditch, Chenxiang discharge ditch, Jiulonggang discharge ditch, Kongdian discharge ditch, and the construction areas of Lake 1, Lake 2, and Lake 3	Temperature, pH, DO, COD, BOD ₅ , ammonia nitrogen, total nitrogen, phosphorus, total nitrogen, coliform	twice/year, 2 days/time, once/day	10,300	103,800	Qualified monitoring agencies
		One monitoring point at construction site domestic sewage discharge outlet	pH, COD, BOD ₅ , suspended solids, petroleum oil	twice/year, 1 day/time, once/day	5,500		
	Atmosphere	One monitoring point at each construction area	TSP	twice/year, 2 days/time, once/day	9,300		
	Noise	One monitoring point at each construction area	LeqdB(A)	twice/year, 1 day/time, twice/day, one in the	9,500		

				daytime and the other in the night			
Operation Period	Water quality	Arrange water quality monitoring sections at Datong discharge ditch, Chenxiang discharge ditch, Jiulonggang discharge ditch, Kongdian discharge ditch, Lake 1, Lake 2, and Lake 3	Temperature, pH, DO, COD, BOD ₅ , ammonia nitrogen, total phosphorus, total nitrogen, coliform	twice/year, 2 days/time, 1 time/day	10,300	10,300yuan/year	

Table 5-3 Monitoring Plan for Subcomponent 3

Monitoring Period	Environmental Elements	Monitoring Location	Parameter	Frequency	Expenses (yuan/a)	Total (yuan)	Monitoring agencies
Construction Period (26 months)	Atmosphere	One monitoring point at the upwind direction and downwind direction of the Datong Landfill respectively	TSP	4 times/year, 2 days/time, once/day	9,600	167,375	Qualified monitoring agencies
			Odor	4 times/year, 1 day/time, twice/day	34,000		
	Water quality	Five monitoring points, respectively the background well, pollution monitoring well, and pollution diffusion well around the old landfill.	9 parameters including PH, total hardness, chloride, ammonia nitrogen, volatile phenol, mercury, nitrite, total bacteria, and total coliforms, and at the same time monitor the water level	Twice/year, 2 days/time, once/day (each in the dry season and the wet season, namely the period from January to March, and the period from July to September)	14,600		
			One monitoring point at construction site domestic sewage discharge outlet	pH, COD, BOD ₅ , suspended solids, petroleum oil	twice/year, 1 day/time, once/day		
	Noise	One monitoring point at each of the boundaries at east, south, west and north	LeqdB(A)	twice/year, 1 day/time, twice/day, one in the daytime and the other in the night	8,000		
Operation	Underg	Set up five monitoring points,	9 parameters including	twice/year, 2 days/time,	14,600	61,000	

Period	round water	respectively the background well, pollution monitoring well, and pollution diffusion well around the old landfill.	PH, total hardness, chloride, ammonia nitrogen, volatile phenol, mercury, nitrite, total bacteria, and total coliforms, and at the same time monitor the water level	once/day (each in the dry season and the wet season, namely the period from January to March, and the period from July to September)		yuan/year	
	Leachate	One monitoring point in leachate storage tank	SS, COD, BOD ₅ , NH ₄ -N, total nitrogen, total phosphorus	twice/year, 2 days/time, once/day	8,800		
		Periodically collect operation data of leachate treatment station in the eastern household garbage sanitary landfill	SS, COD, BOD ₅ , NH ₄ -N, total nitrogen, total phosphorus	twice/year	/		
	Atmosphere	One monitoring point at the upwind direction and downwind direction of the Datong Landfill respectively	TSP, odor strength, ammonia, hydrogen sulfide, methyl mercaptan	twice/year, 2 days/time, once/day	29,600		
	Noise	One monitoring point at each of the boundaries at east, south, west and north	LeqdB(A)	twice/year, 1 day/time, 2 times/day, one in the daytime and the other in the night	8,000		

Table 5-4 Monitoring Plan for Subcomponent 4

Monitoring period	Environmental Elements	Monitoring Location	Parameter	Frequency	Expenses (yuan/a)	Total (yuan)	Monitoring agencies
Construction Period (18 months)	Atmosphere	One monitoring point at each of the construction areas of the four roads	TSP	twice/year, 2 days/time, once/day	7,600	29,400	Qualified monitoring agencies
	Water quality	One monitoring point at domestic sewage discharge outlet each of the four construction sites	pH, COD, BOD ₅ , suspended solids, petroleum oil	twice/year, 1 day/time, once/day	4,000		
	Noise	One monitoring point at each of the four	LeqdB(A)	twice/year, 1 day/time,	8,000		

		construction areas		twice/day, one in the daytime and the other in the night			
Operation Period	Atmosphere	One a monitoring point at each of the four roads	TSP	Once/year, 2 days/time, once/day	3,800	7,800 yuan/year	
	Noise	One monitoring point at each of the four roads	LeqdB(A)	once/year, 1 day/time, twice/day, one in the daytime and the other in the night	4,000		

Table 5-5 Monitoring Plan for Subcomponent 5 (Roadside Service Stations)

Monitoring Period	Environmental elements	Monitoring Location	Parameters	Frequency	Expenses (yuan/a)	Total (yuan)	Monitoring Agencies
Construction Period (15 months)	Atmosphere	Set up a monitoring point at the construction areas of middle and eastern roadside service points respectively	TSP	2 periods/year, 2 days/period, 1 time/day	5,800	20,700	Qualified monitoring agencies
	Water quality	Set up a monitoring point at the sanitary sewage discharge point of the construction areas of middle and eastern roadside service points respectively	pH, COD, BOD ₅ , suspended solids, petroleum	2 periods/year, 1 day/period, 1 time/day	3,000		
	Noise	Set up a monitoring point at each of the four boundaries of the construction areas of middle and eastern roadside service points	LeqdB(A)	2 periods/year, 1 day/period, 2 times/day, one in the daytime and the other in the night	5,000		
Operation period	Atmosphere	Set up a monitoring point at the dining centers of the middle and eastern roadside service points respectively	TSP	1 period/year, 2 days/period, 1 time/day	2,900	5,400 yuan/year	
	Noise	Set up a monitoring point at the middle and eastern roadside service points respectively	LeqdB(A)	1 period/year, 1 day/period, 1 time/day, once in the daytime	2,500		

Table 5-5 Monitoring Plan for Subcomponent 5 (Flower Market, Bonsai Garden and Nursery)

Monitoring Period	Environmental Elements	Monitoring Location	Parameter	Frequency	Expenses (yuan/a)	Total (yuan)	Monitoring Agencies
Construction Period (27 months)	Atmosphere	One monitoring point at each of the construction areas	TSP	Twice/year, 2 days/time, 1 time/day	6,700	41,750	Qualified monitoring agencies
	Water quality	One monitoring point at domestic sewage discharge outlet at each of the construction areas	pH, COD, BOD ₅ , suspended solids, petroleum oil	twice/year, 1 day/time, once/day	3,500		
	Noise	One monitoring point at each of the four boundaries of the construction areas	LeqdB(A)	Twice/year, 1 day/time, twice/day, one in the daytime and the other in the night	6,500		

Table 5-7 Water and Soil Conservation Monitoring plan

Monitoring Area	Monitoring Location	Parameter	Monitoring Period	Monitoring Frequency	Monitoring Methods	Monitoring Expense RMB 10,000	Monitoring Agency
Environmental modification and landscape construction area	① Drain outlet	Water and soil loss quantity and effect of prevention and control measures, etc.	(2015 ~ 2021) Construction period Natural recovery period	Ongoing soil and water conservation measures, borrow area and waste slag in use shall be monitored and recorded once every 10 days; disturbed land surface area and blocking effect of water and soil conservation engineering	Investigation and monitoring method Grit basin method Runoff plot area	70.62	Carried out by construction unit itself, or undertaken by an entrusted agency with relevant water and soil conservation monitoring qualification
Water system improvement area	① Drain outlet ② Excavation slope surface	Water and soil loss quantity and effect of prevention and control measures, etc.			Investigation and monitoring method Erosion gully volume method		
Refuse landfill improvement	① Drain outlet ② Pile body	Water and soil loss quantity and effect			Grit basin method		

area	slope surface	of prevention and control measures, etc.		measures, etc. shall be monitored and recorded once every month; construction progress of main works, impact factors for water and soil loss, and growth situation of water and soil conservation plants shall be monitored and recorded once every three months. In case of rainstorm (rainfall $\geq 50\text{mm}$ over 24h), monitoring shall be conducted timely. And the monitoring shall be completed within one week after disaster event in relation to water and soil loss happened.	Erosion gully volume method		
Road and pipe network area	①Drain outlet ②Temporary stockpile area ③ Excavation slope surface	Water and soil loss quantity, protective engineering construction, stability and operation, and harm of water and soil loss			Erosion gully volume method Investigation and monitoring method		
Land development and use area	①Drain outlet	Water and soil loss quantity and effect of prevention and control measures, etc.			Investigation and monitoring method Grit basin method		
Temporary stockpile area	①Drain outlet	Water and soil loss quantity and effect of prevention and control measures, etc.			Investigation and monitoring method Grit basin method		

6. Environmental Training Plan

6.1 Training requirements

Environmental training is one of the parts of the technical support to this project; it is to ensure the smooth and effective implementation of the Environmental Management Plan, the training about the Environmental Management Plan, and other relevant knowledge and skills shall be offered to the owner, construction unit, operation unit, contractor, supervisor, personnel of the local project office, and other staff of related parties; different trainings shall also be given aiming at different positions.

6.2 Training objects

1. Project Owner
2. Environmental management personnel and environmental supervising engineers

The training shall be organized by the project office a year before the implementation of the project for environmental management professionals, environmental supervising engineers, and other related personnel; the specific training is conducted by the environmental technology experts.

3. Contractor

Through the construction of the project office, the contractor organizes personnel to receive the training given by the environmental management experts or the trained environmental management professionals at the location of the project before the implementation of the project. It can be concretely carried out.

4. Operator

Organize the personnel through the project office or the owner to receive the training at the location of the project before the implementation of the project. The training can be given by the environmental management experts or the trained environmental management professionals.

6.3 Training contents

- 1) Master and utilize the World Bank's environmental policies, and domestic environmental protection laws and regulations, and environmental standards;
- 2) Environmental management mode in the World Bank loan projects, and the environment clauses in the loan agreements;
- 3) Environmental management plan of each project;
- 4) Environmental management regulations of each project;
- 5) Responsibilities of environmental management personnel, environmental supervision personnel, environmental monitoring personnel and contractor, and their mutual relations;
- 6) Preparation of environmental management work report, environmental supervision work report, environmental monitoring report, and the contractor's log, monthly report, interim report, and annual report.

6.4 Training plan and budget

See Table 6-1 for the training plan, personnel, schedule and budget.

Table 6-1 Training Contents, Time and Budget

Training Time	Training Theme	Training Object	Specific Training Content	Times	Number of days/times	Number of people /times in each subproject	Budget (ten thousand yuan)
Construction period	Environmental protection laws and regulations, and policies	Municipal project office, construction unit, supervising unit	1) Environmental protection laws and regulations	3	0.5	15	22.5
			2) Environmental policies and plan		0.5	15	
			3) Environmental management of World Bank		0.5	15	
	Implementing environment management plan	Construction unit, supervising unit	1) Environmental protection responsibility during project construction period	1	0.5	10	16
			2) Main tasks of environmental protection during project construction period	1	0.5	10	
			3) Main contents of environmental protection during project construction period	2	0.5	10	
			4) Various kinds of reports in the environmental management plan	2	0.5	10	
			5) Improvement or amendment of environmental management plan	1	0.5	10	
			6) Internal monitoring methods and data collection and processing, etc.	1	0.5	10	
	Emergency	Construction unit	Emergency processing measures	1	0.5	8	1.5

Training Time	Training Theme	Training Object	Specific Training Content	Times	Number of days/times	Number of people /times in each subproject	Budget (ten thousand yuan)
	processing						
Total of construction period (yearly)							40
Operation period	Environmental monitoring inspection and report	Operating unit	Inspection of environmental protection facilities, etc., environmental quality monitoring, and report preparation	4	1.0	10	10
	Environmental protection facilities, and environmental protection measures		1) Rules and regulations on environmental safety	4	0.5	10	12
			2) Emergency plan	4	0.5	10	
	Total of operation period (yearly)						

7. Environmental Management Cost Estimate and Fund Source

7.1 Budget Distribution

The implementation of the Environmental Management Plan involves many units, so there are many different channels of source of funds. Most of the environmental activities are engineering measures; therefore, the expenses shall be provided by the construction unit and operation unit of the project, and included in the project cost.

Expenses stated in the Environmental Management Plan are mainly used for environmental management in the construction period and operation period, mainly including: environmental measures costs, environmental monitoring cost, staff training expenses and the operating expense of environmental management institutions.

7.2 Funding Source and Budget

Table 7-1 is the summary of environmental protection measures, environmental monitoring, staff training and environmental management expenses in the construction period and operation period of this project.

According to the duration of the project implementation, for each construction period, the annual budget must be guaranteed.

Table 7-1 Summary of Environmental Management Cost Estimate

No.	Name	Construction Period RMB 10,000	Operation Period (Yearly) RMB 10,000
1	environmental protection measures costs	244.1	100.2
2	environmental monitoring costs	55.0	8.5
3	environmental protection training costs	200	22
4	Daily management costs of environmental protection institution	241	70
5	soil and water conservation measures	34,790.54	/
6	Total	35,530.64	200.7

8. Information Management of Environmental Management Plan

8.1 Information Exchange

Environmental management requires making the necessary information exchange between different departments and positions of the Project Office, owner, contractor and operator, and informing the external parties (the related parties, and the social public, etc.) the relevant information.

Internal information exchange can be carried out with a variety of ways such as meetings and internal presentation, but one formal meeting must be held every month, and all the information shall be recorded and archived. External exchange can be held once every six months or one year, the information exchange with cooperative units shall form the summary and be archived.

8.2 Recording Mechanism

For the effective operation of the environmental management system, the organization must establish a perfect system of record, and keep the following several aspects of records:

- (1) Requirements of laws and regulations;
- (2) Administrative licensing;
- (3) Environmental factors and the related environmental impact documents, and the EMP report;
- (4) Training records;
- (5) Record of the checking, verifying, and maintaining of the activities;
- (6) Monitoring data;
- (7) The effectiveness of corrective and preventive actions;
- (8) Information of the related parties; complaints and handling process, and the record of results.

In addition, the various kinds of records that are mentioned above shall be attached with the necessary control, including: identification, collection, cataloging, archiving, storage, management, maintenance, query, retention time and disposal, etc. of the records.

8.3 Reporting Mechanism

The contractor, operator, monitoring unit, environmental supervising engineers and the project office shall record the project progress, implementation of environmental management plan, and environmental monitoring results, etc. in the implementation process of the project, and report promptly to the relevant authorities. The monitoring record of operational condition of the landfill and sewage treatment plant involved in the associated engineering and due survey shall also be learned and collected on a regular basis. The relevant requirements are included in the monitoring plan, and mainly include the following six parts:

1. The project environmental supervising engineers make the detailed record of the EMP executive conditions by month, and timely submit the weekly report and monthly report to the project owner and the municipal project office; the weekly report and monthly report shall include the executive conditions of environmental protection measures, the conduct situation of environment monitoring, and the monitoring data.

2. The contractor and operator shall make the detailed record of the project progress and EMP executive conditions by quarter, timely submit the quarterly report to the project office, and make a copy for the municipal environmental protection bureau.

3. After completing the entrusted task, the monitoring unit shall timely submit the Monitoring Report to the contractor (operator) and the environmental supervising engineers.

4. The contractor shall timely submit the environmental monitoring report of this project to the agricultural investment project office. The agricultural investment project office shall also timely submit the monthly, quarterly and annual reports of the progress and effects of environmental management plan to the World Bank.

5. When special incidents in violation of the environmental protection occur, the environmental supervising engineers and the project office will report to the local competent administrative departments for environmental protection, and report to the higher level if necessary.

