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GHPZ JZi No. 3701 **LDHP 2013**

China-Qinghai Xining Water Environment Management Project

Environmental and Social Management Plan

By: Environmental Quality Assessment & Research Center
(Class-A EIA Certificate No.3701, LDHP 2013) **of Lanzhou University**

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Project Name: **Qinghai Xining Water Environment Management Project**

EIA Entrusted by: **Huangshui River Basin (Xining Section) Integrated Management Committee**

Scope of EIA: **Community Area**

EIA Institute: **Environmental Quality Assessment & Research Center of Lanzhou University**

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1 Project Description

1.1 Project Background

1.1.1 Description of the World Bank Loan Project Previously Implemented in 2009

Xining is the capital of Qinghai Province. With great support of provincial Development and Reform Commission, Xining started at the end of 2006 preparation of a World Bank loan funded project, i.e. Xining Flood and Watershed Management Project, the first standalone World Bank loan project of Qinghai Province, and the project was officially put into implementation at the end of 2009.

Xining Flood and Watershed Management Project was implemented in one city and three counties (i.e., Xining City, Datong County, Huangyuan County and Huangzhong County) and involved 6 components such as flood control and management, sewage collection, participatory small watershed management, institutional capacity building, resettlement and environmental management and project management, as shown in the following table (Table 1.1-1).

The above mentioned project has been successfully accomplished.

Table 1.1-1 Activities included in Xining Flood and Watershed Management Project

No.	Components	Activities	Description of Activities	Expected Results of Construction
1	Flood Control and Management	Gully Improvement: Gully mouth improvement and landscaping and recreation area development	Flood control embankment of 53.617 km in total along Beichuan River, Nanchuan River and mainstream Huangshui River; gully mouth section flood control construction of 35.006km in total for 28 gullies, and construction and development of 3 recreation areas totaling 2.62 km^2 in Xining City.	Flood control standard upgraded to 1 in 100 years for Xining, 1 in 50 years for the 3 counties and 1 in 30 years for the improved gullies.
		Development of flood early warning system	Information collection system, computer network system, information processing system and early warning information disclosure system	Flood control, early warning and protection capabilities of Xining greatly upgraded and losses of lives and property minimalized.
2	Sewage Collection	Xining City	Construction of 58.75km of sewage collection pipes	With newly built 72.5km of sewage and rainwater collection pipes, totally 66300m^3/d of wastewater can be intercepted at 103 discharge outlets.
		Huangzhong County	Construction of 3.2km of sewage and rainwater collection pipes	
		Datong County	Construction of 10.507km of sewage collection pipes	
3	Participatory Small Watershed Integrated Management	Water and soil conservation measures	Water conservation trees of 3019.82hm^2	Participatory small watershed management implemented in 17 small watersheds; water and soil erosion control coverage ratio increased from39.7% to79.7%;sediment load reduced by 658.5thousand tons; newly added water storage capacity of 1.6776 million m^3; per capita income increased from 3204 yuan to 3374 yuan.
		Engineering measures	3 medium size warp land dams, 4 small size warp land dams, 1087 check dams, 710m for slope improvement, 3 38.6km of rural roads, and reinforcement of 11 ponds.	
		Livelihood improvement measures	Terraces of 795.5hm^2, animal sheds of 67506m^2, 2048 biogas pits, 111 warm greenhouses, and 3996 solar stoves distributed to local farmer households.	
4	Institutional Strengthening and Capacity Building		Institutional strengthening and capacity building	Project management capacity enhanced
5	Resettlement and Environmental Management		Implementation of RAP and environmental management and monitoring tasks	RAP and EMP implemented
6	Project Management		Project management by PMOs and supporting expert panels	Project management tasks by PMOs and experts accomplished.

1.1.2 Origin of the Proposed Project

Under the previously implemented Xining Flood and Watershed Management Project, 17 small watersheds in the surrounding area of Xining were improved, a total of 72.5 km of sewage and rainwater collection pipes were installed to intercept 66,300 m^3/d of wastewater from 103 wastewater discharge outlets in Xining, and construction of embankment along some key river sections of Beichuan River, Nanchuan River and main stream Huangshui River and improvement of 28 gullies greatly upgraded flood control standard and protection capacity of Xining, as well as its flood early warning capacity.

Implementation of the project not only accomplished to a great extend a complete flood control system and a small watershed management system, which was not possible before the project due to financial limitation of Xining City, it also played an important role in bringing in new project concepts, staff training and capacity building, and therefore laid a good foundation to guarantee future development and implementation of other projects in Xining.

Thanks to national and the World Bank funded projects, a fundamental flood control system has been formed in Xining and a waste water collection pipe network has been installed in the main urban area of the city.

However, water quality of the rivers in the city is still not up to standard and water quality at Xiaoxiakou control cross-section is poor, characterized by serious pollution and higher sediment content. Currently, the main environmental problem with Xining can be summarized as 'dirty water and turbid water', which can be embodied in the following four aspects:

(1) Water pollution: direct wastewater discharge into river still exist in the suburb of Xining;
(2) Lack of environmental water: seasonal water shortage of rivers in Xining results in reduced overall assimilative capacity of the rivers and reuse of reclaimed water is still inadequate;
(3) Solid waste dumping into river, improper filling of river floodplain for land reclaimation, inadequate urban service infrastructure and poor living environment are problems found in some riverine areas of Xining City;
(4) River sediment problem: gravity erosion of the gullies in Xining is serious. Without adequate engineering facilities, rainwater washes sediment directly into rivers in rainy days. In the gully head areas, solid waste dumping and direct sewage discharge make the local environment lousy and unpleasant.

At the same time, water shortage is a serious challenge to Xining to cope with overall growth of future water demands, since its water resources utilization ratio is now 51.4% and available water resources are scarce.

Based on the current situation, the newly approved Xining City plan clearly

states its objectives as 'reaching waste water treatment ratio of above 90%,with a treatment capacity of 440 thousand m^3/day; reaching reclaimed water reuse ratio of above 30%, with a total reclaimed water amount of 164 thousand m^3/day; fully implementing river channel and river bank improvement; strengthening Huangshui River eco-environmental development and further upgrading vegetation coverage ratio; continuing to implement water and soil conservation and ecological recovery projects in watersheds of Xining City so as to reduce discharge of sediment and wastewater into the rivers'.

In order to realize the above objectives and address the problems of serious water pollution and water shortage, Xining City deems it appropriate and necessary to propose use of the World Bank loan to support an integrated environmental improvement project consisting of components of rainwater and sewage collection pipelines, integrated river bank environment improvement, reuse of reclaimed water, and integrated gully improvement. The proposed project has been listed by NDRC as the World Bank loan pipeline project.

In March 2013, Huangshui River Basin (Xining Section) Integrated Management Committee entrusted Environmental Quality Impact Assessment and Research Center of Lanzhou University to conduct environmental impact assessment of the proposed project. Following that, the task team of Lanzhou University conducted data collection and discussions on potential environmental issues relating to the proposed project, as well as field surveys and monitoring to the planned project sites, with cooperation and support of relevant local departments, and thereby prepared the report Environmental Impact Assessment for the project.

The task team expresses hereby its sincere gratitude to the Project Management Office and other relevant local departments for their great support and assistance it received in the preparation process of this report.

1.2 Project Components

Qinghai Xining Water Environment Management Project consists of four components as listed in the following table and the shown in Figure 1.2-1.

Table 1.2-1 List of Project Components

No.	Project Components	Activities	Type of Works
1	Urban Wastewater Collection Pipe Network	Newly built wastewater collection pipe network on south bank of Xichuan River (Yangjiawan Village – Duoba Town): its service area is about 1,442 hectares; service population is 172,000; total length of pipe network is about 16 Km; DN400-1000; collected wastewater is delivered into No. 4 wastewater treatment plant.	Pipe network

		Newly built wastewater collection pipe network on both banks of Beichuan River (Xining-Datong railway toll station – Datong wastewater treatment plant): its service area is about 4,740 hectares; service population is 83,500; total length of pipe network is about 34 Km; DN400-1000; collected wastewater is delivered into No. 5 wastewater treatment plant through existing wastewater pipe network.	Pipe network
		Newly built wastewater collection pipe network in Beichuan area: its service scope is westwards to Xining – Datong railway; service area is about 290 hectares; service population is 40,000; total length of pipe network is about 34 Km; DN300-600; collected wastewater is delivered into No. 1 and No. 3 WWTPs through existing urban wastewater pipe network.	Pipe network
		Newly built rainwater pipes of 44 km in Beichuan area, including north-south branch pipes DN400-DN500 and west-east main pipes DN400-DN600, to collection and drain rainwater to treatment system along Beichuan River bank and then discharge into Beichuan River after treatment	Pipe network
		Newly built ancillary road of 27km in Beichuan area, including main roads, secondary roads and tertiary roads. Main roads total 8452m in length, with red line width of 32-45m and design speed of 50km/h; secondary roads total 1549m in length, with red-line width of 22-30m and design speed of 40 km/h; tertiary roads total 16963m, with red-line width of 10-20m and design speed of 30 km/h.	Road
2	Low Impact Development and River Bank Environmental Improvement	1. Improving area along both banks of Beichuan River, including cleaning and transport of dumped spoil of 2300 m^3 and land leveling. 2. Greening on both banks with the area about 600,000 m^2. 3. Ancillary scenic road of 119775.19 and associated facilities 4. LID rainwater collection system, including permeable surfacing roads, biological retention depression and pond, native vegetation planting and etc.	Ecological management
3	Reuse of Reclaimed Water	Demonstration of reuse of reclaimed water, including construction of a reclaimed water plant within the existing No. 5 WWTP, with a designed capacity 5,000 m^3/d, including a reclaimed water storage pond of 1000 m^3, two submerged pumps, one for operation and the other as back-up. After sterilization process, the discharged water from the reclaimed water plant will be used mainly as municipal miscellaneous water in core area of Beichuan for purposes of greening and road watering; ancillary reclaimed water pipe of 5 Km.	Reclaimed water plant and pipe network
4	Integrated gully improvement	Improvement of Liujiagou gully section from Xining-Datong highway to river mouth of Beichuan River, with a total length of 0.9 km, mainly including improvement of flood discharge cross-section of	Ecological management