6. Submit one environmental management plan executive report to the World Bank every six months, and the environmental management plan executive report can include the following contents:

(1) Implementation situation of the training plan;

(2) Project progress, such as the progress of the environmental modification, the closure of Datong old landfill, drainage comprehensive improvement project, regional infrastructure construction and regional development and utilization project, etc.;

(3) The implementation situation of environmental protection measures, the conduct situation of environmental monitoring, and the main monitoring results;

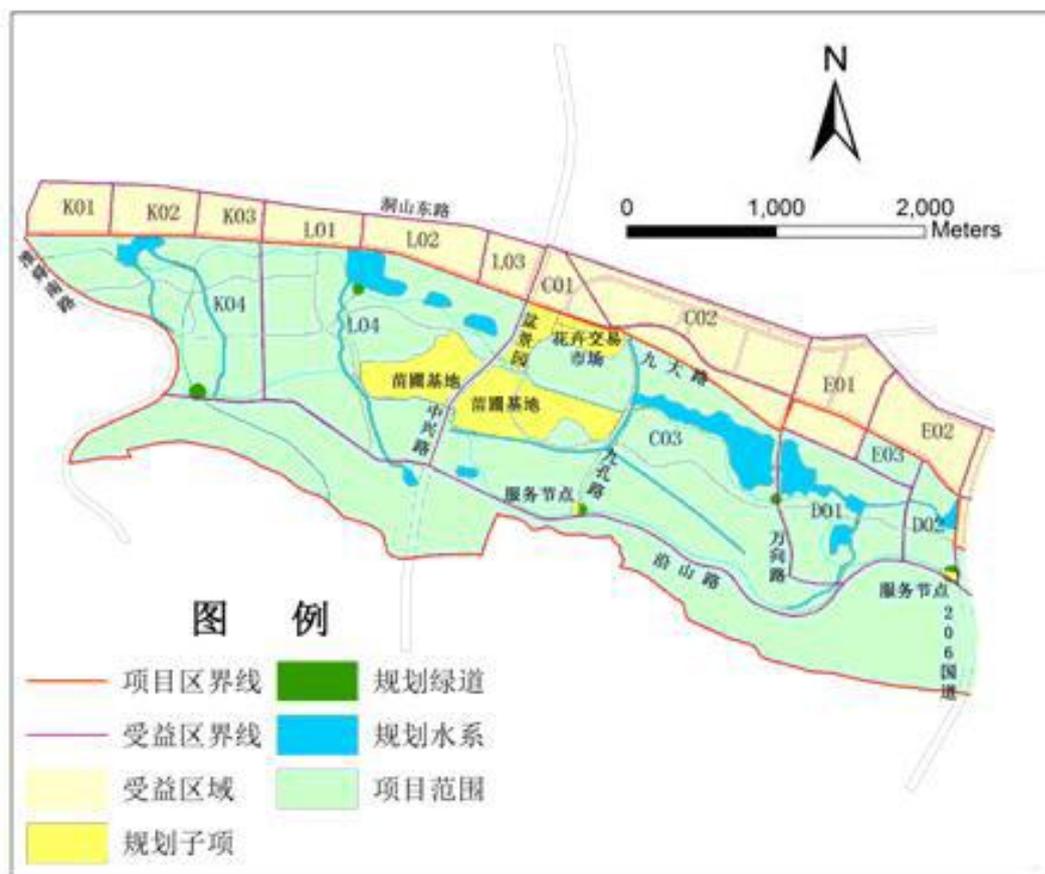
(4) Whether there is any public complaint, if there is, record the main content of the complaint, the solution, and public satisfaction index;

(5) The environmental management plan executive plan of the second half of the year.

9. The Arrangements for Local People to Benefit from Land Value Increase and Monitoring Plan

9.1 The Area with potential of land value increase

The area with potential land value increase is the belt between Dongshan East Road and Linchang Road and Jiuda Road adjacent to the north side of the project area, which includes 10 land plots according to the two development plans (see the map below). The belt is divided into two parts by the Zhongxing Road under planning, which belong to two different regions in terms of planning. The first part to the west of Zhongxing Road with an area of 91.84 hectares belongs to the *Regulatory Detailed Planning on Quanda Resources Exhausted Area of Huai'nan City*, while the second part to the east of Zhongxing Road with an area of 103.37 hectare belongs to *Regulatory Detailed Planning on Jiulonggang Region of Huai'nan City*.



Based on the documents of land ownership and the two development plans, of 195.21 hectares of the total land area of the belt, there are 49.36 hectares of collective land distributed in Chengxiang village, Xiaocai village, Qingfeng community and Datong Street and 145.85 hectares of state-owned land. The size and ownership structure of each plot are shown in Table 1.

Table 1. Land ownership and size of each plot in the belt

Plots	Actual area	Area of Collective land	Collective unit and population		Area State-owned land	User and population	
			Unit	Population		User	Population
C01	14.05	2.83	Chenxiang Village	25	11.22	Datong Forest Farm	400
C02	45.45	18.73	Chenxiang village	75	26.72	Shunfa Hengye Co., Ltd.	3,000
E01	19.69	6.75	Xiaocai Village	700	12.94	Jiu-yi Company	300
E02	24.18	-			24.18	Mining Group	4,048
K01	24.24	12.45	Qingfeng Community	339	11.79	Datong Forest Farm	750
K02	14.50	8.60	Datong Street	843	5.90	Datong Forest Farm	589
K03	8.52	0.00	—		8.52	Mining Group	2,500
L01	11.06	0.00	—		11.06	Mining Group	
L02	18.08	-			18.08	Huai'nan Municipal Government	
L03	15.44	-	Datong Street	230	15.44	Huai'nan Municipal Government	147
Total	195.21	49.36		2212	145.85		11,734

The development status of the state-owned land is the following:

- 59.42 hectares of land plot of C02, E02 and K03 have been developed into residential areas;
- the using right of 33.52 hectares of land plot of L02 and L03 has been transferred to the Huainan Municipal Urban Investment and Construction Company and is ready for development;

- no clear development schedule for the remaining 52.91 hectares of land of other plots.

9.2 Population Profile

The field survey shows that there is a population of 13946 in the belt (see Table 1), including 2212 of rural population (Chenxiang village, Xiacai Village, Qingfeng community and Datong Street) and 11734 of urban population, of which 9548 people live in the newly developed residential area of plots C02, E02 and K03.

9.3 Mechanism for Local People to Benefit from Land Appreciation

Urban residents: Among 11,734 of urban residents, 9,548 people have properties within the belt and their properties will be appreciated along with land appreciation, so they will gain benefit from land value increase as a result of the project implementation. The remaining 2,186 persons to be affected by land development in the future will be compensated by replaced housing area with floor area of 1.2 times of the original living area. The resettlement site will be within the belt. Therefore they will be able to benefit from the land value increase. If these people are relocated outside of the belt, the land value and its appreciation of the resettlement site will not be lower than that of the land within the belt.

Rural residents: As indicated in table 1, there are 2, 212 rural residents within the belt. These people own 49.36 hectares of collective land, of which there are 26.2 hectares of cultivation land and 23.16 hectares of land for housing construction. The collective land is distributed in two villages including Chenxiang village and Xiacai village and remaining land is distributed in four collective entities including Chenxiang Village, Xiacai Village, Qingfeng Community and Datong Street. In order to make the rural residents benefit from land value increase through land development in the future, the government will take the following measures:

- a) To update the Regional Comprehensive Land Price at least once every two years in order to guarantee that the land appreciation can be reflected in new

land compensation standard. It was agreed that Land Compensation Standard will be updated for three times during project implementation respectively in 2015, 2017 and 2019.

- b) Land area expropriated each year shall not exceed 20% of the total collective land area within the belt. It means that collective land expropriated in the area shall not be more than 10 hectares each year during project implementation. Thus there will have land to be expropriated over the next few years after land appreciation. Therefore rural residents will be able to benefit from land appreciation.
- c) To allocate 5-10% of expropriated land to village collective for economic development as per relevant policies. Specific measures and procedures are the following: 1) government pay compensation to affected people at the Regional Comprehensive Land Price; 2) convert the collective land into state owned land when full compensation is paid; 3) government transfers a piece state-owned construction land, which equal to 5-10% of actual size of expropriated collective land, to village collective for economic development; 4) local people will decide how to use the land for development and the benefit distribution appreciation among rural residents.
- d) For those rural residents to be relocated will be resettled within the belt in principle. In case some residents want to move outside of the belt, the land value of the resettlement site should not be lower than the land value within the belt.

9.4 Monitoring mechanism

Currently, the municipal government of Huainan City has a well-established monitoring mechanisms and auditing procedures with regard to the land acquisition, demolition and resettlement. To monitor the implementation of the mechanisms design for local people to benefit from land appreciation, a specific monitoring arrangement will be established as part of Environmental and Social Management Plan. The monitoring arrangements and indicators are the following:

- a) The external resettlement monitoring unit will monitor the implementation of the

mechanism to benefit local people from land value increase and include the findings as a part of the biannual resettlement monitoring report.

- b) The area to be monitored will include all land plots within the belt which have the potential of land appreciation as a result of the project implementation.
- c) The monitoring indicators and contents:
 - Amount of state-owned lands purchased and stored and collective lands expropriated each year during the construction period of the project
 - Population affected by state land purchase and collective land acquisition
 - Resettlement sites of affected people
 - Market price of resettlement houses within and outside of the belt
 - Status of Regional Comprehensive Land Price updating
 - Amount and location of state construction land allocated to the village affected by land acquisition and the status of its development and utilization
 - Distribution of benefits generated from the land allocated to the village among local people within the village

10. Continuous Public Participation Plan and Dispute Complaint Channel

10.1 Continuous Public Participation Plan

1. During the construction period and within 3 years after operating, pay a return visit and inspect the environmentally sensitive targets once every season, and hold an on-site investigation meeting in the areas where environmentally sensitive targets are concentrated once a year; such meeting shall have the public participated.

2. Based on the quarterly inspection and annual inspection results, evaluate the public satisfaction degree and analyze the related opinions, improve the environment mitigation measures when necessary.

10.2 Grievance Redress Mechanism

1. Establishment and composition of the complaint institutions

In order to better ensure the legal rights of the affected people, a kind of complaint mechanism will be established for offering the affected people a convenient, transparent, fair and effective complaint way; thus the complaint acceptance leading group of environmental impact is established, the group leader is the related personnel of Huainan Environmental Protection Bureau, and the group members come from the project office, Huainan environmental monitor station, environmental impact assessment unit and the owner unit, etc. The environmental influence complaint acceptance leading group consists

of a complaint acceptance office, which is set up in the owner's unit; the daily complaints shall be collected and sorted by the complaint acceptance office, which shall propose the treatment suggestions after negotiating with the relevant responsible units.

2. Complaint procedures

The complaint acceptance leading group and office will start accepting complaints within one week after the commencement of the construction, and the special line and e-mail for complaints will also be set up. Detailed complaint procedures are as follows:

The affected person, who thinks his rights in any aspect of the environmental protection are violated, can first go to the complaint acceptance office set up by the owner unit to make the written or oral complaint, and the owner shall negotiate with the complainants to solve the problem according to the complaint situation; the owner shall keep the detailed record of the complaint and its handling information, and then regularly report the record to the leading group.

If the complaint cannot be solved through negotiation, the complainant can continue to make the written or oral complaint to the complaint acceptance office of the environmental protection bureau.

10.3 Public Feedback

Establish a feedback mechanism; the environmental impact assessment unit, builder or construction unit shall immediately organize the visiting and investigation together with the design and other related departments after receiving the complaint or the rectification notice issued by the administrative department; make corrections according to actual situations, and publicize the rectification program for solving the environmental disputes.

The feedback mechanism is divided into two phases.

Phase 1: During the environmental impact assessment of the project, after the publicity of relevant information, the construction unit and environmental impact assessment unit can collect the residents' opinions through holding the symposium, showing announcement, and Internet publicity; the public can make feedback through the symposium, or view the draft of the environmental impact assessment of the project and give opinions. The residents can give opinions to the construction unit or its entrusted environmental impact assessment institution with the means of letter, telegram, fax, and e-mail, etc. They can also submit the written opinions to the competent administrative department for environmental protection that is responsible for the examination and approval of the environmental impact statement. The construction unit or its entrusted environmental impact assessment institution, and the competent administrative department for environmental protection shall file the source materials of the feedback they collect for future reference.

Phase 2: In the construction period or the operation period of the project, the public give opinions to the construction unit or builder with the means of letter, telegram, fax, and e-mail, etc.; and they can also submit the feedback to Huainan Environmental Protection Bureau and the Office for Letters and Calls.

According to the feedback of the public, the environmental monitoring report, and the inspection report of the supervision department, the Environmental Management Plan will make the targeted adjustment of mitigation measures, and further improve the environmental management activities.

If there is a major deviation from the contents of the Environmental Management Plan during inspection, or the changing of the project causes a great negative impact on the environment, or the number of the people affected by the negative environmental impact

increases significantly, the project office will immediately consult the environment agencies and the World Bank to form an environmental assessment team to make the additional environmental assessment; if necessary, the additional public consultation shall also be made. The revised Environmental Management Plan shall also be informed to the implementing agencies; the contractor shall conduct the construction in accordance with the modified contents.

Attachment 1 Construction Environment Standard

1. General

I. In order to prevent inconvenience and influence arising from the implementation of the project to local people's life and reduce impact to environment during construction period and operation period, construction unit and constructors shall carry out all the suggested mitigation measures in this standard;

II. If the remedial measures cannot be effectively implemented in the process of construction, the following articles shall be realized when completing the project:

1. All the affected areas shall restore vegetation landscape in time, such as grass planting and forest planting, etc.;

2. Clean up the rubble and sludge left by construction to ensure smooth flowing of the river system;

3. All the construction sites shall clean up the remaining rubble and waste, and deal with the remaining construction materials properly.

2. Conduct Code of Constructors and Environmental Standards

Combined with state and local laws and regulations, this part provides behavior guidance for the constructors. The construction unit shall prepare a construction plan for the project before the instruction impletion and illuminate the implementing rules of this standard in the plan. Only by obtaining the consent of the engineer who is responsible for the project can the plan advance the project construction.

2.1 Prohibitory Acts

The following acts are forbidden in or around the project construction site:

- 1) Felling for any reason outside the allowed construction scope of the project;
- 2) Hunting, fishing, catching wild animals and picking plants;
- 3) Using unapproved toxic materials, such as lead-based paint and asbestos, etc.;
- 4) Affecting other artistic buildings and buildings with historical value;
- 5) House fire;
- 6) Executing works after drinking.

2.2 Transportation

The selection of the route to construction site shall obtain the agreement of the responsible project engineer. Select appropriate vehicles in accordance with road level of local areas and limit the load to prevent the damage to local traffic roads and bridges. For the local damaged traffic roads and bridges caused by overload, the construction unit shall take the responsibility to repair them after obtaining the agreement of the responsible project engineer.

The construction unit shall not use the vehicles with serious exhaust emission and strong noise. The completed construction area shall be installed with noise reduction device and be ensured with its normal operation.

In the whole duration of the contract, the construction unit can take necessary traffic control measures after obtaining the agreement of the responsible project engineer.

2.3 Constructors and Construction Encampment

The construction unit shall recruit local workers as much as possible and provide

appropriate training.

The construction unit shall build temporary septic tank for the workers living in construction site and make centralized processing to prevent influencing nearby rivers.

The construction unit shall build a set of system and methods for construction materials storage in construction site and the generation and disposition of solid waste.

The construction unit shall arrange the constructors to eat out uniformly or adopt the room service system.

The construction unit shall ensure that the construction site and the materials stacking areas are in appropriate location and 500m far away from residential area, and the asphalt manufacturing location shall be 1000m far away from residential area; in the meantime, the layout plan shall be agreed by the responsible project engineer.

The construction unit shall dig and lay the trench around the construction site and install settling tank or catcher groove at the outlet.

Construction production and living encampment shall be arranged as sub item, and each sub item shall be arranged at the higher location according to actual project situation.

2.4 Waste Management and Water and Soil Loss

Solid waste, sanitary fittings and hazardous waste can be effectively controlled by carrying out the following measures:

2.4.1 Waste Management

1. Reduce the output of rubbish to be disposed and cleared away;
2. Identify and classify the generated waste. If there is hazardous waste, it must be stored, collected, transported and disposed according to appropriate procedure.
3. Identify and divide the treatment area, and clearly indicate the material and substance it is allowed to store.
4. Construction waste (including the excavated ground) shall be transported to appointed location for disposal (the location shall be more than 300m far away from river, lake or wet land). Establish solid waste cyclic utilization and separation and classification system in appointed disposal site, and dispose the waste generated in the process of construction and the remaining construction materials.

2.4.2 Water and Soil Loss Control:

1. Use as less destroyed land as possible, reinforce the destroyed land that has been used as soon as possible, and control the drainage passing area and dispose the sediment locally. Establish water and soil loss control barrier around the digging area, mine and the pavement.
2. Protect the leaf litter and its organic matter of the top soil, and backfill them into the destroyed area to promote the growth of native plants. Cover the corroded barren areas with local grass and vegetation or take surface hardening treatment to the soil surface in this area.
3. Complete the erosion control measures before the rainy season in order to better carry out the following construction. Each construction site shall complete the corresponding erosion measures after finishing the project.
4. Install deposition control equipments in all construction sites to slow down the runoff velocity, change the flow direction and deposit the sand, etc. before the vegetation restoration. These deposition control equipments include material pile, stone road, settling basin, straw bag, hedgerow and mud slag heap, etc.

5. Arrange the layout of gutter way, berm, grass fence and pile up stones to prevent the water flow rushing into construction site or disturbing the construction site.

6. Maintain and continue to adopt the erosion control measures until vegetation is totally restored.

7. Spray water to dirt road, the excavation area, filling and soil deposit area if necessary to reduce wind erosion.

2.4.3 Protection Area:

Identify and divide the equipment protection area (more than 15m far away from river, lake and wet land). Make sure that all equipments are used only within the divided protection area. All overflow objects shall be handled according to standard environment procedure or guidance.

2.5 Earthwork and Excavation and Filling of Slope Engineering

Arrange the earthwork construction reasonably, especially during the rainy season. The construction shall keep the fastness of the cut and fill slope at any time and make as less obstruction to the area out of the construction limited zone as possible. Especially during the rainy season, the construction shall be continuous, and the excavation and filling project in the same section shall be completed as soon as possible to prevent the construction from interruption caused by rain and the erosion to the slope surface.

In order to prevent the cut and fill slope from erosion, the construction site shall build intercepting drain and drainage trench in the top and bottom of the slope according to drawing and plant sod and other plants. Intercepting drain shall be built higher than the excavation slope to reduce the slope erosion caused by runoff scouring.

The earth and stone as well as other unavailable materials shall be disposed in appointed location if agreed by the responsible project engineer.

The disposing site cannot be located in a place having landslide potential, nor affects other farmland or private land, and the objects piled up shall be protected from being washed into surface water body by the rain. Set drainage trench around the storage area under the guidance of the responsible project engineer.

2.6 Layout of the Temporary Soil Stacking Ground

1. Identify and divide the selection of soil stacking ground. Ensure a distance over 15m from sensitive areas (such as high steep slope, soil to be eroded easily, direct drainage to the area of sensitive water body).

2. Avoid the soil material being rushed into drains and then blocking trench at the construction area of the built drains.

3. All the wastes and residues generated from the construction shall be cleaned up from the construction site once the work is done.

2.7 Construction Waste and Traffic and Transportation

The construction unit shall establish and carry out daily construction site waste management procedures, and set up enough waste management facilities.

Rubble and crushed stone generated from dismantling old buildings can be recycled properly and used as building materials for other projects (such as laying the roadbed). Before being recycled, these scrap materials shall be identified and evaluated within the construction site and approved by the project engineer. The construction unit shall ensure the following four points:

1. Not operate works in the designated wood land;

2. Not impact the natural waters;
3. Not impact the endangered or rare phytocoenosium;
4. The construction unit can't treat any waste in any environmentally sensitive area.

During the construction process, the residue or sludge piled in the ground adjacent to the construction site shall be immediately cleared away, and the ground shall be repaired to original appearance and obtain the recognition of the project engineer.

In the whole construction period, including preparation period, maintenance period, demolition and residue cleaning period, the project engineer shall direct the planning of the transportation arrangement and think over the treatment measures to sudden events.

2.8 Safety Problem in Construction

The responsibilities of the construction unit include protecting everyone in and around the construction site and avoiding the impact on their personal and property safety. The construction unit has the responsibility to comply with state and local safety regulations and take any necessary measures to avoid accidents, which include the following 10 items:

1. Set pedestrian safety marking carefully and clearly in the access to constructing transportation roads and construction site;

2. Set up a sufficient number of traffic warning sign (including painting picture, frame and landmark, etc.), road sign and protective railings to ensure the safety of the pedestrian during the construction period;

3. Carry out safety training to hardhat builders before the start of the construction;

- 4 Provide personal protective equipments and clothes (including protective goggles, gloves, gauze mask, dust guard and helmet, etc.) and enforce them to use;

5. Each construction site shall have safety information notice board;

6. Require that all workers understand all kinds of material safety information, clearly explain the possible risks to them and to their family caused by using all kinds of materials (especially to the family with pregnant member or having pregnant plan) and encourage workers to share relevant information;

7. Ensure that the materials containing asbestoses or other toxic materials are disposed by worker who has taken specialized training;

8. The construction shall be suspended when encountering heavy rain or other emergency circumstances;

9. Electrical equipment and mechanical equipment shall be able to withstand a certain level impact of the earthquake.

2.9 Noise and Dust Control

In order to control damage and dust, the construction unit shall accomplish the following points:

1. The running speed of all construction vehicles on the road outside the site can't exceed 25km/h.

2. The running speed of vehicles on the construction site can't exceed 15km/h.

3. Keep the noise of machines and equipments no more than 90 db as much as possible;

4. It needs to take more strict measures to prevent producing harsh noise in sensitive area (including residential area, hospital, etc.);

5. Reduce the producing of dust and particulate matter as much as possible to avoid the influence on surrounding residents' life and commercial activity and mainly protect the vulnerable groups (such as children, the elderly, etc.);

6. Arrange the work time of all kinds of construction machinery properly during the construction work, avoid many high noise equipment working at the same time as much as possible and avoid the sensitive time when the surroundings is sensitive to noise. Arrange the high noise equipments to work at day as much as possible to reduce transportation at night and strictly prohibit night construction (22:00~6:00). Construction activities that must be carried out at night shall be approved by local environmental protection department.

7. Remove plants periodically to prevent large area of them being exposed to wind;

8. Spray water appropriately to reduce dust when carrying out works in roads, excavation area and spoil ground that producing much dust.

9. Take correct measures to reduce the influence of noise and vibration generated from construction work to surrounding environment.

2.10 Cleaning of the Existing Waste Dump

When cleaning up the existing waste dump, the construction unit shall take sufficient measures to protect workers and the public. These measures include:

1. Keep cleanliness in the process of transportation and prevent road surface and air pollution caused by waste slipping off from excessive load vehicle.

2. Provide all workers with protective equipments, such as protective goggles, face guard, helmet and safety shoes, etc.

2.11 Demolition of Existing Buildings

During the demolition of existing buildings, construction unit shall take sufficient measures to protect workers and the public from being hurt by dropped rubbles and residues. The measures are:

1. Keep out a selected waste dropping area or discharge groove so that the wastes could be poured down safely;

2. Control the process such as sawing, digging, grinding, sanding and cutting and so on. Take the proper anchoring pattern to guide the drop of the rubbles;

3. Keep clean during transportation process. Avoid polluting road surface and atmosphere caused by overload of vehicles.

4. Take temporary falling protections at the staging edge such as handrail, toe board to avoid waste drop during lifting and drop process.

5. Evacuate the persons in the area effected by the explosion when conduct a blasting work near crowd settlement and other buildings. Use blasting mat or other deflection measures to reduce the influence of slungshots and splashing to the greatest extent.

6. Provide protective equipment such as safety glasses, edge shield, mask, helmet, safety boots and so on to all the workers.

2.12 Channel Cleanout

1. Implement enclosing construction in the channel cleanout construction area. Enclosing height shall be below 1.8m. And the enclosing shall be firm, stable, neat, standard and beautiful;

2. Transport the bottom mud by using sealed transportation vehicles to avoid splashing. Restrain the output of repugnant substances by throwing lime to sludge-tank.

3. Deliver the bottom mud dug out during the engineering construction to specialized waste disposal area in time to avoid affecting neighboring environment and air;

4. Provide everyone with mask or respirator containing activated carbon fiber while digging the bottom mud. And arrange medical staff at the construction site to make rescue in time;

5. Properly choose the transportation time and route of bottom mud to avoid traffic rush. Avoid downtown and residents concentration areas.

2.13 Pipeline and Road Engineering

1. Make corresponding protections when the earthwork is piled at the roadside. Pay attention to distribute construction period properly. Avoid the concentration period of rainfall. Try to shorten the exposure duration to the greatest extent;

2. To prevent the water and soil erosion or rain wash from entering into the excavated pipeline and affecting engineering construction, the surface soil near the excavated earthwork must be protected by straw bags with soil to prevent the soil body collapsing. The surface soil shall be covered with color band cloth when rainy season or windy weather.

3. Pipeline and road construction shall be constructed in sections. Finish excavation and back fill as soon as possible;

4. Pay particular attention to arrange a temporary shortcut when the construction is near public facilities. Material transport shall avoid traffic rush to decrease city traffic pressure; try to make a special construction road when the construction is near a countryside. Reduce the use of country roads. Avoid road damage caused by large equipment and vehicle travel;

5. Inform the public of construction duration and road segment before the construction. Place warning sign and relative marks. Introduce the engineering contents and construction duration. Make the public understand the inconvenience caused by the construction. And inform the contact and complaints hotline and so on.

2.14 Health Service and AIDS Education

The construction unit shall provide workers with basic first aid service and emergency rescue facilities, including medical equipments and operating mode that are suitable to individual, and the degree of treatment achieved before the injured worker being sent to hospital.

The construction unit has the responsibility to develop a prevention program to avoid the spread of disease, especially the spread of HIV/AIDS among workers.

The construction unit shall add health plan outline to the construction scheme to provide advice on workers' health in the construction period, and the health plan outline shall be approved by the project engineer before start-up of the project.

3. Environmental Supervision Measures

Environmental supervision is the new requirement for environmental protection. The environmental supervision work shall be conducted throughout the whole process of the construction to ensure the smooth progress of the environmental protection work and the effective implementation of environmental protection measures. In order to ensure the completion of the environmental protection measures as planned, and ensure the quality of the environmental construction, the supervision work will be conducted by the personnel with the environmental engineering supervision qualification entrusted by the owner; according to the characteristics that this project will be constructed by phases and periods,

2 full-time environmental supervisors can be preliminarily assigned, the posts of other environmental management personnel can be served by the staff of other departments as needed, and the number will be determined according to the work.

3.1 Working mode of environmental supervisors

1. Include the environmental supervisors into the category of project supervisors under the uniform management of supervision management department of the headquarters; the supervisors attend the monthly meeting of engineering directors, and submit the weekly report, and monthly report, etc. to the director office.

2. Hold the environmental supervision work meetings on a regular basis to solve the problems, and put forward work plans for the next phase in combination with the recent environmental supervision work.

3. Each branch of the environmental supervision department shall hold an environmental supervision meeting periodically every month.

4. Form the sound site environmental protection management system, and set up the environmental protection leading group in each project department for taking charge of the environmental protection work of each project department. The organization extends to each construction group and team, the areas of responsibility are divided, and the persons in charge are determined.

3.2 Working contents of environmental supervisors

1. Environmental supervisors in the preparation period of the project

Review the environmental protection clauses in Project Construction and Organization Plan developed and submitted by the construction unit, check whether the environmental protection system established by the construction unit is reasonable, participate in the approval and submission of the Project Commencement Report, supervise the construction of pollutant treatment projects, and supervise the implementation.

2. Environmental supervisors in the construction period

Compile the Key Emphasis in Work of Environmental Protection according to the construction organization design of each section, publicize the environmental protection work to the construction unit, and point out the sensitive points of environmental pollution for the construction unit; put forward the specific environmental protection measures according to the principal pollutants in the construction period, review the Project Construction Environmental Protection Scheme submitted by the construction unit, check whether the environmental protection system is operated smoothly, check the implementation of environmental protection measures, and supervise the construction of the water-and-soil conservation measures. Supervise the implementation situation of the environmental monitoring plan, and supervise the monitoring results.

3. Environmental supervisors in the operation period: Review the Summary of Environmental Protection Work of the Construction made and submitted by the construction unit, sort the documents of the completion of environmental protection work, make the environmental protection acceptance of the project, and compile the Summary of Environmental Supervision Work, etc.

3.3 Responsibilities of environmental supervisors

1. The environmental supervisors shall strictly fulfill their duties of supervision, effectively play the role of supervision and management, and make the various environmental protection measures adopted by all construction technologies be effectively implemented, to ensure the effective implementation of the environmental protection work.

2. Do well the propaganda work of the environmental protection laws and regulations to increase the environmental protection consciousness of all personnel involved in the construction, and make them voluntarily do well the environmental protection work.

3. Make the phased environmental supervision acceptance plan to conduct the environmental supervision acceptance for the completion of unit project; provide the complete environmental protection procedures and integral data when the construction is completed.

4. As for the construction projects without bidding, the terms of environmental protection shall be signed in the contract, check the contents for environmental protection in the construction organization design. Add the chapter of environmental protection into the construction organization design, and the contents shall be specific.

5. Keep a detailed record for the implementation situation of environmental management of the project, compile the weekly report and monthly report, and timely submit them to the local project office and environmental protection bureau.

3.4 Environmental supervision during construction period

During construction period, the project engineer will supervise the executing conditions of this specification; if multiple specifications are not executed, the project engineer will require the construction units to stop construction or take the other punitive measures, until the violating behaviors being solved. In the meantime, the project engineer will also require the construction units to follow the national or local rules and regulations related to environment, public health and safety during construction process.

Attachment 2: Social management plan

Table 1 Environmental and Social Management Plan

Social Factors	Effect	Enhancement/Promotion Measures	Time Schedule	Budget RMB 10,000	Implementer	Supervisor	Monitoring Index	Frequency
1-Positive benefits								
Governance model	Setting an example for the related work	Improving the research of risk analysis and mechanism of comprehensive management policy		160	Research unit	Project office	Publication of research results	
Improve the investment environment	Promote the development of the industry of real estate, tourism and the related industries	Vigorously publicizing the content and significance of the project		/	Project office, consulting unit	/	/	/
Further development and utilization of project construction	Increasing opportunities for employment and entrepreneurship	Giving priority to employment and entrepreneurship of local residents affected by the project			Datong District	Project office	Quantity of Employment of unskilled jobs during the period of the project implementation	Two times/year
Employment training plan	Enhancing the ability of local residents for employment and reemployment	Project office, Human Social Resources and Social Security Bureau of Datong District, cooperation agreement signed by training department		100	Datong District	Project office	The total number of people is 965; the qualified rate of training is above 90%; the employment rate is above 85%	Two times/year
Closure of Garbage dump for governance	Completely solving the pollution caused by garbage	Diversions of flood control ditch, greening, strengthening the monitoring of surface and groundwater		Included in the construction costs	Implementation Unit	Project office	Refer to monitoring plan	Refer to monitoring plan

Social Factors	Effect	Enhancement/Promotion Measures	Time Schedule	Budget RMB 10,000	Implementer	Supervisor	Monitoring Index	Frequency
Improving the road network and other infrastructure	Reducing travel time, improving quality of life	Design units fully consider car parks, bus transfer and other public service measures in the design		/	Design unit	Project office	/	/
Existing road reconstruction	Eliminating damage and dust of the existing roads and making it more secure, healthier and less obstruction	Jiuda Road reconstruction has been completed and Forest road is gearing up to be implemented	/	/	/	/	/	/
Social Factors	Effect	Mitigation/Avoidance Measures	Time Schedule	Budget RMB 10,000	Implementer	Supervisor	Monitoring Index	Frequency
2-Negative Effects								
Land Requisition Relocation	Roads, bonsai garden, greenways occupy Chenxiang village collective land acres and bonsai garden requires the demolition of four private homes	A. Try to consider using non-cultivated land and state-owned land, transfer the collective land as far as possible and reduce the impact of land requisition on the villagers ; b. By optimizing the design to avoid and minimize the project involving land requisition and demolition; c. For the inevitable permanent land requisition, do a good job of resettlement and compensation of migrants in strict accordance with the relevant policies.	The whole project cycle	Including in the resettlement fees	Design units, project office	Project office, immigration external monitoring mechanism	Refer to immigration monitoring index	Refer to immigration monitoring frequency
Enterprise Relocation	Involving 9 companies and two of them are still running	A.hire both approved qualified appraisal agency to evaluate assets; b.give reasonable compensation to the closed enterprise; c.do the relocation and	2014-2020	Including in the resettlement fees	Design units, project office	Project office, immigration external monitoring mechanism	Refer to immigration monitoring index	Refer to immigration monitoring frequency

Social Factors	Effect	Enhancement/Promotion Measures	Time Schedule	Budget RMB 10,000	Implementer	Supervisor	Monitoring Index	Frequency
		resettlement of workers for the running enterprises.						
Construction disturbs people	During the construction, inevitably generate traffic, noise, dust and other pollution and interfere with the normal production and life of some residents.	<p>Traffic problems: a. During the construction, project office needs to communicate with the construction unit, adopt segmental construction and reduce the impact on residents trip; b. Inform residents of construction information using local radio and television propaganda and posting notices, so that they can prepare in advance; on the premise of ensuring the engineering quality, strictly control the construction period; c. Add signs, limit speed and do traffic safety propaganda ; d. Take immediate safety emergency pan in case of off-site traffic accident.</p> <p>Noise problems: a. Project office needs to communicate with the construction unit, implement strictly the noise standards, take measures to reduce noise pollution and reduce the influence of</p>	The whole project cycle	Including in the environmental-impact assessment fees	Implement unit, project office, basic medical and health institutions and the centers for disease control and prevention	Project office, engineering supervision, external monitoring and evaluation, environmental protection and disease surveillance	Refer to monitoring plan	Traffic, noise, dust, household garbage 3 times/year; the spread of disease should be in accordance with the CDC requirements; complaint 2 times/year

Social Factors	Effect	Enhancement/Promotion Measures	Time Schedule	Budget RMB 10,000	Implementer	Supervisor	Monitoring Index	Frequency
		<p>noise on the surrounding villagers; b.Prohibite high noise construction at night and try to avoid working at night.</p> <p>Dust, exhaust gas and household garbage problems : a. Sprinkle water on a regular basis on the approach roads and construction roads to prevent dust pollution ; b. Timely clean and disinfect the construction camp life garbage and key pollution sources, and regulate the behaviors of construction personnel related.</p>						
3 Potential risk								
Risk of resettlement	Resettlement measures are not proper. The compensation fund cannot be timely and fully provided. Immigration compensation standards for land acquisition is expected to continue to rise	<p>A. Preparation of resettlement planning and social impact assessment ; full public participation and consultation, allowing the public to participate in the project design and protect the interests of their appeal to be reflected;</p> <p>B. Undertaking Reasonable compensation and livelihood restoration</p>	Risk of resettlement	Resettlement measures are not proper. The compensation fund cannot be timely and fully provided. Immigration compensation standards for land acquisition is expected to continue to rise	<p>A. Preparation of resettlement planning and social impact assessment ; full public participation and consultation, allowing the public to participate in the project</p>	Risk of resettlement	Resettlement measures are not proper. The compensation fund cannot be timely and fully provided. Immigration compensation standards for land acquisition is expected to continue to rise	<p>A. Preparation of resettlement planning and social impact assessment ; full public participation and consultation, allowing the public to participate in the project</p>

Social Factors	Effect	Enhancement/Promotion Measures	Time Schedule	Budget RMB 10,000	Implementer	Supervisor	Monitoring Index	Frequency
		measures ; Giving a reasonable compensation of land and housing to those people affected by the project, especially subsidizing female heads of household, persons with disabilities and other disadvantaged groups in housing reconstruction process ; Carrying out resettlement activities combined with technology and skills training of local government ; In the construction of project, giving priority to those migrants in providing unskilled jobs ; c. Establishing complaint mechanisms and solving problems timely in the process of resettlement and with the consent of resettlement plan.			design and protect the interests of their appeal to be reflected; B. Undertaking Reasonable compensation and livelihood restoration measur; Giving a reasonable compensation of land and housing to those people affected by the project, especially subsidizing female heads of household, persons with disabilities and other disadvantaged groups in housing reconstruction process ; Carrying out resettlement activities combined with technology and skills training of local government; In			design and protect the interests of their appeal to be reflected; B. Undertaking Reasonable compensation and livelihood restoration measures ; Giving a reasonable compensation of land and housing to those people affected by the project, especially subsidizing female heads of household, persons with disabilities and other disadvantaged groups in housing reconstruction process ; Carrying out resettlement activities combined with technology and skills training of local