		gullies(using flood discharge canal+ slope protection, trapezoid cross-section, gabion cushion lining, slope 1:1; slope protection by using reinforced Mike mat, with a slope 1:2), and earth backfilling and ecological landscape engineering at the top;	
		Treatment of Shengou gully section from Chaoyangdianqu flood discharge culvert to river mouth of Beichuan River, with a total length of 0.9km, including improvement of flood discharge cross-section of gullies(using flood discharge canal+ slope protection, trapezoid cross-section, gabion cushion lining, slope 1:1; slope protection by using reinforced Mike mat, with a slope 1:2), and earth backfilling and ecological landscape engineering at the top;	
		Treatment for whole line of Chaoyangdianqu water diversion canal, with a total length of 10.4 km. After backfilling at bottom and both sides of original channel, it will be entirely raised by 1.5 m based on originally designed gradient. Renovation is still along the original alignment, on both banks a sidewalk of 1.0m wide is arranged, with a trapezoid cross-section of 1.5m wide at the bottom, slope of 1.25, height of 1.6m. In sections with dense population and frequent human activities, rectangle cross-section with cover on top will be used.	

From the above table it is clear that the project consists of such components as urban wastewater collection pipelines, integrated river bank environment improvement, reuse of reclaimed water, and integrated gully improvement.

Based on the project activities and their engineering characteristics, potential environmental impacts of the project during construction and operation phases are identified and classified, as shown in Table 1.2-2.

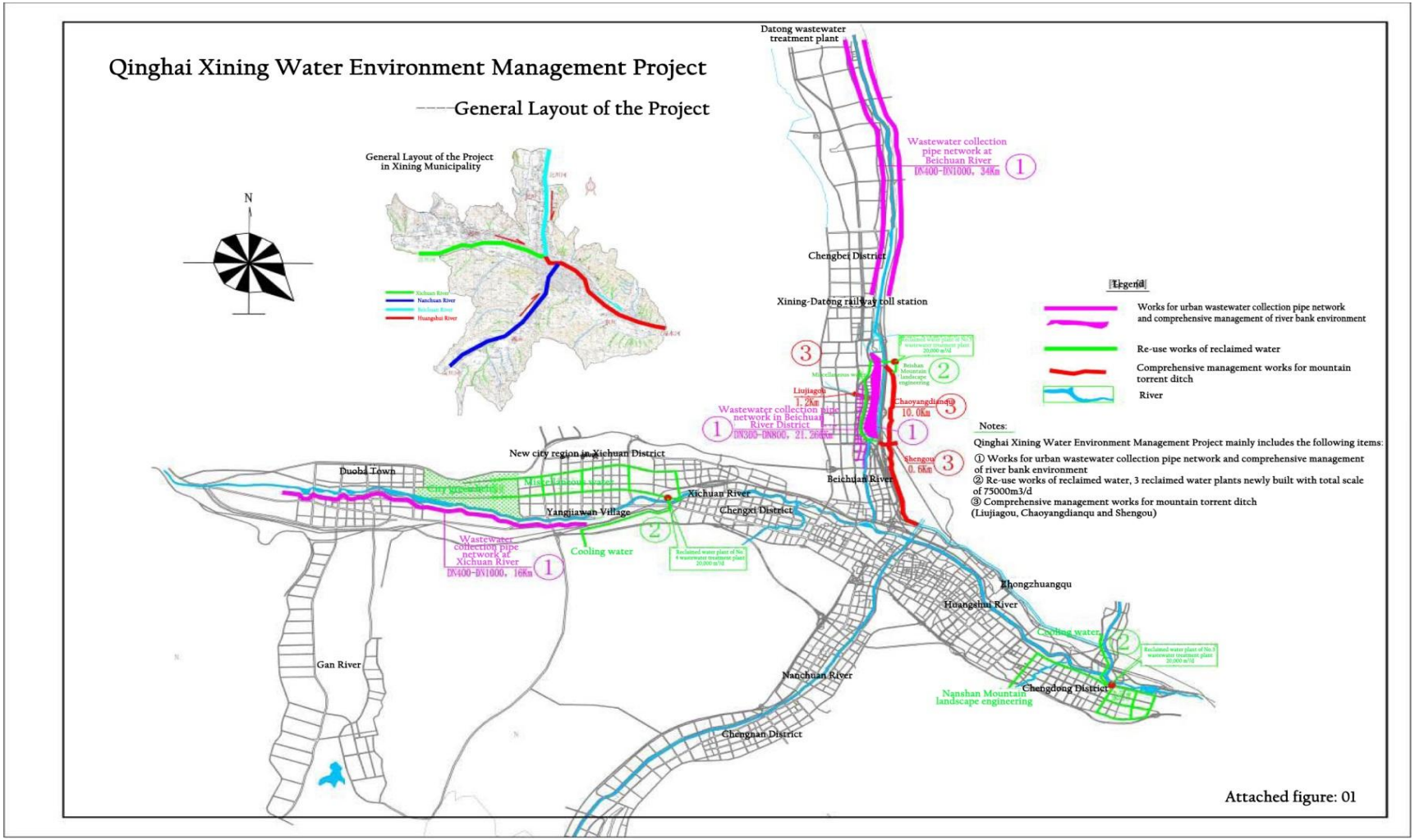


Figure 2.4-1 Total Plane Distribution of Project Components

Table 1.2-2 Classification of Proposed Project Activities

No.	Project Components	Construction Activities	Classification
1	Urban Waste Water Collection Pipe Network	Xichuan River Waste Water Interception Main Pipes	Pipe Network
		Beichuan River Waste Water Interception Main Pipes	Pipe Network
		Beichuan Zone Waste Water Interception Pipes	Pipe Network
		Beichuan Zone Rainwater Collection Pipes	Pipe Network
		Beichuan Zone Ancillary Roads	Roads, Bridges
2	Reuse of Reclaimed Water	Reclaimed Water Plant of No. 5 WWTP	Reclaimed Water Plant
		Reclaimed Water Pipes in Beichuan Zone	Pipe Network
3	Low Impact Development (LID)and River Bank Environmental Improvement	Improvement, Greening and Ancillary Structures of Areas along Beichuan River Banks	River Bank Ecological Improvement, Roads
		LID-based Rainwater Utilization	
4	Integrated Gully Improvement	Slope Treatment of Both Banks of Liujiagou Gully and Waste Water Collection Pipes	Gully Ecological Improvement, Pipe Network
		Slope Treatment of Both Banks of Shengou Gully and Waste Water Collection Pipes	Gully Ecological Improvement, Pipe Network
		Improvement, Green and Roads, etc. along Both Banks of Chaoyangdianqu Canal	Gully Ecological Improvement, Pipe Network, Roads, Bridges

It can be seen from the above table that the proposed project involves constructions of pipes, roads and reclaimed water plant, and river bank and gully ecological improvement. These construction activities differ in their environmental impacts during design, construction and operation periods, the corresponding environmental protection measures are proposed as the results of environmental evaluation process and summarized in Table 1.2-3 that follows.

Table 1.2-3 Summary of Environmental Protection Measures for Various Construction Activities

Types of Construction Activities	Description	Environmental Protection Measures			Monitoring Requirements
		Design Period	Construction Period	Operation Period	
Roads, Pipes	Wastewater collection pipes; reclaimed water pipes; rainwater discharge pipes; and roads in Beichuang Zone	Attachment 1 of EMP	Attachments 2, 3, 4, 7 and 8 of EMP	Attachments 9, 12, 13,14 of EMP	Section 5.3 in EMP on monitoring during construction and operation periods
River Bank Eco. Improvement	Integrated river bank eco. improvement for Beichuan River		Attachment 2 of EMP	Attachment 11	
Gully/Canal Envir. Improvement	Improvement of Liujiagou, Shengou Gullies and Chaoyangdianqu Canal		Attachments 2 and 6 of EMP	Attachment 11	
Reclaimed Water Plant	Reclaimed water plant in No.5 WWTP		Attachments 2 and 5 of EMP	Attachment 10 of EMP	
Bridges, Culverts	Bridges for roads in Beichuan Zone and for Chaoyangdianqu Canal		Attachments 2 and 3 of EMP	Attachments 13 and 14 of EMP	
Solid Waste Cleaning and Transport	Integrated river bank eco. improvement and solid waste cleaning and transport for Liujiagou, Shengou Gullies and Chaoyangdianqu Canal		Sections on solid waste management measures in Attachment 2 of EMP	/	

2 Environmental Standards and Protection Objects

2.1 National Standards

2.1.1 Quality Standards

(1) Atmospheric environment: Class-II standards in the *Ambient Air Quality Standard* (GB3095-2012) are applied for ambient air quality assessment. For those pollutants that are not included in the said Standard, *Sanitation Standard for Design of Industrial Enterprises* (TJ36-79) will apply. For details, see Table 2.1-1.

Table 2.1-1 Standards for Ambient Air Quality Assessment Unit (ug/Nm^3)

Name of Pollutant	Value-taking Time	Class II	Standard
NO_2	Annually average value	40	*Ambient Air Quality Standard* (GB3095-2012)
	Average value per 24 hours	80	
	Average value per hour	200	
SO_2	Annually average value	60	
	Average value per 24 hours	150	
	Average value per hour	500	
PM_{10}	Annual Average	70	
	Average value per 24 hours	150	
$PM_{2.5}$	Annual Average	35	
	Average value per 24 hours	75	
TSP	Annual Average	200	
	Average value per 24 hours	300	

(2) Acoustic environment: class-II standards in the *Environmental Quality Standard for Noise* (GB3096-2008) are applied for acoustic environment quality assessment. For roads with buildings mainly three-storey high or above at the side, class 4a standards in the *Environmental Quality Standard for Noise* (GB3096-2008) are applicable for acoustic environment quality assessment of the side area facing the buildings in the first row and class 2 standards for other area. For roads with buildings mainly less than three floors (including open ground) at the side, class 4a standards in the *Environmental Quality Standard for Noise* (GB3096-2008) are used for the area of 35m within the red line and class 2 standards for other area. For special and sensitive buildings within the assessment scope such as school, hospital and home for the aged, 60dB is enforced for outdoor area in the daytime and 50dB at night. Class 2 standards of the *Environmental Quality Standard for Noise* are applied for the place where wastewater reclamation plant is located according to relevant regulations in the *Environmental Quality Standard for Noise* (GB3096-2008). For

details, see Table 2.1-2.

Table 2.1-2 Class-II Standards of the *Environmental Quality Standard for Noise* Assessment (GB3096-2008) Unit: dB (A)

Category of Standard	Daytime	Nighttime
Class 2	60	50
Class 4a	70	55

(3) Surface water: the *Environmental Quality Standard for Surface Water* (GB3838-2002) is applied for surface water assessment. Class III standards are applied for Huangshui River (Xichuan section), Beichuan River (assessment section) and class IV standards for Huangshui River (Dongchuan section). For details, see Table 2.1-3.

Table 2.1-3 *Environmental Quality Standard for Surface Water* (GB3838-2002)

(Unit: mg/L Except PH Value)

No.	Indicator/Standard Value		Class III	Class IV
1	Water temperature (℃)		Environmental temperature variation due to human activities shall be limited to: maximum weekly temperature rise ≤1; maximum weekly temperature drop ≤2	
2	PH value (dimensionless)		6-9	
3	Dissolved oxygen	≥	5	3
4	Index of permanganate	≤	6	10
5	Chemical oxygen demand (COD)	≤	20	30
6	Five-day biochemical oxygen demand (BOD_5)	≤	4	6
7	Ammonia nitrogen (NH_3-N)	≤	1.0	1.5
8	Total phosphorus (calculated based on P)	≤	0.2 (lake, reservoir 0.05)	0.3 (lake, reservoir 0.1)
9	Total nitrogen (lake, reservoir, calculated based on N)	≤	1.0	1.5
10	Chrome (hexavalent)	≤	0.05	0.05
11	Lead	≤	0.05	0.05
12	Cyanide	≤	0.2	0.2
13	Volatile phenol	≤	0.005	0.01
14	Petroleum	≤	0.05	0.5
15	Fluoride (calculated based on F)	≤	1.0	1.5
16	Sulfide	≤	0.2	0.5

No.	Indicator/Standard Value		Class III	Class IV
17	Mercury	≤	0.0001	0.001
18	Copper	≤	1.0	
19	Zinc	≤	1.0	2.0
20	Selenium	≤	0.01	0.02
21	Arsenic	≤	0.05	0.1
22	Cadmium		0.005	0.005

Note: Refer to standard limits of specific items about central living drinking surface water source for standard values of benzene, methylbenzene, dimethyl benzene, benzopyrene and methyl aldehyde.

(4) Groundwater: Class-III standards of the *Quality Standard for Ground Water* (GB/T14848-93) are applied for groundwater assessment. For details, see Table 2.1-4.

Table 2.1-4 *Quality Standard for Groundwater* (GB/T14848-93)
(Unit: mg/L Except PH Value)

Assessment Item	Standard (mg/L)	Assessment Item	Standard (mg/L)	Assessment Item	Standard (mg/L)
PH	6.5-8.5	Fluoride	≤1.0	Lead	≤0.05
Ammonia nitrogen	≤0.2	NO^{3-}	≤20	Cadmium	≤0.01
Index of permanganate	≤3.0	NO^{2-}	≤0.02	Arsenic	≤0.05
Total hardness	≤450	Manganese	≤0.1	Mercury	≤0.001
Chloride	≤250	Zinc	≤1.0	Petroleum	≤0.05
Cyanide	≤0.05	Copper	≤1.0	Benzene *	≤0.01
Volatile phenol	≤0.002	Selenium	≤0.01	Methylbenzene *	≤0.7
Total coliform group	≤3.0 Nr./L	Sulfide *	≤0.02		

2.1.2 Discharge Standard

(1) *Discharge Standards of Pollutants from Urban Wastewater Treatment Plant* (GB18918-2002) is used for tail water discharge of wastewater treatment plant planned in the proposed project, and *Emission Standards for Odor Pollutants* (GB14554-93) for emission of odor gases, *The Disposal of Sludge from Municipal Wastewater Treatment Plant - Quality of Sludge for Co-Landfilling* (GB/T 23485-2009) for sludge discharge. Dewatering of sludge from municipal wastewater treatment plant should be conducted. After dewatering, water percentage of the sludge should be lower than 80%. *Emission Standards for Odor Pollutants* (GB14554-93) is applied for emission of odor gas from the reclaimed water plant proposed to be located in the wastewater treatment plant.

Table 2.1-5 Discharge Standards of Pollutants from Urban Wastewater Treatment Plant (Daily Average Value) Unit: mg/l

No.	Basic Control Item		Primary Standard	
			Standard A	Standard B
1	Chemical oxygen demand (COD)		50	60
2	Biochemical oxygen demand (BOD_5)		10	20
3	Suspended solid (SS)		10	20
4	Animal and vegetable oils		1	3
5	Petroleum		1	3
6	Anionic surfactant		0.5	1
7	Total nitrogen (calculated based on N)		15	20
8	Ammonia nitrogen (calculated based on N) ②		5(8)	8(15)
9	Total phosphorus (calculated based on P)	Developed before Dec. 31, 2005	1	1.5
		Developed since Jan. 1, 2006	0.5	1
10	Chroma (dilution ratio)		30	30
11	pH		6-9	6-9
12	No. of fecal coliform group (Nr./ l)		10^3	10^4

Notes: ① In following cases, removal rate indicators shall be: when influent COD is more than 350mg/l, the removal rate shall be more than 60%; when BOD is more than 160mg/l, the removal rate shall be more than 50%. ② Values outside the brackets are the control indicators when the water temperature is more than 12 ℃ and those inside are the control indicators when the water temperature is not more than 12 ℃

Table 2.1-6 Emission Standard of Odor Pollutants Unit: mg/m^3

No.	Control Item	Primary Standard	Secondary Standard	Level 3 Standard
1	Ammonia	1.0	1.5	4.0
2	Sulfuretted hydrogen	0.03	0.06	0.32
3	Odor concentration (dimensionless)	10	20	60
4	Methane (maximum volume concentration in the plant area %)	0.5	1	1

Table 2.1-7A Basic Indicators and Limits

No.	Basic Indicator	Limit
1	Water percentage of sludge/ %	<60
2	PH	5-10
3	Mixing ratio/ %	≤8
Note: For the PH indicators in the table, it is not limited to the measure that using hydrophilic materials (such as lime) to mix with sludge to reduce water content in sludge.		

Table 2.1-7B Pollutant Indicators and Limits

No.	Pollutant Indicator	Limit
1	Total cadmium (mg/kg dry sludge)	<20
2	Total mercury (mg/kg dry sludge)	<25
3	Total lead (mg/kg dry sludge)	<1000
4	Total chromium (mg/kg dry sludge)	<1000
5	Total arsenic (mg/kg dry sludge)	<75
6	Total nickel (mg/kg dry sludge)	<200
7	Total zinc (mg/kg dry sludge)	<4000
8	Total copper (mg/kg dry sludge)	<1500
9	Mineral oil (mg/kg dry sludge)	<3000
10	Volatile phenol (mg/kg dry sludge)	<40
11	Total cyanide (mg/kg dry sludge)	<10

(2) Re-use Standard of reclaimed water: See Table 2.1-8 for standards for reuse of reclaimed water as urban municipal miscellaneous water.

Table 2.1-8 Standard for Reuse of Reclaimed Water as Urban Municipal Miscellaneous Water

No.	Item Indicator	Toilet Flushing	Road Cleaning, Fire Prevention	City Greening
1	PH	6.0~9.0		
2	Chroma ≦	30		
3	Smell	No displeasure		
4	Turbidity (NTU) ≦	5	10	10
5	Total dissolved solid (mg/l) ≦	1500	1500	1000
6	BOD_5 (mg/L) ≦	10	15	20
7	Ammonia nitrogen (mg/l) ≦	10	10	20
8	Anionic surfactant (mg/l) ≦	1.0	1.0	1.0
9	Iron (mg/L) ≦	0.3	-	-
10	Manganese (mg/l) ≦	0.1	-	-
11	Dissolved oxygen (mg/l) ≧	1.0		
12	Total residual chlorine (mg/l)	More than 1.0 after 30 min of contact and more than 0.2 at ends of pipe network		
13	Total coliform group (Nr./ L)	3		

(3) *Emission Standard of Environment Noise for Boundary of Construction Site* (GB12523-2011) is applied for assessment of noise during construction period. For details, see Table 2.1-9.