Social Factors	Effect	Enhancement/Promotion Measures	Time Schedule	Budget RMB 10,000	Implementer	Supervisor	Monitoring Index	Frequency
					the construction of project, giving priority to those migrants in providing unskilled jobs; c. Establishing complaint mechanisms and solving problems timely in the process of resettlement and with the consent of resettlement plan.			government; In the construction of project, giving priority to those migrants in providing unskilled jobs; c. Establishing complaint mechanisms and solving problems timely in the process of resettlement and with the consent of resettlement plan.
Risk of land circulation	There are still a lot of uncertainties of experience about land circulation, the form and time of land circulation, signing and management of contracts, the mechanism of determination and exit of rent and so on.	A. Perfecting social security system. Establishing perfect multi-level security system in rural areas, including social relief, social welfare, special care and placement, social assistance, rural cooperative medical care in rural areas, etc. And solving those worries of the immigrants and land transfers. B. Jobs are provided and incomes of rural residents in the project area are increased. In terms of Jobs and job opportunities produced	2015- the end of second round of the contracting period	Included in the resettlement costs	Project office, village committee	Project office, external monitoring unit	Family income, social security; quantity of unskilled employment positions during the period of project implementation; land circulation amount; contract ;	Two times/year

Social Factors	Effect	Enhancement/Promotion Measures	Time Schedule	Budget RMB 10,000	Implementer	Supervisor	Monitoring Index	Frequency
		during the period of the project construction and operation, the owners of the project and implementing agencies are advised to cooperate with the local labor department, and Women's Federation to give preferential treatment to vulnerable groups like women and the disabled in acquiring the non-technical jobs during the construction period. The project is preferred to increase the long-term and short-term employment so that they can benefit from project construction and operation and also increase their household income.						
Public participation	Stress on top-down guidance and command, ignore bottom-up feedback and negotiating participation and the two-way participation is in asymmetric; immigrants, the original residents and other stakeholders don't understand the project and placement	A design units should do field survey along the various settlement, fully understand the reasonable requirements of the local people, optimize project design to fully realize the goals of the project and develop the project function. B strengthen the propaganda and education of environmental protection to local residents, strengthen their environmental protection awareness, integrate environmental protection	2013—2020 /		Project office, village committee, relevant county, town, village, group 4 level stability system, comprehensive management officer, bureau for complaints	Project office, external monitoring unit	Public participation in planning implementation, Complaint case	2 times/year

Social Factors	Effect	Enhancement/Promotion Measures	Time Schedule	Budget RMB 10,000	Implementer	Supervisor	Monitoring Index	Frequency
	information and delay or hinder engineering; immigrants and other stakeholders' interests, doubt, requirements and suggestions can't be effectively expressed	into their daily lives, reduce pollution and actively involve in the project implementation and management. C make public participation plan and establish complaint mechanism(refer to the resettlement plan and environmental impact assessment)						

Table 2 Social Management Plan Meeting the Needs of Various Stakeholders

Recommended Actions	Target Population	Implementing Agencies	Duration	Concrete Cctions	Source of Fund	Monitoring Targets
1. Manage the old waste yard as soon as possible to improve the environment	Residents around the waste yard (for example, residents of the old acetylene plant yard, and residents of Runzeyuan), and villagers from Chengang Village	Project Office , Datong District, Designing Unit and Executing Unit	From 2015 to 2017	Management of the old waste yard has been regarded as the most important item of the project.	Project funding	
2. Eliminate the landscape damage caused by the mixing plant, the quarry or the brickyard as soon as possible.	Residents in Kuangnan Community or on both sides of the concrete plant, and residents of the funeral home and Qishan garden spot	Project Office , Datong District, Designing Unit and Executing Unit	From 2014 to the end of 2015	For improvement of the environment in this area, the Datong District of Huainan City has recently requested that all of the industrial enterprises in the project area be relocated step by step. By now, relocation of the concrete plant has been accomplished.	Huainan Municipal Government Investment	
3. Improve the infrastructure construction of this area as soon as possible, particularly water supply.	Kuangbei Village	Project Office , Datong District, Designing Unit and Executing Unit	From 2014 to the end of 2015	Project Office has listed water supply of this living area as one of the project items.	Project funding	Facilities, time and volume of water supply
4. Do good job of expropriation compensation and resettlement. Solve the employment problems faced by the rural households involved in the land circulation.	Framers from Chengang Village whose lands have been expropriated or who have participated in the land circulation	Project Office , Datong District Government and Village Committee of Chengang Village	From 2014 to the end of 2016	1) Land compensation for the immigrants shall be public, fair and transparent to avoid land disputes caused by unfair or non-uniform allocation. The land compensatory funds shall be paid off to the immigrants to help the immigrants conduct production or development timely and thus to restore production and life. 2) Give priority to solving the employment problems of the farmers whose lands have been expropriated or Who have participated in the land circulation.	Immigrant Investor	1) Information disclosure 2) Satisfaction of the immigrants

5. Deal with the displacement and resettlement properly.	The six relocates from Zhanhou Community	Project office, designing unit, executing unit and relevant town or village committees	From 2018 to 2019	<p>1) Non-code construction will be compensated according to the cost price. Also, economically affordable housing will be provided around the relocation site for the residents to buy in preferential price.</p> <p>2) Free resettlement houses will be provided for the public house residents according to 30m² per person.</p> <p>3) Also, appropriate compensations will be provided during the relocation.</p>	Immigrant Investor	<p>1) Information disclosure</p> <p>(2) Compensation standard of house</p> <p>3) Satisfaction of the immigrants</p>
6. Handle the relocation compensation needs of the enterprises properly.	The five enterprises needing removal	Project office, designing unit and executing unit	From 2015 to 2020	<p>1) A qualified appraisal agency will be invited to conduct assets appraisal for the project.</p> <p>2) For enterprises in production, monetary damages will be paid according to their requirements.</p> <p>3) Also, for enterprises shut down, adequate remedy will be paid according to relevant standards and policies.</p>	Immigrant Investor	1) Information disclosure
7. Improve capacity construction of the project owner.	Project Office	Project Office	From 2014 to 2020	<p>1) The World Bank shall provide as much help as it can.</p> <p>2) An expert group will be invited to accomplish relevant preparation works.</p> <p>3) Consulting team of experts shall be organized by the departments of the government to provide guidance for the preparation, implementation and operation work.</p>	project investment	

Table 3 Social Management Plan for the Promotion of Gender and Development

Recommended Actions	Target Population	Implementing Agencies	Duration	Concrete Action	Source of Fund	Monitoring Targets
1.Promotion of the participation of women in the project	Women affected by the project	Project office, Datong district, design units, construction units, Women's Federation, Jiulonggang town government and Datong street office and village and neighborhood committees	From 2013 to 2020	<p>1) Women's needs and suggestion should be considered during the project design stage</p> <p>2) Build up a public and transparent mechanism for the publication of demolition compensation information and ensure women to have the equivalent compensation right and right to information. The signature of land expropriation compensation agreement and release of funds of every family should be under the prerequisite conditions of informing the female family members.</p> <p>3) Vulnerable groups including women should be given priority to unskilled jobs during the project implementation.</p> <p>4) Ensure that women can sign to receive the land compensatory funds.</p>	Resettlement and project funds	<p>1) Number and frequency of people participating forums and interviews and suggestions;</p> <p>2) Number of women in the unskilled jobs during project implementation;</p> <p>3) Proportion of women signing to receive the compensatory funds</p>
2.Training of women's labor skills	Women affected by the project	Project office, Datong district, design units, construction units, Women's Federation, Jiulonggang town government and Datong street office, village and neighborhood committees, Municipal Agriculture Bureau and Municipal Social Insurance Bureau	From 2015 to 2020	<p>1) Formulate a employment training program with women's characteristics into consideration</p> <p>2) Build up a menu-type employment training system and form a one-stop service covering enterprise demand, professional training and women's personal interests to decrease the blindness of women employment.</p> <p>3) Exert the role of Women Federation, Family Planning Association and other women's organizations and combine women's development and access to opportunities to the activity implementation of these organizations</p>	The training funds of the Municipal and District Women's Federation, Agricultural Bureau, Social Insurance Bureau, Poverty Relief Office and other agencies	<p>1) Number and frequency of women participating the training and suggestions</p> <p>2) Training duration and methods</p>

				to attract and lead women to enjoy opportunities brought by the development. 4) Encourage women to establish businesses and give priority to providing small loans to women entrepreneurs.		
3. Protect the lawful rights and interests of women	Women affected by the project	Project office, Datong district and Municipal Social Insurance Bureau	From 2014 to 2020	Provide the endowment insurance for land lost farmers (including women) as soon as possible to ensure women's economic status.	Resettlement funds	Please see the resettlement action plan
4. The special needs of the disadvantaged groups should be considered during resettlement	Homes of the disabled affected by the demolition	Project office and government of Datong district	From 2014 to 2020	The Datong district has handled the minimum living guarantee for this patient and sends him/her to the hospital for treatment.	Datong district	

Attachment 3 Disease and Pest Management Plan

1. Background of Disease and Pest Management Plan in the Project Area

1.1 Goals of the project plan

The purpose of this plan is to implement the idea of “green plant protection”, adhere to the plant protection work policy of “prevention first, integrated control”, vigorously promote non-chemical control technologies, and carry out green prevention and control and comprehensive treatment for crop diseases and pest in the project area, by optimizing and integrating agricultural, biological, physical, chemical and other prevention and control technologies, with plant protection and disaster mitigation and harmonious ecology as the core, in order to prevent and minimize any losses caused by disease and pest, guarantee safety of agricultural production, agricultural products quality, and ecological environment as well as continuous, efficient and safe development of agriculture in the project area.

1.2 Overview of Pest and Disease Occurrence in the Project Area

Current dominant plants in Datong District, Jiulonggang Town, Huainan City mainly include: *paniculata*, southern magnolia, *populus tremula*, elm, *albizia julibrissin*, *platycladus orientalis*, *bischofia polycarpa*, *photinia serrulata*, *buxus megistophylla*, *lagerstroemia indica*, and *pyracantha fortuneana*, etc. according to relevant domestic and foreign studies, these plants may suffer from pests and diseases during the nursery breeding period and growth process after transplant, such as leaf spot disease, stem rot, and dark mildew in *buxus megistophylla*; leaf spot disease, slug, and mussel scale in *photinia serrulata*; powdery mildew, aphid and *ceroplastes japonicus* green in *pyracantha fortuneana*; *tinocallis kahawaluokalam kirkaldy* in *lagerstroemia indica*; *histia rhodope cramer* in *bischofia polycarpa*; and *corythucha ciliate* in oriental plane, etc. However, in the investigation process of pests and diseases in this area, the above diseases and pests were not discovered to happen and be prevalent in a large scale in Datong District, Jiulonggang Town, Huainan City, causing no harm to vegetation in this area. In the investigation process, we also consulted Forestry Bureau, Environmental Protection Bureau, and Forestry Inspection Bureau and other relevant management departments and experts in Huainan City and found that serious plant diseases and pests have never occurred to garden plants in recent ten years. Currently, biodiversity in this area is high, community structure is stable, and health level of the ecological system is good on the whole. For some weak diseases and pests, the ecosystem can resist and inhibit such diseases and pests by its own regulation ability. Thanks to high attention paid by city and county governments in China and property management measures taken by management departments at all levels, especially Huainan Landscape Administration Bureau in recent years, the ecological environment in this region is good, vegetation is rich, and large scale diseases and pests are not discovered, thus large scale and dose insecticide and bactericide, as well as pesticide are not necessarily applied in a large area.

Occurrence of plant diseases and pests is influenced by many environmental factors and the situation is a dynamic process every year. As a result, according to the investigation result of plant diseases and pests, we can further improve the predication of probability and scale of occurrence in forests of Huainan City and enhance green construction and maintenance quality in the evaluation area according to the climate change in the coming year in combination with the occurrence regularity and features of pests. Apart from main plants, such as arbors and shrubs, herbaceous plants also suffer from pests and diseases mainly. herbaceous plant communities in nine areas mainly consist of the grass family and the composite family, including reed, green bristlegrass, cogon, *erigeron annuus*, and *artemisia rubripes nakai*, etc. which might mainly suffer from

orthoptera, hemiptera, coleopteran pests, such as *trilophidia annulata*, *oxya chinensis*, and *acrida cinerea*. True bugs and phytophthira in hemiptera and chrysomelidae and scarabaeoidea in coleopteran are important pest groups. In Datong District, Huainan City, farmlands are mainly located on both sides of road along No. 206 national highway and of typical dry land in the North. The tillage method here is to yield two crops a year, with oilseed rape and wheat planted mainly in spring and sweet potato, peanut, soybean, and corn in summer. Vegetables include cucumber, hot pepper, eggplant, and shallot. There are some common herbs on roadside farmland, including bromegrass, barnyard grass, *pterocypsela laciniata*, *vicia sativa*, *vicia cracca*, and wild oats. Among these plants, oilseed rape, wheat, sweet potato, and cucumber area vulnerable to diseases and pests. Insect communities, including Lepidoptera, orthoptera, coleopteran, and hemiptera, etc. mainly harm the farmland ecosystem, such as imported cabbageworm in sulfur butterfly, *gryllotalpa orientalis burmeister*, a soil insect, and scarabaeoidea, etc. It is suggested that attention shall be paid to the prevention of those insects influencing growth and survival of vegetation possibly.

1.3 Pest management institutions and current policies

1.3.1 Management institutions

There are some diseases and pest management institutions [Plant Protection and Quarantine Bureau (Stations)] respectively at national, provincial and city (county) and town level with clear responsibilities for agricultural and forest crop disease and pest management, pesticide management, and safety production of agricultural products, etc. at their own level.

According to the requirements of agricultural, environmental protection, and food safety requirements, the National Ministry of Agriculture once formulated a list of chemical pesticides prohibited or limited for chemical prevention and control of plants in different stages to strictly implement the system of “three licenses” and pesticide label management system on pesticide varieties coming to the market. Besides, Plant Protection and Quarantine Station and Agricultural Law Enforcement Department in each county (city) and province also manage the pesticide according to relevant laws and regulations.

Diseases and pest management in the project area of Huainan City is an important part of *Overall Emergency Plan of Anhui Province for Public Emergencies*, the people’s government of counties, cities and provinces sets up an emergency command agency for agricultural biological disasters to be responsible for coping with and disposing agricultural biological disasters in respective administrative region.

Anhui Plant Protection and Quarantine Station is a government agency to lead crop diseases and pest control in Anhui Province. And throughout the province, major diseases and pest prediction agencies are established in each district, county, and city to predict major diseases and pests seven days or so in advance regularly, release diseases and pest information to township and towns and organize famers to timely prevent and control diseases and pests.

Pesticides are sold to farmers via distribution branches in villages and towns which are operated by county (city/ district) agricultural sectors, agricultural materials supply and marketing system and individual businesses. The pesticide operation behaviors and product varieties are supervised by agricultural law enforcement teams and industrial and commercial departments in each district, county, and city.

Agricultural sectors in each county (city/ district) are responsible for guiding local farmers how to prevent and control main diseases and pests on local crops and newly occurred major diseases and pests and training farmers to use new technologies, methods and pesticide for prevention and control in manner of broadcasting, guiding document, and

booklet, etc.

1.3.2 Current policies

Policies related to plant protection, integrated management of diseases and pests, and pesticide management currently implemented in the project area of Huainan City include:

[1] *Regulations of the People's Republic of China on Implementation of the Forest Law* (the State Council, Jan. 2000)

[2] *Forest Law of the People's Republic of China* (the State Council, Aug. 2009)

[3] *Regulations of the People's Republic of China on Forest Pest Control* (the State Council, Dec. 1989)

[4] *Law of the People's Republic of China on Plant Quarantine* (the State Council, May 1992)

[5] *Urban Greening Regulations* (the State Council, Aug. 1992)

[6] *Implementing Rules of New Plant Varieties Protection Ordinance of the People's Republic of China* (Ministry of Forestry Branch) (the State Council, Aug. 1999)

[7] *Forest Park Management Methods* (Ministry of Forestry, Dec. 1993)

[8] *Management Methods for Tree Germ Plasm Resources* (Forestry Bureau, Nov. 2007)

[9] *Forest Tree Seed Quality Management Methods* (Forestry Bureau, Jan. 2007)

[10] *Regulations of the People's Republic of China on Pesticide Management* (the State Council, Nov. 2001);

[11] *Good Agricultural Regulation* (Ministry of Agriculture, Animal Husbandry and Fishery Department, and Ministry of Health, Jun. 1982);

[12] *Measures for Implementation of Pesticide Management Regulations* (Ministry of Agriculture, Jul. 2004);

[13] *Management Methods for Nuisance Free Agricultural Products* (Ministry of Agriculture, and State Administration for Quality Supervision and Inspection and Quarantine, Apr. 2002);

[14] *Opinions of General office of the Ministry of Agriculture on Promoting Green Prevention and Control of Crop Diseases and Pests* (May 15, 2011)

[15] *Standard for Safety Application of Pesticides GB4285-89* (National Environment Protection Bureau, Sep.1986);

[16] *Standard for Safety Application of Pesticides GB8321.2—1987*(National Environment Protection Bureau, Sep.1986);

[17] *Green Food. Pesticide Application Guideline NY/T393-2000*;

[18] *Maximum Residue Limits for Pesticides in Food GB2763-2005*;

[19] *Determination of Organophosphorus Pesticide Residues in Foods GB/T 5009.20-2003*;

[20] *Regulations of Anhui Province on Agricultural Ecological Environmental Protection* (Jun. 29, 2006)

[21] *Overall Emergency Plan of Anhui Province for Public Emergencies* (Mar. 22, 2006)

[22] *Emergency Plan of Anhui Province for Food Quality and Safety Emergencies* (2011)

[23] *Ecological Agriculture Development Planning in Anhui Province* (2010)

[24] *The "Twelfth Five-Year" Development Plan for Agriculture Industrialization in Huainan City* (2011)

2. Monitoring and forecasting of plant diseases and insect pests

Monitoring and forecasting are technological means of monitoring the occurrence of plant diseases and insect pests, forecasting its occurrence dynamics and spreading tendency, and are the premise and guarantee of scientific implementation of pest control. The monitoring and forecasting of plant diseases and insect pests stick to the principle of public monitoring and professional monitoring combination.