Table 2.1-9 ***Emission Standard of Environment Noise for Boundary of Construction Site*** **(GB12523-2011)**

Standard Value LAeq (dB)	
Daytime	Nighttime
70	55

(4) See Table 2.1-10 for class 2 standard in the *Standard of Noise at Boundary of Industrial Enterprises* (GB12348-2008).

Table 2.1-10 Standard of Noise at Boundary of Industrial Enterprises

Unit: dB (A)

Category	Daytime	Nighttime
2	60	50

2.2 Safeguard Policies of the World Bank and EHS Guidelines

(1) Interviews and Filed Survey

The proposed project is mainly located in the urban area and peripheral main gullies in Xining Municipality. After preliminary field survey, no natural habitat or cultural relic unit is found. Neither the sensitive area, such as natural reserve, drinking water source and forest, nor cultural relic on the ground surface, such as place of interest and religious site is involved.

After the field survey, accompanied by the staff of Huangshui River Basin (Xining Section) Integrated Management Committee, the task team interviewed relevant units, such as Xining Municipal Culture Radio and Television Bureau, Xining Forestry Bureau, Agriculture and Animal Husbandry Bureau in Xining Municipality and investigated the cultural relic units, natural reserves and wildlife resources in the project development site. According to consultation, they affirmed that there is no natural habitat or cultural relic unit in the area involved in the project. See Attachment II for certificate provided by relevant units.

(2) Safeguard Policies Triggered

World Bank operational policies triggered by the project are marked with a tick in the following table (Table 2.2-1).

Table 2.2-1 World Bank Operational Policies and EHS Guidelines

World Bank Operational Policies		Whether or not triggered	Remarks
OP4.01	Environmental Assessment	√	The project may cause certain impacts on ambient environment during construction and operation periods and thus needs an assessment of the environmental impacts.
OP4.04	Natural Habitat		Field survey confirmed that the project sites are located in Xining City urban and suburb rural areas with frequent human activities but far away from the existing natural reserves, so this policy is not triggered.
OP4.09	Pest Management	√	Since greening and tree planting are included in the project component relating to low impact development and river bank environmental improvement, use of pesticides may increase in the process of maintenance of greening and tree planting areas.
OP4.10	Indigenous Peoples		The policy is triggered.
OP4.11	Physical Cultural Heritage		There are neither cultural relic sites nor tombs identified in the project construction areas. However, the 'Chinace Finds Procedure' shall be adopted.
OP4.12	Non-voluntary Resettlement	√	OP4.12 is triggered by the project, thus RAP of the project has been prepared by the Resettlement Center of Hoihai University.
OP4.36	Forests		The policy is not triggered because the project does not have the potential to have impacts on the health and quality of forests or the rights and welfare of people and their level of dependence upon or interaction with forests, or aims to bring about changes in its management or protection.
OP4.37	Dam Safety		The project involves no dams.
OP7.50	International Water Ways		The project construction sites are all within the territory of the P.R.C, without involving any international water ways.
OP7.60	Project in Disputed Area		The project does not involve any disputed area.
BP17.50	Information Disclosure	√	At least two rounds of information disclosure and public consultations shall be conducted.

The project construction activities mainly relates to infrastructure construction and ecological improvement, without involving dam safety or pest management. Therefore, this EIA will mainly deal with environmental assessment, non-voluntary resettlement and information disclosure. Considering particularity of physical cultural heritage, i.e. some of the objects may lie hidden in the earth and thus cannot be identified before commencement of project construction, the 'Handling Procedure for Cultural Relic Discovered' shall be adopted upon cultural relic discovered during construction period (For details, see Section 5 of Attachment 2 to this *Environmental Management Plan*).

2.3 Objects and Sensitive Receptors for Environmental Protection

Environmental protection objects identified based on project proposal, feasibility study report and field surveys are described in the following sections.

2.3.1 Objects and Sensitive Receptors for Ambient Air and Acoustic Environmental Protection

A big amount of residents was identified during the detailed survey to the assessment area of the project. Table 2.3-1, 2.3-2 and Figure 2.3-1 give the details.

Table 2.3-1 Objects of Environmental Protection in the Project Area

No.	Project Components	Construction Activities	Objects of Environmental Protection in The Project Area	
			Acoustic, atmospheric and social environmental protection objects	Surface water
1	Urban Wastewater Collection Pipe Network	Wastewater interception main pipes along Xichuan River	Zhangjiawan Village, Xiaozhai Village, Weijiazhuang Village, Duoba Town	Xichuan River
		Wastewater interception main pipes along Beichuan River	Hetan Village, Wangjiazhuang Village, Qinglv living Quarters	Beichuan River
		Pipe network for rainwater and sewage collection in Beichuan Zone	/	Beichuan River
		Ancillary road network	Kunlun College of Qinghai University, No.4 High School of Xining	Beichuan River
2	Low Impact Development and River Bank Environmental Improvement	LID design, landscape engineering and relevant ancillary works on both banks of Beichuan River	/	Beichuan River

3	Reuse of Reclaimed Water	Reclaimed water plant and reclaimed water pipe network of No.5 wastewater treatment plant	Shuangsubao Village	Beichuan River
4	Integrated Gully Improvement	Integrated environmental treatment of Liujiagou, Shengou gullies & Chaoyangdianqu Canal	Shuangsubao Village, Guojiata Village, Jiujiawan Village, Xin Village, Xiachaoyang Village	Beichuan River

Table 2.3-2 Summary of Sensitive Receptors

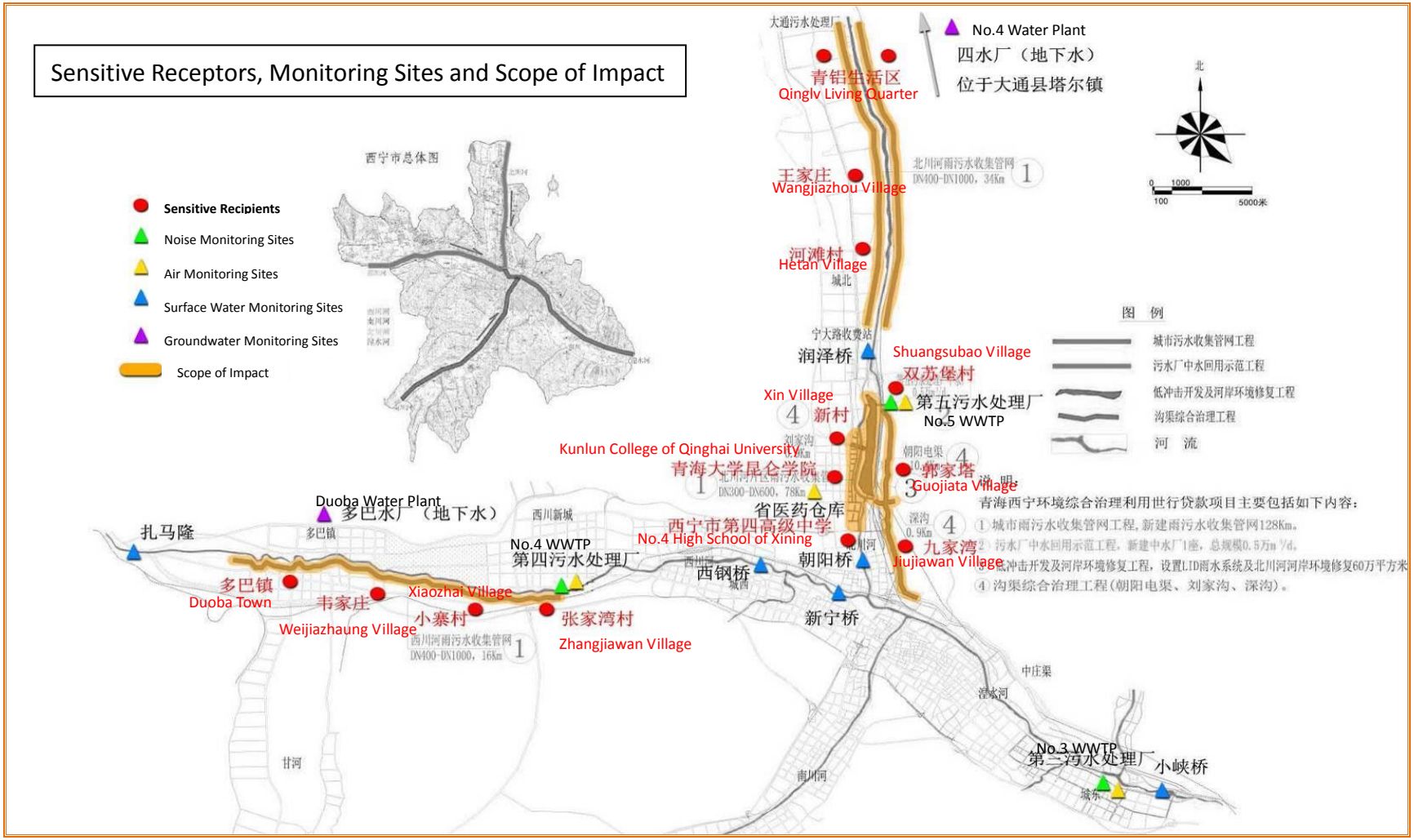
Subproject Name	No.	Name	Distance to Pipe Center (m)（m）	Location on Map	Photo	Environment Characteristic	Number of People that may be Affected within 200m
Wastewater interception main pipes along Xichuan River	1	Zhangjiawan Village	15			Rural environment. Pipes are arranged through north side of village periphery along the river. Houses are distributed at south side of pipes with brick-concrete structure.	50 household,200 persons
	2	Xiaozhai Village	30			Rural environment. Pipes are arranged through north side of village periphery along the river. Houses are distributed at south side of pipes with brick-concrete structure.	15 households, 60 persons
	3	Weijiazhuang Village	90			Rural environment. Pipes are arranged through north side of village periphery along the river. Houses are distributed at south side of pipes with brick-concrete structure.	50 households, 200 persons

	4	Duoba Town	40			Urban environment. Pipes are arranged through the middle of Duoba Town and along south side of the river. Houses are distributed at both sides of pipes, all building housing estates.	200 households, 800 persons
Wastewater interception main pipes at Beichuan River	1	Hetan Village	15			Rural environment. Pipes are arranged from the right side through the village along Beichuan River. Houses are distributed at west side of pipes with brick-concrete structure.	21 households, 84 persons
	2	Wangjiazhuang Village	160			Rural environment. Pipes are arranged from the left side through the village along Beichuan River. Houses are distributed at east side of pipes with brick-concrete structure.	10 households, 40 persons
	3	Qinglv Living Quarters	20			Residential district. Pipes are arranged through middle of the district and laid along both side of the river. Houses are distributed at both sides of pipes, all being building housing estates.	200 households, 800 persons
Demonstration of Reuse of Reclaimed Water	1	Shuangsubao Village	100			Rural environment at northeast and southeast sides of No. 5 WWTP, with buildings of brick-concrete structure.	60 households, 240 persons

Integrated Gully Improvement	1	Shuangsubao Village	10			Rural environment. Gully improvement of Chaoyangdianqu goes through the middle of Shuangsubao Village, with buildings of brick-concrete structure	80 households, 320 persons
	2	Guojiata Village	10			Rural environment. Gully improvement of Chaoyangdianqu goes through the middle of Guojiata Village, with buildings of brick-concrete structure	80 households,320 persons
	3	Jiujiawan Village	40			Rural environment. Gully improvement of Chaoyangdianqu goes through east side of Jiujiawan Village, with buildings of brick-concrete structure	40 households, 160 persons
	4	Xin Village	5			Suburban area in the north of Xining, with residents living along both sides of gullies, with buildings of brick-concrete structure	60 households, 240 persons
Wastewater pipes and roads in Beichuan Area	1	Kunlun College of Qinghai University	130			Located on west of Xining-Zhangye Highway in Beichuan Area, mainly impacted by the road noise. Teaching building and dormitory building are sideways to Xining-Zhangye Highway and the planned Erwei Road	1000 persons

	2	No.4 High School of Xining	160			Located on south of Tianjin Road, mainly impacted by noise of Tianjin Road and Beijing-Tibet Expressway; Teaching building is directly facing Xining-Zhangye Highway and sideways to planned Tiedong Road south extension section.	500 persons

Sensitive Receptors, Monitoring Sites and Scope of Impact



2.3.2 Objects for Surface Water Environmental Protection

Objects for surface water environmental protection under the proposed project are the river sections that are located within the evaluation area of the project and therefore to be evaluated, and the protection aims at ensuring that they meet Class-III or IV water quality standards as defined in the Quality Standards for Surface Water Environment (GB3838-2002), and also functional requirements as per the surface water environment function zoning of Qinghai Province. Table 2.3-1 gives the details.

2.3.3 Objects for Social Environmental Protection

Villages, schools and hospitals and other sensitive receptors that may be impacted by the project are the main objects for social environmental protection, as summarized in Tables 2.3-1 and 2.3-2.

Table 2.3-2 Objects for Social Environmental Protection in the Project Area

No.	Objects for Protection	Focus of Protection
1	Residential Area	Inconveniences caused to daily travelling of people due to construction interferences; noise, dust that impact on living environment during construction period; traffic blocked during road construction; noise during operation period, and etc.
2	Schools, Hospitals and Other Sensitive Receptors	Traffic block, noise and dust during construction; noise and exhaust during operation and etc.
3	Households to be resettled	Living quality and arrangements made for the households resettled, opinions and wishes of the resettled residents, and etc.
4	Cultural Relics	Cultural relics of protected nature identified during construction

2.3.4 Objects for Ecological Environmental Protection

The main object for ecological environmental protection under the proposed project is vegetation in areas surrounding the project construction sites and borrow area.

3 Organizational Arrangement for Environmental Management

3.1 Environmental Management Organization

The implementation of Qinghai Xining Water Environment Management Project can be divided into three stages: feasibility study and design stage, project construction stage and project operation stage. For the purposes of this project, an integrated environmental management system is established to include such organizations as project management organization, implementation agency, supervision agency, consulting service agency and monitoring agency, which jointly assume environmental management responsibilities but with differentiated functions. Organized and led by Project Management Office, the project is to be carried out to ensure compliance with relevant regulations and policies of the nation and the World Bank on construction procedures and pollution control and mitigation. Organizational arrangement for environmental protection under the proposed project is illustrated in Table 3.1-1.

Table 3.1-1 Environmental Management Plan for Project Implementation

Project Components	Type of Works	Environmental Protection Measures at Design Stage	Environmental Management Plan during Construction Period	Environmental Management Plan during Operation Period	Implementation Agency	Supervision Agency	Content of Works
Urban wastewater collection pipe network	Road construction Pipe network construction	See *Regulation on Environmental Protection at Design Stage*	See Attachment 2, Attachment 4, Attachment 7 and Attachment 8.	See Attachment 9, Attachment 10, Attachment 12 and Attachment 13.	The contractor is responsible during construction period. During operation period, Xining Drainage Company is responsible for wastewater collection pipe network. The municipal facilities in Beichuan Zone(Area) including roads and rainfall pipe network are under the charge of Xining Huangshui Investment Management Co., Ltd.	Xining Environmental Protection Bureau	Pipe networks for wastewater collection from Beichuan River and Xichuan River
							Road works in Beichuan area
							Rainwater drainage pipe network works in Beichuan area
Reuse of Reclaimed water	Reclaimed water works and pipe network construction	See *Regulation on Environmental Protection at Design Stage*	See Attachment 2, Attachment 4, and Attachment 13	See Attachment 9, Attachment 10, and Attachment 11	The contractor is in charge during construction period. The respective wastewater treatment plants are responsible during operation period. The advanced retreatment of reclaimed water is under the charge of Xining Reclaimed Water Company.	Xining Environmental Protection Bureau	No.5 wastewater treatment plant
Integrated River Bank Environmental Improvement	Ecological management of river banks	See *Regulation on Environmental Protection at Design Stage*	See Attachment 2 and Attachment 8	/	The contractor is in charge during construction period. Xining Huangshui Investment Management Co., Ltd. is responsible during operation period.	Xining Environmental Protection Bureau	Comprehensive Management of Beichuan River Bank Environment
Comprehensive Gully Improvement	Gully Improvement	See *Regulation on Environmental Protection at Design Stage*	See Attachment 2, Attachment 6, and Attachment 8	/	The contractor is in charge during construction period During operation period, the upstream section of Liujiagou (upper part of Beichuan area) is	Xining Environmental Protection	Improvement of Shengou , Liujiagou Gullies& Chaoyangdianqu

					under the charge of Xining Water Authority, and the downstream section (Beichuan area) is under the charge of Xining Huangshui Investment Management Co., Ltd., Shengou is under the charge of Huangshui Investment Management Co., Ltd., and Chaoyangqu is under the charge of Zhongzhuangqu Control Station of Xining Water Authority.	Bureau	

3.2 Responsibilities of Each Organization

In order to practically strengthen the organizational leadership of Qinghai Xining Water Environment Management Project and ensure successful implementation of the project, corresponding project management organization is established according to the relevant provisions in *Measures for Administration of Projects Funded by World Bank* and the requirements for administration of projects making use of foreign investment established by NDRC and MOF of P.R.C. and so on. Full-time personnel are appointed to carry out the work. Project Coordinating and Leading Group is established, under which the Project Coordinating and Leading Group Office and the Project Management Office (or Project Office) are established. In order to properly perform each and every task under the project, Project Executive Offices are also established, under which comprehensive division, construction division, etc. and Expert Advisory Group are set up.

See Fig. 3.2-1 for details of the organizational arrangement.

The environmental management organizations of the project include management organization, supervision agency, implementation agency, consulting service agency, and monitoring agency. These organizations jointly constitute the complete environmental management system for the project but undertake different tasks with varied responsibility ranges. See Table 3.2-2 for their responsibilities in detail.