2.1 Monitoring Survey

Based on the manner in which the plant diseases and insect pests occur, the monitoring survey can be divided into:

2.1.1 Fixed point monitoring

Choose the fixed places in the forest or forest edge, and periodically observe the occurrence dynamics of the plant diseases and insect pests.

When fixed point monitoring is used, seduce the insects by lamplight, sex induction and pheromone according to the taxis of the insets, count the trapped number, thus mastering the occurrence dynamics of plant diseases and insect pests; use the host plant of the plant diseases and insect pests as the plant source, monitor the occurrence dynamics of plant diseases and insect pests; the occurrence dynamics of plant diseases and insect pests can also be monitored by surveying the sample plot and standard strain.

2.1.2 Walk investigation

Based on different investigation objects and goals, the insect pest situation investigators can walk on the monitored forest land, and choose a fixed path to observe the plant diseases and insect pests. Walk investigation paths shall pass through the main forest types and the location where pests may occur. In the forest land where investigation objects are found, we can adopt mechanical sampling method, and select a certain number of sample plants (quadrat).

2.1.3 System investigation

This investigation is to further determine the effect size and rules of the related factors which may influence the plant diseases and insect pest population densities' growth and decline to the plant diseases and insect pest population. It aims to understand and master the survival rate (death rate) and proliferation rate of object population in each developmental stage, and the relations between forest pathogenic microorganism quantitative level and the danger degree under different local forest stand conditions, different site conditions, different meteorological conditions and the influences of natural enemies. The national central observation and forecasting points shall undertake this survey task.

When carrying out the monitoring survey, light trap, trap and other observation and forecasting investigation tolls can be used according to different survey modes.

2.2 Forecast and Prediction

The plant protection department of the project area should timely announce the occurrence dynamics and occurrence trend of the plant diseases and insect pests

according to its occurrence, the biology ecological characteristic and the occurrence and development law. The forecast content includes the emergence period, the occurrence amount, the occurrence scope and the endanger degree and so on.

3. Implementation of PMP

3.1 Overall Objectives

The objectives of the pest control plan for the World Bank Project in nine areas of Huainan City, Anhui Province are:

- (1) The high-toxic chemical pesticide is banned for the nursery stock operator to use;
- (2) Reducing the selling amount of the chemical pesticides that are inappropriately or incompletely tagged to the forest workers.
- (3) Increasing the awareness, understanding and applying ability concern the plant diseases and insect pests integrated management.
- (4) Increase the ability of safe handing and management to the chemicals.

The following measures can be taken for this project to enhance the understanding and recognition of pest integrated management:

- (1) Introduce the quality standards of the chemicals in the purchasing policies for the nursery stock operators who are apply for project loans;
- (2) improve the capacity building of the government in the extension service of pest integrated management;
- (3) Educate and train the pesticide issuers and retailers in the respect of pest integrated management methods.

3.2 Basic Principles and Objectives

3.2.1 Basic principles

The pest integrated management (IPM) is the core content of the insect disease integrated control and is the significant measures of the plant diseases and insect pest prevention and control.

The pest integrated management (IPM) was the modified pest control strategy in 1972 and was based on the integrated pest control (TPC) suggested by the United Nations Food and Agriculture Organization in 1966. IPM is a science related to plant diseases and insect pests. The pest integrated management emphasizes the dominated control of nature controlling and other prevention measures should cooperate harmoniously and efficiently with nature controlling. The IPM will be in accordance with the feature and habit of different pest to firstly enhance monitoring and emphasize the using of quarantine act, forestry building, physical and mechanical method and biological method to prevent insect disease. Only in the condition that the above method cannot efficiently prevent the insect disease can the chemical method of using the chemical insecticide of high efficiency and low toxicity be used.

In the pest control strategy making, we should consider not only the economic benefit, but also the ecological balance and the society security. Based on this theory, the prevention should be first and the forest building measures should be the base in the forest pest control project. Meanwhile taking full use of the nature's control to the pest disease and creating the adverse conditions to the generation and development of the pests. Adjusting measures to local conditions and applying the biological, mechanical, chemical and other measures to supplement and coordinate each other in the control of the pest disease. Trying to avoid killing or hurting the pest's natural enemy and avoid polluting the

environment, and controlling the pest disease to an enduring level.

Sticking to the localization management, government responsible and each department performs its own functions to practice the responsibility system of protect and develop the nursery stock resources. Sticking to the measure of prevention first and prevention and treatment integrated, and strictly control the spread of the epidemic situation. Sticking to comprehensive prevention and focused treatment to make sure the security of the key region. Sticking to compartment reasonably and take classifying management measures to increase the efficiency of the prevention. Sticking to the prevention measures that are in accordance with the law and sticking to the standard management to promote the scientific prevention level.

3.2.2 Prevention and control objectives

(1) Integrate, demonstrate and promote the nuisanceless control techniques of plant diseases and insect pests, gradually reduce the input of agricultural chemicals;

(2) Strictly prohibit the use of agricultural chemicals forbidden by the country, and enhance the scientific pesticide-using level of the farmers;

(3) Improve the farmers' recognizing and applying abilities of pest integrated management knowledge, and improve the comprehensive control level;

(4) Gradually standardize the pesticide production and sales behaviors, and promote the safety production and sales of agricultural chemicals;

(5) Guarantee that serious diseases and insect pests of the nursery stock, fish and turtle in the project area will not cause severe losses.

3.3 Recommended Methods of Pest Management Plan

3.3.1 Objectives of recommended methods

In the coal mining subsidence area management project of Anhui Huainan constructed with the use of the World Bank loans, the objectives of the recommended methods in the pest control plan are mainly to reduce the dependence on synthetic chemical pesticides though demonstrating and popularizing a series of measures on plant diseases and insect pests in each project area to the greatest extent; for nursery stock, plant quarantine, insect pest situation forecasting, forestry methods, physical methods, biological methods, chemical methods are some other control methods can be adopted.

3.3.2 Main methods recommended in the pest management plan

3.3.2.1 Plant quarantine

The project area should strengthen the plant quarantine. They should execute the producing area quarantine, the transportation quarantine and the rechecking to ensure the efficient quarantine treatment. Forbidding to buying the vegetation from the area where there are quarantine objects and serious quarantine. To manage the forest in the registration certificate system and conduct the "nursery stock production certificate", "nursery stock quality inspection certificate" and "nursery stock production and management certificate" so that to standard the production and sales behavior of the nursery stock. To strengthen the quarantine work to the import wood and woodwork and when find the quarantine object destroy it on the spot to prevent the quarantine object from spreading into the project area.

3.3.2.2 Pest forecast

Huainan Agriculture (Forest) Industry Office has provided enterprises in the project area with timely information on pest control, including control objectives, control measures, technology, insecticide, etc. This information should be provided to enterprises in the

garden 7 to 10 days before the implementation of control measures. The Agriculture (Forest) Industry Office should ensure that the control measures are carried out in the nearby districts (counties), villages (towns), community residents' committees etc. at the same time to improve the effect of control.

3.3.2.3 Forestry practices

Select resistant tree species: improve the trees' ability to resist plant diseases and insect pests;

Intercrop plants: reasonably allocate tree species and crops to reduce hazards;

Cultivate strong seedlings: sterilize seeds and soil, remove unhealthy seedlings and cultivate strong seedlings of high quality;

Match tree species with the sites: choose the tree species suitable for the local environmental conditions;

Timely plant: select appropriate planting season;

Use fertilizers reasonably: apply enough collected manure, apply nitrogen and phosphorus fertilizer limitedly and increase the use of calcium;

Clean nursery stock ground: plow the soil to expose pests to the extreme climate, and clear away the infected plants, branches and leaves;

3.3.2.4 Physical methods

Catch and kill pests: use a black light lamp or frequency oscillation pest-killing lamp to trap and kill moths, beetles and Orthoptera insects;

Trap and kill moths with sweet and sour solution; artificially capture Coleoptera imagoes and Lepidoptera larvae, pupas and egg masses;

Methods of deinfestation and disease curing: artificially excavate the pests overwintering in the soil or becoming pupas; artificially cut the branches and leaves with diseases and pests from plants; etc.

Blocking insecticide: exploit the habits of some pests to prevent and control the harm. For example, hang a piece of plastic around the trunk to prevent and control the pests like pine moths with the habits of overwintering off the tree or causing harm on the tree during the night and hiding off the tree in the daytime.

3.3.2.5 Biological methods

Make use of biological pesticides, such as the matrine, thuringiensis bacillus (Bt), Spodoptera Litura Nuclear Polyhedrosis Virus (SNPV), etc;

Take advantage of natural enemies, such as Scleroderma guani, Chouioia cunea Yang, Dastarcus helophoroides, Coccinellidae, etc., and use the sex attractant to trap and kill pests, such as monochamus alternatus, etc;

3.3.2.6 Chemical methods

Use an effective economic method combining pesticides with other control methods to improve the effective rate of controlling plant diseases and insect pests. We should use the pesticides of high quality with low toxicity or non-toxic to human body and livestock and secure for nursery stock.

The main measures of improving the pesticides' prevention and control effect include: prohibit the use of pesticides which are highly toxic and highly residual; use different pesticides for different pests, and prohibit the use of broad spectrum pesticides; according to the occurrence regularity of pests, the spraying frequency of pesticides should be

appropriate; spray a moderate amount of pesticides; Mix pesticides properly or use pesticides interactively; strictly implement the interval for safe harvest (GB4285-89).

For the chemical control method, the following principles are adopted:

(1) Adopt chemicals of non-pesticides with high cost-effectiveness.

(2) Use pesticides of high efficiency which are low toxic and low residual (WHO III Type).

(3) Promote the use of the control technology which produce low toxicity to human body, livestock and plants and produce less pollution to the environment, this includes the following contents:

① Use pesticides which are low toxic and low residual;

② Limit to the source region and central area with large density of pests as well as the stage for larva, timely use the pesticides with high efficiency and low concentration to control different pests, and make sure that the application of pesticides for each time can achieve the best effect, and at the same time, we should strictly prohibit the use of the pesticides which have lethal effect on natural enemies in the later period when the pests are rampant and the natural enemies increase;

③ Ensure the interval of safe application of pesticides;

④ Do not continuously use a single pesticide to prevent and control pests for a long time, and often transform the types of pesticides and use them alternatively.

(4) Use the safety spraying devices (such as the knapsack sprayer, the best nozzle size) and methods to increase the effect of using pesticides and controlling diseases and pests.

(5) Enhance the propaganda and education of safe and rational use of pesticides, promote the training of safe usage of pesticides, and strictly observe the regulations on pesticide use and pay attention to safety.

(6) The safe storage of chemicals (for example, far away from children and food, etc.)

(7) Waste chemicals as well as the chemical containers and drug delivery instruments which have been used should not be cleaned in the natural water domain; we should choose safe places to handle them properly (such as deep burial).

3.4 Pesticide Management of the Project

3.4.1 The pesticides that are recommended to use in the project

In order to further promote the nuisanceless control to the forestry pests, and protect the ecological environment and the biodiversity, the State Forestry Bureau recommends a batch of pesticide products that are of high efficiency, low toxicity and low residue according to the current pesticides development level of our nation.

Among them, the biologics and the natural enemy are: agritol (Bt), the pine moth virus, the gypsy moth virus, the spring inchworm virus, the fall webworm virus, the tea geometrid virus, sophocarpidine, azadirachtin, nicotine, rotenone, the celastus angulatus, avermectins, spinosad, beauveria bassiana, green muscardine fungus, micro sporozoan, pyrethrin and the scleroderma guani, the trichogramma, the chouioia cunea Yang, the coccobius azumai Tachikawa, ladybird and other parasitic and predatory natural enemies.

The attractant are: the monochamus alternatus hope attractant, the dendroctonus valens attractant, the parathrene tabaniformis rottenberg attractant, the sex pheromone of pine caterpillar, the fall webworm attractant, the holcocerus hippophaecolus attractant and so on.

The combination drugs (chemical pesticide) are: deltamethrin, cyfluthrin, cypermethrin, chlorpyrifos, chlorbenzuron, triflumuron, hexaflumuron, diflubenzuron, tebufenozide, imidacloprid, methylamine abamectin, acetamiprid, fipronil, chlorfenapyr, lime sulphur, mancozeb, carbendazim, chlorothalonil, triadimefon, myclobutanil, iprodione, flumorph and floccoumafen, bromadiolone, chemosterilant, repellent.

The equipments for plant protection are: the engine driven sprayer-duster (to give pesticide evenly, the electrostatic machine), the engine driven sprayer-duster, the vehicle-mounted high range sprayer, aerosol sprayer, the motor punch injection machine, the forest injection sampler and the insecticidal lamp.

(1) During the process of the construction of the project, the use of pesticide shall be combined with measures of forest culture and management, physics and biology. The use of pesticide shall follow the economic, safe and effective principles. The selection of pesticides shall be the biological agents, botanical pesticides, biomimetic agents and pollution-free chemical agents.

(2) The pest control methods of each variety of trees include the main factors of the integrated management approaches for plant diseases and insect pests, which have strong dependency on the prevention and cure of the drugs however.

(3) Non-chemical control measures are physical measure of forest culture and management and the biological control measure. In the integrated management technology of plant diseases and insect pests, the biological control measure has been tested and approved effectively; it has been promoted well continually in Zhongshan Quarantine Station of Prevention and Cure of Forest Diseases and Pests, which will be applied in the project. Measures are adjust to local conditions at the project area, such as forestry, physics, biology and chemistry and more control methods and other effective ecologic means, all kinds of advantages of control measures are exerted, which are complemented and coordinated mutually, which constitute an organic prevention and cure system, after carrying out the project, the comprehensive control technology of nursery stock diseases and insect pests is formed and integrated, guiding the pest control of nursery stock for the whole city.

The control measures of forest culture and management, physics (like insecticidal lamp, pheromone trap), and biology or synthetic pesticides that has equal cost-benefit, all of those methods are the preferences to the use of pesticides. Unregistered chemicals or chemicals carried with the Type I active ingredients of WHO are prohibited in the project area.

3.4.2 Pesticide instrument that used in the project

To guide the safe, scientific and reasonable use of prevention and cure of instruments in all places, further promote the pollution-free control on pests for the forestry, preserve the ecological environment and biological diversity, according to the development level of prevention and cure instruments in our country at present, the State Forestry Administration recommends a batch of prevention and cure instruments. The equipment for plant protection: engine driven sprayer-duster (drug supply in balance, electrostatic machine), sprayer-duster, vehicle-mounted long range sprayer, smoke sprayer, engine driven punching and injecting machine, forest injecting and sampling machine, insecticidal lamp.

3.4.3 Use management of pests control drugs in the project.

(1) In the project area, the management center of the plant diseases and insect pests is based upon the policy of plant protection of "prevention first, integrated control", offers technology trainings for enterprises in the forest regularly. The contents include: develop and organize and promote safe and efficient pesticides, improve pesticide application

technology, popularize the harms of plant diseases and insect pests of nursery stocks, and relevant emergency and common senses of precaution and other relevant laws and regulations.

(2) In the project area, the management center of the plant diseases and insect pests reinforces the guideline of safe and reasonable use of pesticides, strengthens the purchased and verified chemical drugs, and monitors the usage rate and usage condition of drugs. According to the occurrence status of plant diseases and insect pests, formulate the use regulations of use turns of drugs, make a good plan to change the drugs, relieve the drug resistance of diseases and pests and then enhance the effect of prevention and cure.

(3) The labels of pesticides that sold near the management center of the plant diseases and insect pests and the monitoring park are met the specifications, all of them are the drugs that audited (Type II or below), so as to make sure the enterprises and peasants nearby know about the comprehensive management methods for the plant diseases and insect pests, and correctively use the pesticide and abide by the rules of antitoxin of pesticides, rightly make up a prescription and delivery the drug, handle with the waste articles and safety protection well, and then prevent pesticide pollution and pesticide poisoning events.

(4) Huainan City Departments of Agriculture (Forestry) shall check regularly, ensure the pesticides users follow the relevant regulations of safe and reasonable use of pesticides in the areas of jurisdiction, arrange the drug delivery according the regulated dosage, drug delivery time, dosage methods and safety interval, then avoid polluting the agricultural and sideline products. Toxic and high-toxic pesticides cannot be used for preventing and curing of insect pests, and cannot be applied for vegetables, melons and fruits, teas and Chinese medicinal herbs. In the process of use of pesticides, please pay attention to protect the environment, beneficial organisms and rare species. It is prohibited to use the pesticides for the fish, shrimp, bird and beast and so on.

(5) The project area adopts the World Bank loan to build the coal mining collapse area administration project leader group, which may promote the sales and use of chemical products and formulate relevant environment friendly policies.