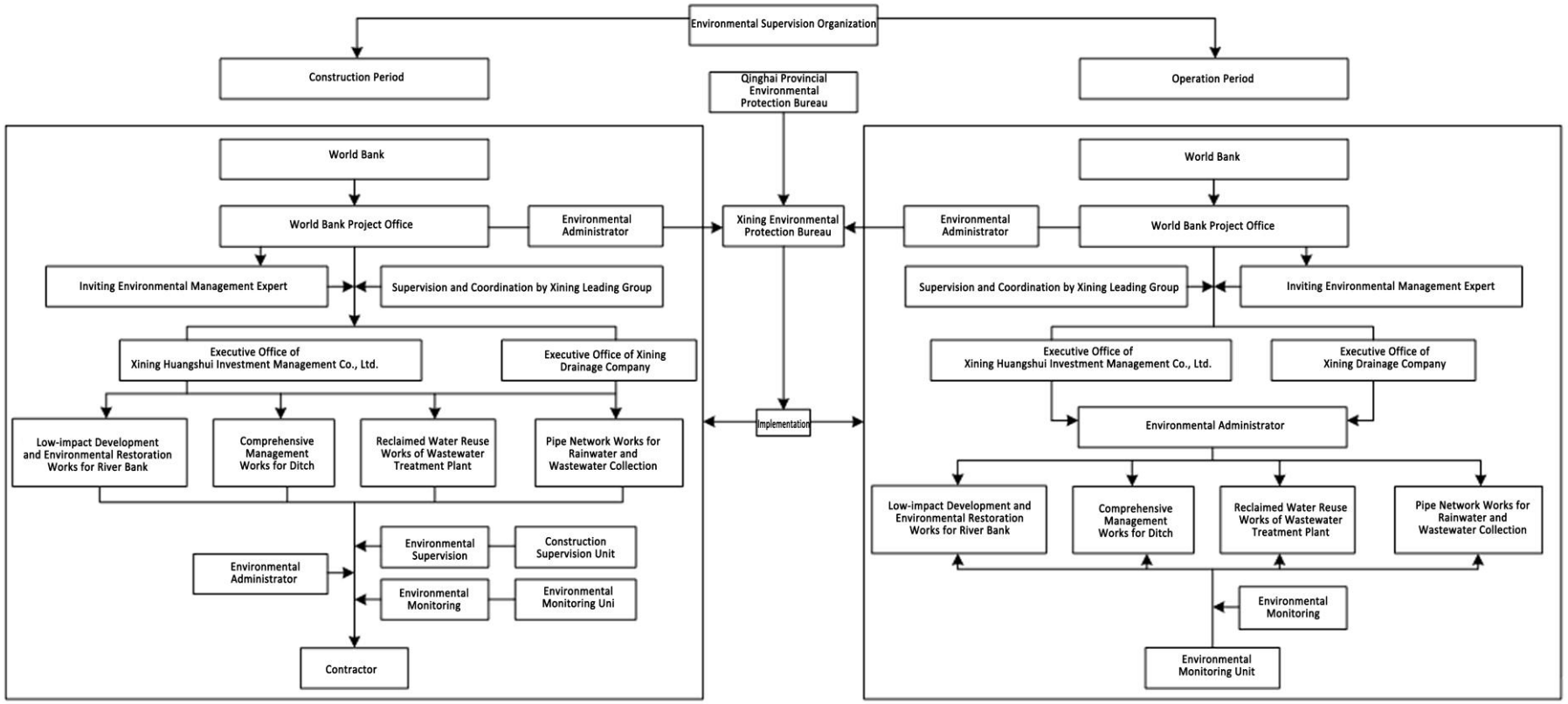


Fig. 3.2-1 Schematic Diagram for Project Management Arrangement

Table 3.2.2 Responsibilities and Staffing of Each Organization of Environmental Management System

Name of Organization	Type of Organization	Responsibilities of Organization
Provincial Environmental Protection Bureau	Supervision Agency	Carry out the environmental monitoring and supervision management during the whole process d the project according to law, including the approval of environmental impact assessment report on the project and the environmental monitoring and management at stages of project construction and operation and the like.
Huangshui River Investment Company	Management organization	Be responsible for financing of domestic supporting funds for the project and for management work for part of the project during operation period. See Table 3.1-1 for details.
Municipal Drainage Company	Management organization	Be responsible for management work for part of the project during operation period. See Table 3.1-1 for details.
Huangshui River Committee	Administration organization	Be responsible for project implementation.
World Bank Project Office	Management organizations	To establish environmental and social management unit under the PMO, and designate dedicated staff for managing the implementation of EMP. 1. Be responsible for the environmental management and demolition and relocation work of the proposed project. Be responsible for entrusting the work of environmental monitoring, environmental impact assessment, and design of project resettlement plan of the proposed project. Monitor and administrate the pollution management of units subordinate to this system, be responsible for organizing the preparation and implementation of contingency plan for contamination accident, and investigate and handle the accident. Be responsible for the implementation and management of environmental protection measures during operation period. 2. Supervise the implementation of *Environmental Management Plan*, ensure that corresponding environmental code of management is incorporated into bidding documents and construction contract for the project, and organize and coordinate relevant training. 3. Urge and coordinate to implement the environmental management requirements of China and World Bank. 4. Submit relevant reports of EMP implementation to World Bank every half year. 5. Coordinate with other relevant departments to resolve major environmental problems. 6. Entrust invited environmental expert group to inspect the project.

		7. Properly record and sort the complaints made during construction and operation period of the project, explain the disposal results to the public and solve the public petition issues. 8. Be responsible for collecting and filing the environmental management documents and approval documents at stages of design, construction and operation of the proposed project.
Environmental impact assessment unit	Consulting service agency	Be responsible for compiling *Environmental Impact Assessment Report* and *Environmental Management Plan* and provide relevant consulting service.
Construction Supervisor (undertaking environmental supervision work)		Designate qualified environmental staff to supervise the EMP implementation. 1. Supervise and inspect the water and soil loss prevention measures, exhaust gas and noise control measures, and production and domestic waste etc. in construction area. 2. Regularly fill in all the checklists of environmental management in attachment to *Environmental Codes of Practice.* 3. Put forward rectification solutions to problems relevant to environmental protection encountered by the contractor during construction activity and follow up the implementation, such as to send rectification notice and rectification check list, and inspect the filing of documents. 4. Submit the situation of project implementation to Municipal Project Office every week.
Design institute		Be entrusted to prepare feasibility study report and construction design scheme.
The contractor	Implementation agency	1. Be monitored and inspected by project supervisor, World Bank and environmental protection departments at all levels on environmental protection. 2. Establish feedback mechanism, and complete rectification within 3 work days after receiving rectification notice (complete rectification within 10 work days if coordination with management organization is needed). 3. Finish construction site check lists together with project supervisor before construction and report the lists to Project Office. 4. Report the situation of project implementation to project supervisor every week.
Environmental monitoring agency	Monitoring agency	1. Carry out environmental monitoring for the project and its filing according to *Environmental Monitoring Plan* during construction period and operation period of the project, and report to Municipal Project Office. 2. Carry out the work of timely monitoring the environmental impact of sudden contamination accident.

4 Environmental Codes of Practice (ECOP)

4.1 Regulations on Environmental Protection at Design Stage

See Attachment I *Regulations on Environmental Protection at Design Stage* for details.

4.2 Regulations on Environmental Protection during Construction Period

The details are included in:

Attachment 2 *General Rules of Environmental Protection during Construction Period;*

Attachment 3 *Management Regulations on Protection Measures for Bridge Construction*;

Attachment 4 *Management Regulations on Protection Measures for Wastewater Intercepting Main Sewer Construction;*

Attachment 5 *Management Regulations on Protection Measures for Reclaimed Water Reuse Works Construction;*

Attachment 6 *Management Regulations on Protection Measures for Gully Improvement Works Construction;*

Attachment 7 *Management Regulations on Protection Measures for Construction of Road Network and Pipe Network Works in Beichuan Zone*;

Attachment 8 *Labor Protection and Safety in Production*

4.3 Regulations on Environmental Protection during Operation Period

For details refer to:

Attachment 9 *Regulations on Environmental Protection of Road and Pipe Network Works during Operation Period*;

Attachment 10 *Regulation on Environmental Protection of Reclaimed Water Reuse Plant during Operation Period.*

Attachment 11 Regulations on IPM

4.4 Environmental Protection Regulations on Environmental Risks

For details see Attachment 12 *Control and Prevention Measures against*

Environmental Risk Accident of Wastewater Interception Pipe Network, Attachment 13 *Control and Prevention Measures against Road Environmental Risk Accident* and Attachment 14 *Emergency Preparedness Plan for Risks relating to Transport of Hazardous Articles.*

4.5 Social Impact Assessment and the Action Plan

The project management office (PMO) for the proposed project engaged a task team of the Resettlement Center of Hoihai University to conduct investigations on and assessment of the potential social impacts by the proposed project. The task team thus prepared a *Social Assessment Report* for the project and the main findings are summarized in the following sections.

4.5.1 Social Impact Assessment

Based on systematic field surveys, the social assessment expert and his task team conducted prediction and adequate analysis of social impacts and benefits of the proposed project during its construction and operation periods, and summarized the main findings of social assessment. In accordance with results from a great amount of public consultation and participation activities, suggestions on strengthening positive impacts and mitigating negative impacts were also put forward to promote sustainable project development and safeguard interests of and benefits to the local people in the project area. Details of the findings and suggestions are shown in Table 4.-1 that follows.

Table 4-1 Findings from Social Assessment and Suggestions

No.	Findings from Social Assessment	Suggestions
1	During project construction, business of shops, enterprises along both sides of the roads and daily life and safety of trips of the local residents may be impacted.	1) Information dissemination prior to the construction should be well conducted, and section by section and phased construction should be adopted to minimize impacts on the enterprises and businesses along both sides of the roads. Measures for noise abatement, dust prevention and staggered construction hours to avoid impacts on daily life of local residents should be used. 2) Rapid and effective methods should be used to ensure the local residents are informed in a timely manner of project construction and safety information. 3) Safety guidance and direction sign boards should be placed on the construction sites and critical road sections. 4) Construction safety management should be incorporated into contract with the contractors, and safety awareness of the construction workers and the education should be strengthened.
2	Maintenance and management should be strengthened at later stage of the project, such as pipe maintenance, management on solid waste to reduce arbitrary dumping of solid waste	1) Responsibilities of environmental protection, urban management, water resources, municipal management and other departments should be clearly defined, and scientific management should be promoted. Meanwhile, participation of and supervision by all citizens should be strengthened. 2) Emergency repair mechanism should be established and specially assigned telephones for sewage pipe repair should be disclosed to the public. 3) Supervision on wastewater discharge and solid waste dumping by the enterprises and local residents along the rivers should be enhanced.