3.4.4 Users may dispose the chemical drugs in the acceptable risk range.

After the evaluation on the adopted measures, it indicates that the abilities of nursery stocks enterprises and pesticides retailers are different on the disposal of pesticide in acceptable risk range (such as safe storage, equipment of safety, protective clothing and safe disposal on waste pesticide and package). As for the peasants and pesticide retailers, the suggested training plans will effectively settle down these issues. Even so, the local monitoring and assessment plan will be used in monitoring the abilities of safe use and disposal of chemical products among the peasants and pesticide retailers. With regard to the unsafe means, we will provide further trainings.

3.4.5 Environment, career and health risk

3.4.5.1 Environment risk

(1) Main environment risk during the use of insecticide:

①The insecticide residual results in the deterioration of water quality, the potential risk will reduce the quantity of aquatic organism (such as fish and aquatic insects);

②The spraying of insecticide or chemical leakage near the source of drinking water will cause the pollution of water resource;

③The use of high-toxic insecticides may impact on the non-target species (especially

the bee, bird, livestock and natural enemy of pests);

④The long-term use will enhance the drug resistance on certain pesticides;

⑤The soil residual may result in pollution of soil quality;

(2) Measures to relieve the above risk:

As for the town leaders, peasants, dealers of nursery stock and pesticide retailers, conduct the training for specific chemical products in the field of influence on the environment, and recommend better spraying methods and instruments;

①Monitor the spraying of pesticides, make sure no poisonous pesticides near the water resources;

②The safe praying devices shall be purchased and audited;

③Select the pesticides of high efficiency and low toxicity;

④Adopts the insecticides of low residual and half-life period;

⑤Improve and promote the biological control measures, reduce the dosage of chemical drugs as less as possible;

⑥Use series of control measures for the pests (forest culture and management, physics, living beings and chemical means), so as to ensure the drug resistance may not be improved;

3.4.5.2 Career and health risk

(1) Main career and health risk of production and use of pesticides:

①When making the chemical products, if absorbing the smoke or without the mask, the spraying of pesticides may cause discomfort after absorbing the scattered gas;

②Without wearing of protective clothes, the spraying or leakage of pesticides may cause the burn of skin;

③If the pesticide spraying place closes to the source of drinking water, which will generate the pollution of drinking water, or leakage of chemical drugs will impact the water drinking resources;

(2) Measures to lower the above risks:

(i) Train and show the town leaders, nursery stock and fish turtle operators, peasants, and pesticide sellers the following items. They are: the harm on health from some specific pesticides, suggested operation and spraying methods; the approved instruments and equipment and methods of application (such as, sprayer, the nozzle size); wearing safety clothing (long-sleeved clothes, masks, hats, gloves, pants and shoes); spraying when no wind; storing the pesticide in a locked cupboard out of children's touch; safely disposing the pesticide waste and packaging by deep burying or burning.

(ii) Monitor these measures implementation, further training is required if the implementation does not reach the designated position.

3.4.6 Take management measures to lower the harm of pesticide concerned in the project

(1) A plant diseases and insect pests' management center will be set up in the project area. The center will regularly inspect the pesticide using in the project area and make sure that chemicals project beneficiary used are consistent with the following items:

(i) Production, packaging, labels, transportation, storage, use and handling all conform to the standards of the World Bank.

(ii) It should be avoided that the prepared pesticide belongs to the World Health

Organization (WHO) IA and IB class products; or the intensity degree of II class exceeds the WHO standards.

(2) Project beneficiaries to purchase any pesticide purchased by project beneficiaries should pass through the following inspections:

(i) Audit the types and degrees of the danger that may be caused by the using methods or by the users;

(ii) Audit the reliability of the using methods and the application of the users;

(iii) Audit the level and preparation of the pesticide based on According to the Classification of Pesticide Risk Recommendations and Classification Procedures (Geneva: WHO2004-05) and the latest information of classification.

(3) The choice of pesticide must meet the World Bank business policy (OP 4.09) standard. These pesticides:

(i) Their harm to human's body must be extremely insignificant

(ii) They must be testified to be effective to the prevention and cure of target objects

(iii) Their influence to the non-target objects and the natural environment must be the smallest. The choice of the pesticides' using methods, time and frequency must be the least harmful the natural enemies. Pesticides used for the public health must be testified to be safe to people in the sprayed region, the local species and the users.

3.5 The Main measures for Prevention and Control of Plant diseases and Pests

Table 1 Prevention and Control of Plant Diseases and Pests

Plant Species	Kinds of Plant Diseases and Pests	Control Measures	Recommended Pesticides	Pesticide Classification (WHO)
Bischofia polycarpa	Histia rhodope Slug moth	1. Afforestation measures: choose pest resistant tress species to improve their own resistance; 2. Physical and mechanical control: manual cutting net and egg mass and so on; use pheromone to trap and insecticidal lamp to trap and kill and so on; 3. Biological control: spray BT and beauveria bassiana and so on; 4. Chemical control: give priority to botanical insecticides, bionic preparations and pollution-free chemical pesticides.	Beauveria bassiana Bt Matrine Diflubenzuron	III III III III
Platanus orientalis	Mildew	1. Afforestation measures: alternate seeding and use the cutting seeding method and forbid continuous seeding. Collect and burn reserved bed seedling in Autumn to reduce bacterial sources in Winter. 2. Chemical control: from late May until July, spray 1: 2: 200 Bordeaux Mixture 2-3 times for seedlings in cultivation and the solution should be sprayed to the back of leaves.	Bordeaux mixture	III
	Powdery mildew	1. Afforestation measures: choose species of light disease or strong resistance, purchase healthy seedlings and use pesticide for control to prevent seedlings with disease passing bacteria to new areas. Plant with proper density, thin out branches, and increase organic fertilizer and phosphate-potassium fertilizer and prevent only applying nitrogenous fertilizer. 2. Physical control: clear and cut diseased branches and diseased bud during dormant period and disbud timely in spring; cut new diseased tip and diseased leaf cluster timely during the growth period. Diseased branch, leaf and diseased leaf cluster at diseased tips should be taken away from the plantation area for centralized processing. 3. Chemical control: give priority to spray control in spring	Lime sulphur Mancozeb Triadimefon Thiophanate methyl Polyoxins	III III III III III
	Corythucha ciliata	1. Afforestation measures: choose the proper land and trees, and	Beauveria bassiana	III

		<p>choose fertile land and moist forest stand for afforestation.</p> <p>2. Mechanical and physical method: use light trapping and killing and manual removal of cystid, scrap egg mass on trunk and branch and remove cocoon in winter;</p> <p>3. Biological control: protect natural enemy, spray BT, Eauveria Bassiana and insecticidal bacteria and other biological pesticides;</p> <p>4. Chemical control: carry out safe agent control.</p>	<p>Bt</p> <p>Matrine</p> <p>Diflubenzuron</p>	<p>III</p> <p>III</p> <p>III</p>
	Spider mite	<p>1. Biological control: its natural enemies include <i>Chrisopa sinica</i> Tjeder, <i>Stethorus</i> and Predatory Mite and so on, including <i>Chrisopa sinica</i> Tjeder with the largest population quantity to prey on a large quantity of spider mite, and protection and increase of natural enemies can enhance the control of the population of spider mite.</p> <p>2. Chemical control: apply Emamectin Benzoate and Avermectins and others spray to achieve good control.</p>	Abamectin	II
	<i>Cryptothelea variegata</i> snellen	<p>1. Afforestation measures: combine cultivation, remove unwanted sprouts and trim branch to remove harmful parts and clear kudzu vine in the forest;</p> <p>2. Mechanical and physical control: use trapping and killing of light, sugar-vinegar solution and poison bait, remove cystid manually, use iron wire to kill or degreasing cotton soaked in pesticide original fluid to seal the wormholes and control pest;</p> <p>3. Biological control: protect and use natural enemy and spray biological preparations such as BT;</p> <p>4. Chemical control: carry out safe agent control.</p>	<p>Dipterex</p> <p>Bt</p> <p>Beauveria bassiana</p> <p>Matrine</p> <p>Diflubenzuron</p>	<p>III</p> <p>III</p> <p>III</p> <p>III</p> <p>III</p>
	<i>Anoplophora glabripennis</i>	<p>1. Protect and use natural enemy.</p> <p>2. Plant mingled forest and plant a proper quantity of Locust, Paulownia and Ailanthus and others to mingle with poplar in strips or patches, in order to create the environment unfavorable for the breeding and spread of <i>Anoplophora Glabripennis</i>. Enhance cultivation management to grow trees rapidly and reduce pests.</p> <p>3. Use fumigation to control larva on treelet, insert a zinc</p>	<p>Beauveria bassiana</p> <p>Bt</p> <p>Matrine</p> <p>Diflubenzuron contacted breaking micro capsule</p>	<p>III</p> <p>III</p> <p>III</p> <p>III</p>

		phosphide prod in each dejection hole or 1/4 piece of aluminum phosphide below 2 meters on the trunk and use mud to seal it. 4. For tall poplar, in later September, use the vapor injection method to control young larvae damaging phloem, inject 40% omethoate missible oil into the trunk base and use 9-12 mL of original fluid into the base of trunk.		
Euonymus japonicus	Grey leaf	1. Afforestation measures: choose healthy seedlings for afforestation to prevent entering and reduce cause of disease. When unavoidable, use pesticide before planting and collect and burn fallen leaves in winter. 2. Chemical control: high-incidence season of disease from early June until July.	Carbendazim Chlorothalonil Tuzet	III III III
	Stem rot	1. Afforestation measures: enhance management, soil and fertilizer management, scarify the soil and remove grass regularly to keep air permeability of soil; 2. Mechanical and physical control: reduce wounds, disinfect natural wounds and wounds because of cutting in time and use solid grafting wax to seal the wound surface; and apply whitewash on trunk at the beginning and end of year; 3. Chemical control: spray on truck or apply pesticide and pay attention to alternate application of pesticides.	Lime sulphur Cuaminosulfate aqueous solution Carbendazim. Chlorothalonil Triadimefon Bordeaux mixture	III III III III III
	Sooty blotch	1. Afforestation measures: choose healthy seedlings for planting. Collect fallen leaves in winter for centralized burning. 2. Chemical control: spray chemical pesticide from early June until July.	Carbendazim Chlorothalonil Tuzet	III III III
	Abraxas miranda butler	1. Taking advantage of phototaxis of adult, carry out light trapping and killing during adulthood; 2. Spray pesticide for control during larval harm period; 3. Remove egg mass during spawning period. Turn the soil near the root to kill pupa in winter. 4. Under euonymus japonicas crown where the cultivated surface soil is 5 cm deep, dig pupa in winter and kill it.	Beauveria bassiana Bt Matrine Diflubenzuron Nicotine Rotenone	III III III III III
	Pryeria sinica moore	1. Because winter egg mostly attach to the top of fresh branch in that year, use cutting to prevent it for greenbelt each year, cutting branch with egg and kill egg;	Beauveria bassiana Bt Matrine	III III III

		2. Because the hosts of <i>Pryeria sinica</i> Moore are mostly green plants, high-toxic pesticides are forbidden.	Diflubenzuron Nicotine Rotenone	III III III
Sweet-scented osmanthus	Brown blotch	1. Afforestation measures: Clear diseased or damaged plant in time; enhance management of water and fertilizer, ensure well-ventilated and sun-exposed environment, try not to spray during diseased period and prevent rain; and control scale insect, aphid and other piercing-sucking pests in time. 2. Chemical prevention: spray twice before entering room at the end of autumn.	Mancozeb Chlorothalonil Carbendazim	III III III
	Dipsacus leaf spot	1. Afforestation measures: remove diseased leaves in time and collect and burn fallen leaves. 2. Chemical control: spray pesticide during the early stage of diseased period.	Bordeaux mixture Carbendazim	III III
Koelreuteria paniculata	Gummosis	1. Afforestation measures: pay attention to winter protection in winter by applying whitewash or applying carding agent. Pay attention to sunscald in summer and control diseases of branch and trunk in time, trying to prevent mechanical damages. 2. Physical control: Apply pesticide on scrapped scar, scrap away jelly on trees and use agent to apply on wound. Cut new branch with severe pests from trunk in time in incipient stage, in order to eradicate plant louse that are produced but have not dispersed yet. 3. Biological control: protect and use ladybug and <i>Chrysopa perla</i> and other natural enemies. 3. Chemical control: spray pesticide when budding in early spring, spray for prevention and spray in time to control disease if any.	Lime sulphur Chlorothalonil Carbendazim Imidacloprid Imidacloprid	III III III III II
	Plant louse	1. It should start from the wintering period to eradicate plant louse to achieve better results. The results of control will be remarkable in case of control during spring and autumn when the plant louse pest is the most severe. 2. With respect to newly-introduced flower species and plants, examine them carefully to prevent intrusion of new pests and disinfect soil and old flowerpots to kill remaining egg. 3. Eradicate withered flower and diseased branch and leaf where plant louse inhabits or egg incubates, and then burn it in a	Beauveria bassiana Bt Matrine Diflubenzuron Nicotine Rotenone	III III III III III III

		<p>centralized way.</p> <p>4. Different species of flower have different pest resistance, so people should choose pest resistant species that can reduce plant louse harm as well as save costs of pesticides.</p> <p>5. When a small amount of plant louse is found, use brush dipped in water to brush it clean or wash the pot flowers obliquely rotating under running water, which can eradicate plant louse as well as clean the leaf to increase its ornamental value and promote respiratory action of the leaf; when possible, use ladybug and Chrysopa perla to control plant louse.</p> <p>6. When finding lots of plant louse, isolate it in time and use pesticides or indigenous methods to eradicate pests.</p>		
Willow	Long-horned beetle	<p>1. Avoid the occurrence of forest pests by adjusting the structure of tree species; follow the principles of matching species with the site, adjusting measures to local conditions and fortification to harm; create a different form of mixed forests, such as mixing paulownia with poplar, etc; or choose some tree species with strong insect-resistant ability to renovate the existing woodlands and enhance self-control ability of trees, achieving the purpose of pest control.</p> <p>2. Protect and use natural enemies; hang bird boxes in the woods and attract beneficial insects such as woodpeckers to eliminate long-horned beetles; use biological means such as parasitic wasps and beauveria bassiana for prevention and control.</p> <p>3. Insert poisonous swab and cotton balls for prevention and control.</p> <p>4. Adopt artificial killing for the forests with low insect density and small spinney.</p> <p>5. As for the saplings with lighter harm, use chemicals for prevention and control.</p>	<p>BEAUVERIA BASSIANA, BT, MATRINE, DIFLUBENZURON CLASS, CONTACTED BREAKING MICRO CAPSULES</p>	<p>III III III III III</p>
Salix integra	Rhabdophaga salicis	<p>1. Pay special attention to the prevention and control of storage to adult eclosion period, which is the most convenient and effective method.</p> <p>2. Handle the left plant residue after peeling to reduce the overwintering insect source.</p> <p>3. In the initial period of galls, use strong systemic insecticide for</p>	<p>ACETAMIPRID IMIDACLOPRID PYMETROZINE</p>	<p>II II II</p>

		prevention and control.		
	Foot moth	<ol style="list-style-type: none"> 1. Use adult phototaxis for light trapping in the adult stage; 2. Use spraying control in larvae damage period. 3. Eradicate egg mass in the spawning period. Turn over the root soil to kill overwintering insect pupae in winter. 4. In the crown of Chinese littleleaf box, plough shallow 5cm deep topsoil, dig and kill the overwintering pupae. 	BEAUVERIA BASSIANA, BT Matrine, Diflubenzuron Nicotine Rotenone	III III III III III
	Ceroplastes japonicus	<ol style="list-style-type: none"> 1. Do the quarantine and disinfection work of nursery stock, scion and root stock. 2. Protect the natural enemies, such as ladybirds, lacewing flies and parasitic wasps, etc. 3. Cut off the insect branches or brush insect body. 4. When there are ice and rime on the branches, tap the branches with a stick and the insect body can fall with ice. 5. Spraying oil content is 10% of diesel oil emulsion after just falling leaves or before germination; if it is mixed with chemicals, the effect is better. 	BEAUVERIA BASSIANA, BT Matrine, Diflubenzuron Nicotine Rotenone	III III III III III
	Aromia bungii	<ol style="list-style-type: none"> 1. Protect and use natural enemies. 2. Build mixed forest. Popularize appropriately locust, paulownia and ailanthus and so on to mix with poplar in strips or in clumps to create unfavorable environment for the breeding and spreading of Anoplophora glabripennis. Strengthen the cultivation and management to enhance tree vigor and reduce the pests. 3. Use fumigation to control sapling larvae. Insert each defecation hole with 1 zinc phosphide poisoning sign or 1/4 slice of aluminium phosphide in the trunk under 2m and seal with mud. 4. For the tall poplars, use systemic injections to prevent and control the young larvae harmful for the phloem in the mid to late September. Inject 40% omethoate EC at base of trunk and each tree use 9-12ml liquid. 	BEAUVERIA BASSIANA, BT MATRINE, DIFLUBENZURON CLASS, CONTACTED BREAKING MICRO CAPSULES	III III III III III
	Zeuzera leuconotum	<ol style="list-style-type: none"> 1. Artificial control. Artificial capture adult is an effective method of prevention and control. Cut off the insect branches and twigs. 2. Eliminate insect source. Timely clip the seriously damaged insect branches and burn the insect source tree. 3. Biological control, such as attract woodpeckers and release natural enemies. 	BEAUVERIA BASSIANA, BT Matrine, Diflubenzuron Nicotine Rotenone	III III III III III

Southern Magnolia	Southern magnolia brown patch	1. Forest management measures: plant in the place where soil is fertile and sunshine is sufficient. Increase fertilizer properly if it is on the poor soil to enhance tree vigor and improve disease resistance. Clear away diseased fallen leaves in time and destroy them in a concentrated way. Remove diseased leaves of seedlings in the nursery as soon as possible to reduce the infection source. 2. Chemical prevention: it can spray medicament in the early stage of disease in summer.	Bordeaux Mixture Thiophanate-Methyl Chlorothalonil Carbendazim Polyoxins	III III III III III
	Southern magnolia anthracnose	1. Forest management measures: clear away diseased fallen leaves and destroy them in a concentrated way. Increase the organic fertilizer. 2. Chemical prevention: spray the medicament at the early stage of the disease.	Zineb Thiophanate-Methyl	III III
	Ntidulid	1. Manual prevention: it can catch the adult in the morning or cloudy days according to the feigndeath of this kind insect; remove and destroy in a concentrated way if the insect damage is serious. 2. Protect and utilize its natural enemies.	Matrine, Diflubenzuron Nicotine Rotenone	III III III III
	Pseudaulacaspis cockerelli	1. Intensify quarantine: due to its fixed parasitism, the scale insects are easy to spread to different places. So the quarantine must be strict, and prohibit to bring in or out the seedlings with the scale insects. 2. Intensify cultivation management. Increase organic fertilizer and compound fertilizer timely to strengthen the tree vigor. Increase the insect resistance. By combining clipping and thinning branches in time, cut branches and leaves of serious insect damage to decrease the insect source, and improve the ventilation and light of plants to reduce the damage of this scale insects. 3. Protect and utilize the natural enemies. The scale insect has natural enemies such as multiple kinds of little bees that are inside parasitism and rapacious chrysopids, ladybugs and amblyseius andersoni and so on. Therefore, the category and measure of drug delivery shall be rational to avoid killing and hurting natural enemies.	Matrine, Diflubenzuron Nicotine Rotenone	III III III III
Albizzia	Albizzia blight	1 Forest culture and management measures: choose Chiwen,	carbendazim	III

		<p>Charlotte or other varieties of strong disease resistance, adopt ornament plantation of single plant or multiple plants to loosen the soil. Plant at the locations with good drainage conditions, avoid low-lying and ponding areas by all means. It is not suitable to be planted with large area or as the border tree; try not to pruning as far as possible, so as to reduce the wound, and the pruning wound shall be properly painted with protective agent. Big tree transplantation shall receive sterilization and disinfection first. Water when dry and drain water after raining; apply fertilizer at fixed period to enhance the frowth condition and improve the disease resistance of the plants.</p> <p>2. Physical control: grass binding protection, prevent the invasion of germs.</p> <p>3. Chemical control: when there are 2~3 true leaves, spray pesticide to prevent ant or other injurious insects causing wound. Afterwards, spray leaf fertilizer on the leaf surface at fixed time and amount.</p>	<p>Zineb Copper sulfate</p>	<p>III III</p>
	cottony-cushion scale phylloxera	<p>1. Forest culture and management measures: scientific and balanced fertilization, timely clipping and clearing, intertillage and ridging.</p> <p>2. Mechanical and physical control: trap and kill with insecticidal lamp, pheromone, poison bait, color plate.</p> <p>3. Biological control: Spray BT, Beauveria bassiana, or other biologicals; strengthen the protection to parasitic and insect predators.</p> <p>4. Chemical control: timely agentia control, alternate pesticide application.</p>	<p>BT Beauveria bassiana, Matrine, Diflubenzuron class,</p>	<p>III III III III</p>
Platyclusus orientalis	Platyclusus orientalis leaf blight	<p>1. Managing methods:Base on the technical measures of forestry, moderately prune and thin, increasing fertilizer application.</p> <p>2. Chemical prevention: In the middle of June, spray the sterilization of smoke agent or other pesticide around the dusk</p>	<p>POLYOXINS DESTROY DISEASE POWER CARBENDAZIM CHLOROTHALONIL</p>	<p>III III III III</p>
	Platyclusus aphid orientalis	<p>Protect and make use of the nature enemies such as, coccinella septempunctata, harmonia axyridis, aphelinid, aphelinidae, metasyrphus corolla, chrysopa perla and hoverfly, etc. In spring, if the situation is not serious, clean water scouring the pests is</p>	<p>BEAUVERIA BASSIANA, BT Matrine, Chlorbenzuron</p>	<p>III III III III</p>

		preferred over spraying pesticide to protect the nature enemies' reproduction and development.	Nicotinamide rotenone	III III
Chinese ash	Powdery mildew of Chinese ash	1.Forest management measures: timely pull the disease stem and leaves and burn them after flowing; should not plant too close; add phosphorus potassium fertilizer. 2Chemical prevention and control: use chemical control in early spring before germination or winter hibernation; avoid the plants flowering period and high temperature(32°C) when using chemicals.Spraying time depends on the disease development.	LIME SULPHUR TRIADIMEFON Thiophanate-Methyl	III III III
	Clania variegata Snellen	1.During flowers-picking and tea garden management, find cysts and remove them in time, centralized burning. 2. Pay attention to protect natural enemy insects, such as parasitic wasps, etc. 3. Advocate spraying live insecticidal bacterium or nutritional bacteria (every 8 containing 100 million live spores) for biological control.	Matrine, Diflubenzuron Nicotine Rotenone	III III III III
Moor besom	Heather Leaf Spot	1. Forest management methods: in winter and spring , concentrate to clean the fallen leaves, eliminate the wintering pathogens 2. Chemical control: spray chemicals in march and early June.	BORDEAUX MIXTURE CARBENDAZIM THIOPHANATE METHYL	III III III
	Scarab LimacodidaeOystershell scale trialeurodes vaporariorum;	1. Strengthen the quarantine of the seedling; prohibit transporting seedling from or to the infected area; strengthen the patrolling and management; do a good job of monitoring forest diseases and insect pests 2. Mechanical physical control: color trap, pheromone traps 3. Biological control: protect, attract, and breed beneficial birds; protect the nature enemies of the pests. 4. Chemical prevention: spray pesticides when necessary	BT MATRINE, DIFLUBENZURON CLASS,	III III III
Three-leaf maple	Slug moth	1. Forest culture and management measures: choose insect resistant seeds of trees, and improve their own resistance; 2. Physical mechanical control: manually shear the net curtain and egg mass; induce and collect the insects with pheromone; induce and kill the insects with insecticidal lamp, etc.; 3. Biological control: spray BT. Beauveria bassiana, etc.;	Beauveria bassiana, BT Matrine, Diflubenzuron	III III III III

		4. Chemical control: preferentially select the botanical insecticide, bionic preparations and nuisanceless chemical agents.		
Yellow side poplar	Chinese Littleleaf Box silk leaf snout moth Japanese ceroplastes japonicus Peach mealy aphid	1. Forest culture and management measures: choose insect resistant seeds of trees, and improve their own resistance; 2. Physical mechanical control: clear away intermediate host plants; induce and collect the insects with pheromone or according to the insects' life habits; induce and kill the insects with insecticidal lamp, etc.; 3. Biological control: attract woodpecker, release Scleroderma guani and Chouioia cunea, etc.; spray BT, Beauveria bassiana, and virus, etc.; 4. Chemical control: preferentially select the botanical insecticide, bionic preparations and nuisanceless chemical agents; choose safe pesticide application technology to the greatest extent, such as root application, poison ring and poison stick.	Beauveria bassiana, BT Matrine, Diflubenzuron class, Nicotine Rotenone	III III III III III
Hibiscus	Red spider Psychid Noctuid	1. For manual garden management and control, timely remove the inset bladder once finding, and burn up concentratedly. 2. Pay attention to protect and use the natural enemy insects. The natural enemies of psychid include psychid wart ichneumon, pine moth menciana wart ichneumon, mulberry caterpillar wart ichneumon, brachymeria, and chalcidoid, etc. 3. Biological control: it is suggested to spray snout moth killing bacillus or insecticidal bacteria wichi contains 100 million active spores every 8 for controlling.	Beauveria bassiana, BT Matrine, Diflubenzuron class, Nicotine Rotenone	III III III III III
crape myrtle	powdery mildew	1. Forest culture and management measures: in winter, shear off all the branches of the seriously illd plants and concentratedly burn up, so as to completely eliminate the source of the disease. Control the cultivation density, add phosphorus and potash fertilizers, control the application amount of nitrogen fertilizer, and improve the disease resistance of the plants. 2. Chemical control: in the region of serious morbidity, spray agentia on the branches before the plant sprouts in spring.	sulphur mixture Zineb thiophanate methyl carbendazim	III III III III
	tan disease	1. Forest culture and management measures: clear away the illd branches and leaves as soon as possible, and concentratedly burn up or bury them. Shape and clip the plants to make them ventilated and transmitting.	carbendazim Zineb chlorothalonil	III III III

		2. Chemical control: at the early stage of illness, spray 50% wettable powder 500 times fluid, or 65% wettable powder 1000 times fluid, or 75% wettable powder 800 times fluid.		
	sooty mould	1. Forest culture and management measures: Find and clear away the illed branches and leaves as soon as possible, and concentratedly burn up or bury them. Strengthen cultivation and management. Shape and clip the plants to make them ventilated and transmitting. 2. Chemical control: spray agentia at the early stage of illness.	carbendazim Zineb chlorothalonil	III III III
	Yellow slug moth Actias selene Crape myrtle long spot aphid	1. Forest culture and management measures: choose insect resistant seeds of trees, and improve their own resistance; 2. Physical mechanical control: manually shear the net curtain and egg mass; induce and collect the insects with pheromone; induce and kill the insects with insecticidal lamp, etc.; 3. Biological control: Spray BT, Beauveria bassiana, etc.; 4. Chemical control: preferentially select the botanical insecticide, bionic preparations and nuisanceless chemical agents.	Beauveria bassiana, BT Matrine, Diflubenzuron	III III III III
Camphor	anthracnose	1. Managing methods: the nursery garden must be disinfected; make sure the soil suits the trees; use fertile foil and humid forest for forestation; enhance management and operation; increase organic fertilizer application; strengthen row weeding; improve the resistance against the disease 2. Mechanical physical control: the minor infected plants must be timely wiped out and burned when found infected. 5. Chemical prevention: Paint lime sulfur, bordeaux; spray disinfectant timely	Carbendazim lime sulphur	III III
	Sawfly Tea bagworm Limacodidae The silkworm moths Tea brown camphor Butterfly Orthaga Achatina ButlerTaiwan milk termites Aphid(control methods	1. Managing methods: make sure the soil suits the trees; use fertile foil and humid forest for forestation; 2. Mechanical physical control: 7. Light trap; remove the insect bract artificially; shave the egg mass on the branches and trunks; remove the overwintering pupa cocoon 3. Biological control: protect the nature enemies; spray BT, Beauveria bassiana, budworm bacteria 4. Chemical prevention: develop pollution-free control	BT budworm bacteria Beauveria bassiana, Matrine, Diflubenzuron class,	III III III III III

	are the same as the below)			
aspen	rust disease	1 the forest culture and management measures: when the ill bud occurd in the early spring, it shall be removed in time. The nursery garden shall be away from the ill large seedlings area. 2 the chemical control: to spray the drug in the seedling stage to eliminate the ill duds and to spray drug to protect in the morbidity period.	CARBENDAZIM AMOBAM	III III
	black spot	1 the forest culture and management measures: to apply the organic fertilizer and the logged compost, to improve the ventilate and translucidus condition, to strengthen the tree vigor and increase the disease resistance of the trees; the ponding in the forest land shall be excluded in time after the rain; the ill leaves and fallen leaves shall be swept at any time to kill the pathogenic bacteria. 2 the chemical control: in the primary infection of the disease, using the aerosol sprayer to protect the huge adult plants at the 5-7 am or at dusk. The crown shall be protected by mist spray. At least before the coming of the rainy season the nursery stocks and the low saplings shall be sprayed the 700 times liquid. There shall be the 0.3% agglutinant in the spray of rainy season to prevent being washed down by the rain.	BORDEAUX MIXTURE CHLOROTHALONIL FLUSILAZOLE MANCOZEB	III III III III
	ROT	1 the forest culture and management measures: matching species with the site. To cultivate the strong seedlings and to prevent high strength pruning. The saw bites shall be painted drug to disinfect. 2 the chemical control: to clear away and burn the aspen that has been infected seriously. To spray and brush the bactericide on the trunk before the winter or in the early spring. The ill trees shall be stricken off the scabs and then to brush the drug. The lightly infected plants shall be stricken off the scabs by knife and then to spray to dry or to brush to dry.	EDIBLE WATER CONTAINING SODA, LIME SULPHUR, BORDEAUX MIXTURE, TETRAMYCIN, AGRICULTURAL ANTIBIOTIC 12 ASOMATE TUZET TOPSIN CARBENDAZIM	III III III III III III III III III
	leaf blight	1 the forest culture and management measures: to breed the disease-resistant variety. To sweep the dry branches and fallen leaves in the autumn and then to concentrate them to burn so as	CARBENDAZIM ZINEB ALIETTE	III III II

		to reduce the infection chance. 2 the chemical control: in the initial stage of the morbidity to spray drugs.		
	Aspen, long-horned beetle Red spider	1、 the forest culture and management measures: to select the insect resistant varieties of trees so as to increase the self resistance. 2、 the physical mechanical control: to seize the adult long-horned beetles manually, to cut the net curtain, to cut the insect gall, to dig pupa, to eliminate the intermediate host plant and so on; to use the attractant of the pheromone, to use the pest life inhabit to induce and to use the insecticidal lamp to trap and kill and so on; 3、 biological control: to attract the woodpecker, to place the scleroderma guani and the Chouioia cunea Yang and others, to spray BT、 Beauveria bassiana and virus and so on; 4、 chemical control: to give preference to the botanical insecticide, the bionic preparations and the pollution-free chemical agent; to try to select the safe pesticide application technology, such as root application, poison loop and poison tag.	BEAVERIA BASSIANA, BT MATRINE, DIFLUBENZURON CLASS, CONTACTED BREAKING MICRO CAPSULES	III III III III
firethorn	powdery mildew	1 the forest culture and management measures: to eliminate the fallen leaves and to burn them to reduce the source of the disease. 2 the chemical control: to spray drugs in the morbidity period and the influential season.	LIME SULPHUR, BORDEAUX MIXTURE, TUZET, CARBENDAZIM THIOPHANATE METHYL POLYOXINS	III III III III III
	aphid	It is needed to protect and utilize the natural enemies, such as the coccinella septempunctata, harmonia axyridis, aphelinid, aphelinidae, metasyrphus corolla, lacewing and hoverfly and so on. To try not to spray drugs if the disease is not serious in spring and the rinsing can be used to wash the polypide so as to protect the breed and development of the future natural enemies.	BEAVERIA BASSIANA, BT MATRINE, CHLORBENZURON, NICOTINE, ROTENONE	III III III III III
elm	white asnt	1 to eliminate the breeding place of the white ant, especially the wasteland and the graveyard; the places where there are many stumps and rotten woods, shall be plough under to great depth to destroy the ant nest and then to handle with drugs before the forestation.	ASPERGILLUS FLAVUS, BEAVERIA, BASSIANA, GREEN MUSCARDINE FUNGUS, CHLORBENZURON,	III III III III III

		<p>2 it is needed to cultivate the mingled forest to appropriately keep the multiple vegetations in part of the forestland so as to reduce the harm of the white ants to live trees.</p> <p>3 it is needed to build the forest in the rainy season.</p> <p>4 the management in the fore-and-aft period of the nursery stocks transplant: to pay attention to avoid the damage of the trunk and the root, in addition, to use the toxic mud to dip the root and use the liquid medicine to brush the trunk rind, etc.</p> <p>5 it is necessary to strengthen the quarantine.</p> <p>6 the light trap and the bait killing.</p> <p>7 the killing method of killing the white ant ethnic group in the ant nest.</p>	<p>ROTENONE, HEXAFLUMURON</p>	<p>III</p>
<p>Pinus Thunbergii</p>	<p>Bursaphlenchus Xylophilus</p>	<p>According to <i>The State Forestry Administration Issues Notice of 2014 Domestic Bursaphlenchus Xylophilus Affected Area</i>, Huainan City of Anhui province is not in the affected area. Quarantine is the main measure.</p> <p>1. Quarantine measures: strict quarantine, forbid dispatching pine seedlings, disease wood and its product from the epidemic area. Request quarantine rate 100%, re-examination rate 100%</p> <p>2. Forest management methods: as far as possible use resistant varieties, such as cedar, loblolly pine, etc. and carefully use cultivars, such as the Japanese black pine.</p> <p>3. Chemical control: control the population quantity of vector insect <i>monochamus alternatus</i> hope</p> <p>4. Biological control: control the population of vector insect <i>monochamus alternatus</i> hope</p> <p>5. Monitoring measures: set up monitoring team; make survey system and reporting system. Census twice in spring (April to May) and autumn (September to October), and ensure monitoring coverage rate 100%.</p> <p>6. Disease eradication and blockade measures: discover epidemic situation, and in the shortest possible time take decisive measures to wipe out it.</p> <p>7. Disease wood processing method: intensive fumigation processing, or charcoal burning processing</p>	<p>THIACLOPRID</p> <p>CARBOSULFAN</p> <p>SCLERODERMA GUANI XIAO ET WU</p> <p>SCLERODERMA SICHUANENSIS XIAO</p> <p>PIEBALD DASTARCUS HELOPHOROIDES EGGS</p>	<p>II II NON-POISONOUS NON-POISONOUS NON-POISONOUS</p>
<p>Cedar</p>	<p>Termite</p>	<p>1. Remove termite breeding grounds, especially in the graveyards,</p>	<p>ASPERGILLUS FLAVUS</p>	<p>III</p>

		<p>waste hills, stumps, and deadwood plots. Deeply plough soil before afforestation, destroy the nest, and then use drug treatment.</p> <p>2. Build mixed forest, and appropriately maintain a variety of vegetation in part forest, in order to reduce termite harm to live standing trees.</p> <p>3. Afforest in the rainy season.</p> <p>4. Management before and after the seedling transplantation: avoid the trunk and shoot root damage as much as possible; at the same time, roots dip the toxic mud, and use liquid medicine to smear and brush the trunk skin, etc.</p> <p>5. Strengthen the quarantine.</p> <p>6. Light traps and traps in predator-prey system</p> <p>7. Destroy termites in the mound.</p>	<p>BEAVERIA BASSIANA</p> <p>METARHIZIUM ANISOPLIAE</p> <p>DIFLUBENZURON ROTENONE</p> <p>HEXAFLUMURON</p>	<p>III</p> <p>III</p> <p>III</p> <p>III</p> <p>III</p>
--	--	--	--	--

4. Pests and Diseases Management Ability of the Project

4.1 Related policies

4.1.1 Policy measures to be implemented by the project office to manage pests and diseases

- (1) Decrease the current ratio of using chemical insecticides;
- (2) It is suggested that the government should strengthen the pesticide regulation through legislation and law enforcement;
- (3) Enforce the administrative provisions about pesticide application;
- (4) Prohibit the use of high-toxic, high-persistent and unlicensed pesticides during project implementation.
- (5) Prohibit replacing the low-toxic pesticides with pesticides categorized as Class I by the WHO during project implementation.