		4) Establish a complete environmental sanitation service system.
3	Lack of environmental protection awareness of the local residents	1) Make use of multiple communication and information dissemination methods to upgrade environmental protection awareness of local people. 2) Conduct the awareness raising activities at time and in the way easier for local people to accept
4	Weak project participation awareness and capability of local residents	1) Ensure information disclosure to the public and establish complaint and grievance channels. 2) Establish volunteer service groups at community level. 3) Give priority treatment to women, poor people and other vulnerable groups when non-technical employment opportunities are available in the process of project construction based on full respects to their own willingness
5	Participation in resettlement process	1) Consult people to be resettled to understand their opinions and ideas on structure, site selection of houses for the resettlement arrangement. 2) Enable participation of people to be resettled in supervision on their house construction to ensure quality of the construction. 3) Listen to opinions of the people to be resettled on house allocation plan.
6	Management on new communities to be built	1) Prepare property management manual. 2) Listen to opinions of the residents on property management and property fee charging.
7	Attend to sustainable project development needs and capacity	Reserve some connection inlets in the sewage and reclaimed water pipes to allow for future connections at later stage of the project.

4.5.2 Social Risks and Action Plan

Through implementing construction of sewage and rainwater collection pipes, demonstration of reuse of reclaimed water, LID and river bank environmental recovery and gully integrated improvement, the proposed project will help in improving natural and human environment of the project area, upgrading living and leisure environment for the local residents, promoting local community development and construction, facilitating upgraded urbanization and community management, and thus actively promoting comprehensive development of the project area. Implementation of the proposed project will produce all-rounded, open to all and shared social benefits. Such social benefits will not only be apparent in the short run, but also sustainable in the long run to promote sound social development.

In the process of project implementation, while paying attention to attaining project benefits, social risks that may accompany the project should not be neglected. If improperly handled, the activities involving sewage and/or reclaimed water pipe installation, connection and management and other constructions may cause negative impacts that undermine the project benefits or even cause negative impacts on realization of project objectives. To address these potential risks, relevant departments of Xining should have comprehensive consideration and adopt corresponding measures

to reduce such risks and ensure project benefits for sustainable project development.

Together with the PMO, project owners, implementing entities and project design institute, the social assessment task team conducted thorough consultation and discussions on the social risks and prepared a feasible social action plan with details shown in the following table (Table 4-2).

Table 4-2 Social Risks of the Proposed Project and the Action Plan

Project Components	Project Risks	Actions	Timing of Action
Rainwater and Sewage Collection Pipes	① During construction, business of enterprises and shops along both sides of the roads and daily life of local residents may be impacted and the resulted risk; ②Risk relating to low affordability of people having minimal living allowance subsidies; ③ Risk of wastewater treatment fee partially not collected; ④ Risk relating to pipe connection fee ; ⑤ Risk relating to pipe operation and maintenance	① Project unit committed to well conduct information dissemination prior to construction, and adopt phased and section by section construction method to reduce impacts on business of the enterprises and shops along both sides of the roads. Meanwhile, measures for noise abatement, dust prevention and staggered construction timing to avoid or reduce impact on daily life of local residents will be adopted. ②Project owner and relevant departments of the local government have committed to exercise preferential policy prior to project operation to exempt water charge or provide subsidies to people having minimal living allowance subsidies. ③Well perform activities to collect waste water treatment fee from households that are not using tap water as domestic water supply source. ④Based on full consultation with local residents and incomes of local residents, formulate affordable connection fees; ⑤Establish emergency repair mechanism and publicize specially assigned telephones for sewage pipe repair.	① Prior to and during construction; ②During construction; ③During construction and operation; ④During construction and operation; ⑤During operation.
Demonstration of Reuse of Reclaimed Water	①Risks relating to reclaimed water quality and quantity; ②Risks resulted from construction. ;	①Establish self-check system to ensure regular and irregular check of quality of reclaimed water from the reclaimed water plant; ② Project unit committed to well conduct information dissemination prior to construction, and adopt phased and section by section construction method to reduce impacts on business of the enterprises and shops along both sides of the roads. Meanwhile, measures for noise abatement, dust prevention and staggered construction timing to avoid or reduce impact on daily life of local residents will be adopted.	①During operation; ②Prior to and during construction; ③Prior to and during construction.
LID and River Bank Enviornmental Improvement	①Risks relating to lack of environmental protection awareness of local residents; ②Risks relating to project	① Strengthen information dissemination and awareness raising of environmental protection to the local residents, and reinforce supervision by administrative departments on waste water discharge by enterprises and residents along the river banks, so as to ensure clean water in the	①During construction and operation; ②During operation;

	maintenance at later stage; ③Risks relating to living habits of local residents.	rivers; ② Responsibilities of environmental protection, urban management, water resources, municipal management and other departments should be clearly defined, and scientific management should be promoted. Meanwhile, participation of and supervision by all citizens should be strengthened.; ③ Set up warning sign boards at dangerous sections.	③During operation.
Integrated Gully Improvment	①Risks relating to lack of awareness of environmental protection of local residents; ②Risks relating to project maintenance at later stage; ③Risks relating to project construction.	①Upgrade environmental protection awareness of local people by using multiple measures of information dissemination and awareness raising; ②Establish a sound and complete environmental sanitation service system; ③Project unit committed to well conduct information dissemination prior to construction, and adopt phased and section by section construction method to reduce impacts on business of the enterprises and shops along both sides of the roads. Meanwhile, measures for noise abatement, dust prevention and staggered construction timing to avoid or reduce impact on daily life of local residents will be adopted.	①During operation; ②During construction and operation; ③Prior to and during construction.

5 Monitoring Plan

5.1 Purpose and Principle of Monitoring

The environmental impacts during construction period are mainly domestic pollution due to gathering of construction personnel, noise due to operations of construction agency, and water and soil loss, dust nuisance and other pollutions caused during construction work, earth and stone work evacuation, and road surfacing. When the project is put into operation after its completion, the driving vehicles will generate exhaust gas, dust nuisance, noise, etc., the operation of wastewater treatment and reclamation plant will generate noise and foul smell contaminating surrounding environment, and the operation of wastewater treatment and reclamation plant project will cause noise emission. In addition, the serious contamination of local area by sudden contamination accident needs to be considered. Therefore, in order to overall and timely grasp the trends of pollution along the project, learn about the environmental quality change of neighboring region, and serve the environmental management of project construction area, the environmental monitoring needs to be carried out for the construction project.

The environmental monitoring plan is prepared for the purpose of supervising the implementation of each measure so as to adjust in a timely manner the environmental protection action plan, providing basis for the implementation time and implementation plan for environmental protection measures. The monitoring plan is prepared by predicting the main environmental impacts, road sections likely to exceed standard and indexes that might be exceeded (with focus placed on main sensitive receptors).

Implementation of the environmental monitoring plan will enable timely understanding of environmental quality of project area and will help in analyzing environmental impacts of project construction, so that corresponding mitigation measures can be taken to minimize environmental impacts caused by project construction, ensuring that negative impacts on people's life or damage to natural ecological environment can be eliminated or mitigated. Environmental monitoring for the overall proposed project can be entrusted by Xining Municipal World Bank Project Office to a qualified institute, which will then take responsibilities for collecting and analyzing data and preparing environmental analysis report for submission to the entrusting party and, via the entrusting party, to the World Bank. See Table 5-1 for organizational responsibilities of monitoring plan for the project.

Table 5-1 Organizational Responsibilities of Monitoring Plan

Tasks	**Responsible Unit**
Collection of monitoring data	Local environmental monitoring station with qualifications can be entrusted

Data analysis	Monitoring unit is responsible for collecting and analyzing data
Preparation of environmental report	Monitoring unit prepares the report based on monitoring data collected
Xining Municipal World Bank Project Office may entrust a unit to conduct the above tasks. According to the monitoring plan, the entrustee should consolidate and analyze the quarterly monitoring data, and prepare and submit environmental analysis report to the entrusting party for its submission to the World Bank.	
Management Plan	After its submission, the environmental analysis report shall be managed and filed by Xining World Bank Project Office, and will be used to compile the overall environmental impact report during project implementation for the purpose of project completion acceptance.

5.2 Monitoring Agency

It is recommended that management organization should entrust the local environmental monitoring station with qualifications to perform monitoring plan and undertake timely monitoring of environmental impacts of sudden contamination accident. On one hand, such arrangement can make use of advantages of the fully-staffed, well-equipped, existing environmental monitoring; on the other hand, it can save costs of investment in monitoring equipment and personnel for the management organization of the proposed project. The project management organization should sign monitoring contract for implementation period prior to commencement of construction, and sign monitoring contract for operation period prior to project delivery.

5.3 Environmental Monitoring Plan

According to results of environmental impact prediction, the pollution sensitive receptors are selected as monitoring objects. Based on potential pollution during construction period and operation period, acoustic environment and environmental air are to be monitored. Monitoring indicators are determined based on pollution characteristic factors identified through engineering analysis. The monitoring analysis methods of corresponding items in *Environmental Monitoring Technical Norms* are adopted. Corresponding assessment standards defined in national standards and confirmed during environmental impact assessment are applied as evaluation criteria.