4.1.2 Obey the regulations below strictly

- (1) Guideline for regulation, allocation and application of pesticides formulated by FAO (or the corresponding guidelines in China);
- (2) Guideline for packaging and storage of pesticides formulated by FAO (or the corresponding guidelines in China);
- (3) Guideline for labels of external packaging of pesticides formulated by FAO (or the corresponding guidelines in China);
- (4) Guideline for the disposal of residual pesticide and its packaging container formulated by FAO (or the corresponding guidelines in China);
- (5) Observe the emission standards for pesticide pollutants formulated by State Environmental Protection Administration (SEPA);
- (6) Strive for the funds provided to pests and diseases control and supports for the project from government of Huainan City in Anhui Province.

4.2 Management Goals

4.2.1 Strengthen the awareness of policy implementation

The awareness to implement policies of integrated pests and diseases management has been enhanced during the project implementation. The performance is as follows:

- (1) Decrease the daily usage amount and frequency of chemical pesticides within the scope of project;
- (2) Prohibit using unregistered pesticides within the scope of project;
- (3) Prohibit using high-toxic pesticides (WTOI type), and replace them with low-toxic ones.
- (4) Implement the regulations on restrictions, allocation and application of pesticides formulated by FAO (or the corresponding guidelines in China);
- (5) Implement the guidelines for packaging and storage of pesticides formulated by FAO (or the corresponding guidelines in China);
- (6) Implement the guidelines for labels and application of pesticides formulated by FAO (or the corresponding guidelines in China);
- (7) If there are no corresponding guidelines in China, the project should prepare to formulate such guidelines;

(8) The government is encouraged to impel and support IPM methods through discussion and project implementation (especially for long-term benefits) except for the Pest Management Plan under Sustainable Development Project of Resource-Based City (Huainan City) World Bank Loan Project of Coal Mining Collapse Area Comprehensive Treatment and Utilization.

4.2.2 Enhancement of Forest Protection Capability at Basic Level

The plant protection capability has been enhanced through project implementation. The performance is as follows:

(1) Technicians, extension workers and grass-roots farmers were trained in the plants nursery enterprises of Datong district and the nearby township.

(2) Technicians in the plants nursery enterprises have got familiar with and grasped the IPM method and farmers have had certain knowledge to it during project implementation.

(3) The connection of pest control between cities, districts, towns and villages has been strengthened during project implementation, which has promoted the implementation of integrated pest management plan.

4.3 Infrastructure, Management Ability, Institutional Arrangement and Mutual Cooperation

The project shall control the sale and usage of pesticides through strengthening the infrastructure construction of basic forest pests and diseases control and the monitoring of pesticide allocation and application system. The project shall be conducted through the following methods:

(1) Experts from Municipal Agricultural Bureau and Forestry Bureau shall strengthen the training of agricultural technology-extension workers and forest workers in the project area.

(2) Develop a monitoring plan to evaluate the management of disease and insect pest and adopt an integrated pest management technology during project implementation;

(3) The project office shall appoint a full-time staff to supervise the implementation process of pest and disease management measures.

(4) The project office shall establish cooperative relationship with Collage of Plant Protection under Anhui Agricultural University, Anhui Forest Pest Control and Quarantine Station, Plant Protection Station under Anhui Agriculture Committee and Plant Protection Institute under Anhui academy of Agricultural Sciences, etc.

(5) Enhance the techniques and experiences communication of pest control between peasant households in project area to share the results.

(6) Encourage and support leaders from districts and towns to promote the use of security control measures and integrated management techniques of pests and diseases.

4.4 Summary of Training and Human Resource Development

Here are some suggestions on strengthening the construction of pest and disease management ability and human resource development:

(1) The control measures to newly-occurred and new types of insect pests can be acquired by visiting the plant protection experts and technicians;

(2) Train the agricultural technology-extension workers regularly to ensure the effective implementation of pesticide regulations;

(3) The agricultural technicians shall pass on the control measures of new pests and

diseases timely to farmers by applying the method of farmer field school, and pest control experts can be invited to participate the training if necessary;

- (4) Compile practical training materials supported by audio-visual equipment.

4.5 Training of the Forest Workers

The purpose of training workers and other staffs in project area is to strengthen their ability to control pests safely and effectively, including how to identify the pests, making appropriate management decisions and taking control measures (as described in the project implementation plan).

Use related materials to conduct 4 days of training courses for every plant nursery enterprise in each quarter.

4.5.1 Training Content

- (1) Features of pests and diseases;
- (2) Different damage caused by various pests and diseases;
- (3) Natural enemies of main pests;
- (4) Sampling method of field survey of pests and diseases;
- (5) Control scope and intensity (threshold value of controlling, pests and diseases)
- (6) Controlling measures, including integrated pest management technology concerning silvicultural, physical, biological and chemical control measures;
- (7) Store the pesticide and dispose its package safely;
- (8) Application methods of chemical pesticides and standard use of protection suits;

The training objects include:

- (1) Forestry enterprises which can take a lead;
- (2) Training the forestry technology-extension workers in towns and villages;
- (3) Pesticide dealers.

4.5.2 Units that can Provide Training Services

- (1) Forest pest control and quarantine agencies at the provincial or municipal level;
- (2) Other national and provincial agencies that can provide training services, including universities and research institutes at provincial level or above.

5. Project Monitoring and Assessment

5.1 Project Monitoring Work Content

During implementation of this project, conduct site monitoring of the implementation of plant diseases and insect pests integrated management plan, use mode of pesticide, product quality (the nursery-grown plant growing condition compared with the controlled items), the dynamic condition of main plant diseases and insect pests and natural enemy species, and the environmental influence of the project on the environment.

5.2 Project monitoring management content

When the World Bank Monitoring Team monitors and inspects the project, site monitoring shall be implemented for conduct the following work:

- (1) Registration condition of the pesticide (documentary evidence);
- (2) Ever used Type I pesticide or not;

(3) Implementation of relevant policies;

(4) Execution of site monitoring plan and subsidy measures of analysis result.

World Bank Monitoring Team monitors and inspects the project two times per year usually in the occurrence period of plant diseases and insect pests, so as to observe the implementation of plant diseases and insect pest prevention and treatment at site.

World Bank Monitoring Team shall consist of experienced plant diseases and insect pest prevention and treatment experts, and the monitoring and inspection cost shall be provided by the World Bank fund.

The municipal forest fire prevention department, aquaculture technicians shall coordinate with the agricultural technology popularizing personnel to conduct monitoring in the project zone.

The dispatched personnel of the World Bank shall help establish an appropriate monitoring system as early as possible and sampling procedure, and provide training in the implementation and analysis of monitoring system.

5.3 Monitoring and supervision plan

5.3.1 Plant diseases and insect pest management and supervision plan

5.3.1.1 Implementation of the monitoring plan

The monitoring work shall be conducted by agricultural (forest) industry office, project office and owners (nursery-grown plant enterprises) participating in the project together, and in case of any plant diseases and insect pest, report and disposal must be done timely. The dispatched personnel of the World Bank shall help establish an appropriate monitoring system as early as possible and sampling procedure, and provide training in the implementation and analysis of monitoring system.

5.3.1.2 Monitoring point setting up, varieties and monitoring content

Set up monitoring point according to the conditions of project area.

5.3.1.3 Data collection and sampling method

According to the monitoring content, the data collection and sampling method of key monitoring are shown in Table 3.

Table 2 Data Collection and Sampling Method

Index	Data Collection and Sampling Method	Times
1. Product quality	Collect data at each monitoring site of the project area; the data include the growth condition of each main product, compared with the controlled item	1 time/year
2. Pesticide use condition	Collect data at each monitoring site; the data include pesticide type, use frequency, and the disposal of waste pesticide and packages	2 times/year
3. Dynamic condition of plant diseases and insect pests and natural enemy	Collect data at each monitoring site; data collection include the key monitoring types of plant diseases and insect pests, occurrence area, extent of injury, occurrence time, and conditions of natural enemies	12 times/year, with 1 time/month
4. Determination of	Collect data at each monitoring site of the project area data collection include the residual	1 time/year

pesticide residues	condition in the soil	
5. Pesticide poisoning	Collect data at each monitoring site each year	1 time/year

5.3.1.4 Monitoring assessment system

(1) The degree of adopting plant diseases and insect pests comprehensive management and control measures

- The number of farmers participating in adopting comprehensive management and control measures for plant diseases and insect pests;
- The variety area adopting comprehensive management and control measures for plant diseases and insect pests;
- The number of farmers who can identify main plant diseases and insect pests /natural enemy;
- The number of farmers who participate in plant diseases and insect pests comprehensive management plan training;
- The effect on controlling main plant diseases and insect pests after adopting plant diseases and insect pests comprehensive management and control measures.

(2) Safe handling of pesticide

- The times of main nursery-grown plant to use pesticide each year;
- The pesticide type and quantity used by main nursery-grown plant in each acre each year;
- The pesticide cost used by main nursery-grown plants in each acre to prevent plant diseases and insect pests;
- The number of farmers implementing safe handling and disposal of pesticide (safe storage and sue labor protection articles);
- People and livestock poisoning caused by pesticide use.

(3) Product growth

- The growth condition of main nursery-grown plants after the project implements plant diseases and insect pests comprehensive management plan (compared with the controlled);
- The profit condition of main nursery-grown plants after plant diseases and insect pests comprehensive management plan.

(4) Economic system impact degree

- Plant diseases and insect pest occurrence area and impact degree of main varieties in different demonstration areas;
- In terms of implementation varieties of plant diseases and insect pests comprehensive management plan, the varieties and quantity change of beneficial organisms in each unit sample plot (including predatory insects and parasitic insect, etc.) in each;
- The degree of influence on wild animal, bees, water, soil, etc. after plant diseases and insect pests comprehensive management and control measures are adopted.

(5) Other indexes

- The times of agrochemical product sales person visiting the project areal;
- The advertising times of agrochemical products on media (television, radio and papers);

- The present times of pesticide products in project area through retail channels;
- The acceptable pesticide product exhibition times;

5.3.2 Supervision plan

5.3.2.1 Supervision plan implementation

Project offices at all levels shall be responsible for the normal operation of regular supervision activities. Project offices at all levels and agricultural technology popularization center shall supervise and inspect the plant diseases and insect pests management plan during the peak time of plant diseases and insect pests, and coordinate World Bank Monitoring Team's project supervision and inspection work of the project. World Bank Monitoring Team shall consist of experienced plant diseases and insect pest prevention and treatment experts, and carry out supervision and monitoring work 1-2 times a year, particularly at the peak period of plant diseases and insect pests each year.

5.3.2.2 Specific content of supervision and inspection

(1) Use conditions of pesticide

- Check whether the pesticides sold by the dealers and used by the farmers in the project area have been registered and recommended by plant diseases and insect pests management plan;
- Check whether Type I pesticides are sold/used in the project area;
- Check the pesticide register to check and verify the registration condition of new pesticides;
- Check whether farmers have taken protective measures during using pesticide;
- Check the disposal of waste pesticide and packages by the farmers.

(2) Policies

- Government subsidies for pesticide use condition (if any);
- The local government implementation of policies and regulations on pesticide use and plant diseases and insect pest comprehensive management technology popularization;
- Unified and joint law enforcement of municipal agricultural and forest departments.

(3) Execution of site monitoring plan

- Assess the site monitoring plans at all counties inspected by World Bank Monitoring Team;
- Help relevant personnel solve any problems arising from the implementation of site monitoring plan;
- Provide training on site monitoring process, data process and result interpretation for relevant personnel of the project area timely, and adjust those plant diseases and insect pest treatment needing improvement.

5.3.3 Responsibilities

Municipal agricultural and forest bureaus shall be responsible for providing guidance, supervision, monitoring and training on comprehensive prevention and treatment plan of plant diseases and insect pests. The project area plant diseases and insect pest management center shall be responsible for discovering and reporting the insect pest situation timely, and implement the comprehensive prevention and treatment plan of plant diseases and insect pests as required.

5.3.4 Professional technical support

Agricultural technology popularization centers at all levels, forest and aquaculture departments provide the technologies and method on plant diseases and insect pests.

Attachment 4 Associated Facilities and Potential New Activities

1. Introduction

There are some facilities and activities that are closely associated with the facilities to be built under this Project. In accordance with the World Bank financing requirements, these associated facilities and activities shall be in compliance with both PRC laws and regulations and WB safeguard policies.

Due diligence of existing facilities and facilities under construction has been done and conclusions have been included in EIA report. Environmental management plan (this attachment) will focus on the facilities planned as well as possible activities to identify environmental management requirements to be met.

2. Associated Facilities and Activities

Associated facilities and activities planned are listed in **Table 1**.

Table 1 Associated Planned Facilities and Activities

Sector	Facility/Activity	Description	Responsible Party
Water Supply	South Zhongxing Road Water Supply Pump Station	Included in 2020 urban planning, with capacity 27,800 m ³ /day and land area 2 ha.	Huainan Beijing Capital Water Company Ltd.
Drainage	Longwang Drainage Channel	12,650 meters in total length, and 8,022 meters is new construction. Included in ADB funded project, designed by applying 1-in-30 years drainage standard.	ADB Financed Huainan Urban Water System Rehabilitation Project PMO
Road	Section Linking Yanshan Road and Zhongxing Road	Road length 100 meters, right-of-way 10 meters.	Huainan Urban-Rural Construction Committee
Industry Demolition	Demolition of Closed Industries	Closed industries possibly to be demolished in addition to the five industries included in the Resettlement Plan.	Huainan City Datong District Government
	Potential new activities	TBD	PMO

3. Environmental Management Measures

Adverse impact concerned associated with these activities, and potential new activities, and environmental management measures required are summarized in **Table 2**.

Associated Facility/Activity	Potential Environmental Impact	Management Measures Required	Responsible Party
South Zhongxing Road Water Supply Pump	Adverse impact associated with construction and	Collect progress information periodically. The EIA report/EMP to be prepared	Huainan Beijing Capital Water Company Ltd.

Station	operation period	<p>should include the following:</p> <ul style="list-style-type: none"> • Particular mitigation measures to be taken during construction and operation, especially sound insulation and vibration reduction measures; • Environmental protection practice for construction activities; • Monitoring plan; • Cost; and • Public consultation and information disclosure. 	
Longwang Drainage Channel	Adverse impact associated with construction period based on the prepared EIA report	<p>EIA report prepared and disclosed.</p> <p>Collect progress information and implementation performance of EMP periodically.</p>	Huainan City Municipal Infrastructure Management Division
Road (Section Linking Yanshan Road and Zhongxing Road)	Adverse impact associated with construction and operation period	<p>Collect progress information periodically. The EIA report/EMP to be prepared should include the following:</p> <ul style="list-style-type: none"> • Environmental protection measures to be taken during construction and operation, including environmental protection practice for construction activities; • Monitoring plan; • Cost; and • Public consultation and information disclosure. 	Huainan Urban-Rural Construction Committee
Demolition of Closed Industries	Potential environmental pollution to be caused by demolition activities, such as waste treatment and disposal.	<p>Once additional industries will be demolished during project implementation, the responsible party is required to take the following steps:</p> <ul style="list-style-type: none"> • Employ professional individual/institute to conduct industrial site pollution survey; • Classify the industries to be demolished (Category A, B or C); • Conduct environmental impact analysis and prepare demolition plan 	Huainan City Datong District Government

		<p>similar to environmental management plan. This plan should include waste location, nature, quantity, treatment/disposal approach and other mitigation measures like worker safety and health protection measures;</p> <ul style="list-style-type: none"> • Monitoring/supervision program; • Cost; • Public consultation and information disclosure; and • The drafts of site pollution survey report, environmental impact analysis report and demolition plan should be submitted for WB review in a timely manner. 	
Potential new activities identified during project implementation.	Potential environmental and social impacts caused by the new added activities	<p>Once new activity is identified during project implementation, the responsible party is required to take the following steps:</p> <ul style="list-style-type: none"> • Employ professional individual/institute to conduct site survey; • Screening for potential environmental and social safeguard impacts and determination of safeguards documents required according to Chinese regulations and World Bank policies; • Review of the safeguards screening by World Bank; • Preparation of safeguard documents, consultation and disclosure; • Review and clearance of the safeguard documents within the government or/and by the Bank; • Implementation of agreed actions; and supervision, monitoring, and evaluation 	PMO