According to the engineering and environmental characteristics, the environmental monitoring contents during construction period and operation period are determined. See Tables 5-2 through to 5-7, respectively, for detailed monitoring content of project activities including reclaimed water plant, reclaimed water pipe network, urban wastewater collection pipe network, river bank environmental improvement, and integrated gully improvement. Environmental supervisor will supervise the civil work contractors to implement the general

ECOPs and the specific ECOPs.

Table 5-2 Environmental Monitoring Plan for Reclaimed Water Reuse Works

Periods	Environmental Factors	Monitoring Locations	Monitoring Items	Monitoring Frequencies	Responsible Agencies	Implementation Agencies	Supervision Agencies	Monitoring Expense (RMB 10,000)
Construction period*	Sound	Construction site of sensitive points (Shuangsubao Village) surrounding Reclaimed Water Plant	LAeq	Once every quarter, 2 consecutive days every time, once respectively during day and night every day	Contractor	The entrusted monitoring unit	Xining Environmental Protection Bureau	0.4/year
	Atmosphere	Construction site of sensitive points (Shuangsubao Village) surrounding Reclaimed Water Plant	TSP, PM_{10}, PM2.5	Once every quarter, 2 consecutive days every time, 4 times every day				2/year
Operation period	Sound	Boundaries of Reclaimed Water Plant	LAeq	Twice every year, 2 consecutive days every time, once respectively during day and night every day	Xining Drainage Company			0.2/year
	Atmosphere	Boundaries of Reclaimed Water Plant	Concentrations of ammonia, hydrogen sulfide and stench	Once every quarter, 2 consecutive days every time, 4 times every day				3/year
	Water	Outlet of Reclaimed Water Plant	PH, chroma, smell, turbidity, total dissolved solid, BOD5, COD, ammonia nitrogen, total nitrogen, total phosphorus, anionic surfactant, iron, manganese, dissolved oxygen, total residual chlorine, total coliforms	Before application of water at greening season Once every day during greening period Once every day during period of road sprinkling		Analysis laboratory of No.5 Wastewater Treatment Plant		/
	Soil	Areas where reclaimed water is adopted for greening	Total salt content, chloride content (calculated by cl%), and sulfate content (calculated by SO_4^-%) of soil	Once every month, 3 consecutive days every time		The entrusted monitoring unit		3/year

Table 5-3 Environmental Monitoring Plans for Rainwater and Wastewater Collection Pipe Network Works, Reclaimed Water Reuse Pipe Network Works, Ancillary Road Works, Low-Impact Development and River Bank Environmental Improvement Works Implemented within Beichuan Area

Period	Environmental Factors	Monitoring Locations	Monitoring Items	Monitoring Frequencies	Responsible Agencies	Implementation Agencies	Supervision Agencies	Monitoring Expense (RMB 10,000)
Construction period	Sound	Construction sites with strong noise within 200m from residential area and sensitive area (Hetan Village, Zhangjiawan Village, Xiaozhai Village)	LAeq	Once every quarter, 2 consecutive days every time, once respectively during day and night every day	Contractor	The entrusted monitoring unit	Xining Env. Protection Bureau	0.4/year
	Atmosphere	Construction sites with strong noise within 200m from residential area and sensitive area (Hetan Village, Zhangjiawan Village, Xiaozhai Village)	TSP, PM_{10}, PM2.5	Once every quarter, 2 consecutive days every time, 4 times every day				2/year
	Water	Runze Bridge, Chaoyang Bridge, Zhamalong, Xigang Bridge, Xinning Bridge	pH, COD_{Cr}, SS, BOD5, DO, Cr^{6+}, petroleum, phosphate, ammonia nitrogen, sulfide, total number of bacteria, coliforms	Once respectively during high, normal and low flow seasons				5/year
Operation period	Sound	Kunlun College of Qinghai University, Xining No.4 Senior Middle School	LAeq	Once every year, 2 consecutive days every time, once respectively during day and night every day	Executive Office of Xining Huangshui Investment Management Co., Ltd.			0.4/year
	Atmosphere		SO_2, NO_x, CO, TSP, PM_{10}, PM2.5	Once every year, 2 consecutive days every time, 4 times every day				1/year

Table 5-4 Monitoring Plan for Integrated Gully Improvement

Stage	Environmental Factors	Monitoring Items	Monitoring Locations	Monitoring Frequencies and Time	Responsible Agencies	Implementation Agencies	Supervision Agencies	Monitoring Expense (RMB 10,000)
Construction period	Sound	LAeq	3 sensitive points selected along ditch (Guojiata Village, Jiujiawan Village, Xin Village)	Once every quarter, 2 consecutive days every time, once respectively during day and night every day	Contractor	The entrusted monitoring unit	Xining Environmental Protection Bureau	0.4/year
	Atmosphere	TSP, PM_{10}	3 sensitive points selected along ditch (Guojiata Village, Jiujiawan Village, Xin Village)	Once every quarter, 2 consecutive days every time, 4 times every day				2/year

Table 5-5 Environmental Monitoring Plans for Relevant Supporting Projects during Operation Period

Stage	Monitoring Locations	Monitoring Items	Monitoring Frequencies	Implementation Agencies	Responsible Agencies	Supervision Agencies	Monitoring Expense (RMB 10,000)
Operation period	Outlets of No. 3, No. 4, No. 5 Wastewater Treatment Plants	pH, SS, COD, BOD5, animal and vegetable oils, petroleum, anionic surfactant, total nitrogen, ammonia nitrogen, total phosphorus, chroma, number of fecal coliforms	Routine monitoring frequency of Wastewater Treatment Plant	Analysis laboratory of plant	Water Supply and Drainage Company	Xining Environmental Protection Bureau	/
	No. 3, No, 4, No. 5 WWTPs	To get the information on the performance of sludge disposal	Twice a year	WWTPs	Water Supply and Drainage Company	Xining EPB	/

Table 5-6 LID Implementation Effect Monitoring

Stage	Monitoring Locations	Monitoring Items	Monitoring Frequencies	Implementation Agencies	Responsible Agencies	Supervision Agencies	Monitoring Expense (RMB 10,000)
Before construction	Surface rainfall within areas of River Bank Restoration Works in Beichuan area	BOD5, COD, SS, TN, TP, escherichia coli	After every rainstorm	Executive Office of Xining Huangshui Investment Management Co., Ltd.	The entrusted monitoring unit	Xining Environmental Protection Bureau	0.5/time
Construction period	Surface rainfall where LID system is set up						
Operation period							

Table 5-7 Monitoring of Water and Soil Conservation

Stage	Monitoring Locations	Monitoring Items	Monitoring Frequencies	Implementation Agencies	Responsible Agencies	Supervision Agencies	Monitoring Expense (RMB 10,000)
Before construction	Temporary waste yard, large excavation area, borrow pit, construction camp, and the ditch and river bank covered by environmental management	Current situation of landscape and vegetation of the proposed construction area Current situation of grass coverage Current situation of intensity and amount of water and soil loss	Once every quarter within one year before construction. Add monitoring after rainstorm	Executive Office of Xining Huangshui Investment Management Co., Ltd.	The entrusted monitoring unit	Xining Environmental Protection Bureau, Xining Water and Soil Conservation Bureau	10/year
Construction period		Scope of responsibilities for water and soil loss prevention; Area of land occupied by project construction and area of disturbed surface; Changes of landscape and vegetation disturbance area; Excavation and filling quantity changes of the project; Area, amount and intensity changes of water and soil loss;	Once every month. Add monitoring after rainstorm. Monitoring of earthwork volume once every 10 days;	Contractor			10/year

Operation period		Quantity and quality of prevention measures for water and soil conservation (engineering measures, vegetation measures and temporary measures); Area, situation of growth and development (height of tree, DBH of arbor, and crown breadth of arbor and shrub), survival rate, preservation rate and vegetation coverage of grass; Reliability, soundness and operating condition of engineering protection measures; Effect (soil conservation effect) monitoring of implemented water and soil conservation measures, including effects of controlling water and soil loss amount, improving rate of slag retaining, and improving ecological system.	Once every month. Add monitoring after rainstorm. Monitoring of earthwork volume once every 10 days; Monitoring of survival rate, coverage rate and growth increment of vegetation once every 3 months.	Executive Office of Xining Huangshui Investment Management Co., Ltd.			10/year

In addition to the above monitoring content, during construction period of the project, the personnel responsible for supervision shall investigate every day the construction field where dust is prone to formation (such as whether temporary waste bank meets land occupation and dust prevention standards, whether the borrowing at borrow pit conforms to standards and generates much dust nuisance etc.) and strengthen the management of construction site.

5.4 Expenditures for Monitoring

(1) One Year Before Construction

Monitoring of soil and water conservation: 100 thousand yuan;

LID monitoring (calculated based on 6 rainstorms per year): 30 thousand yuan

Costs for background monitoring of the proposed project before construction are RMB 130 thousand in total.

(2) Construction Period

The construction period of the proposed project is 5 years. Monitoring costs involved in construction period of each sub-project are listed as follows:

For reclaimed water plant: 120 thousand yuan;

For integrated gully improvement: 120 thousand yuan;

For works in Beichuan area: 370 thousand yuan;

For water and soil conservation: 500

LID monitoring (calculated based on 6 rainstorms per year): 150 thousand yuan.

Monitoring costs involved in construction period of the proposed project are RMB 1.26 million in total, including costs for monitoring of water and soil conservation RMB 0.5 million and that for monitoring of environmental protection RMB 0.76 million.

(3) Operation Period

Operation period of the proposed project is taken as 30 years. Monitoring costs involved in operation period of each sub-project are listed as follows:

For reclaimed water plant: 1.86 million yuan;

For works in Beichuan area: 420 thousand yuan;

For water and soil conservation: 3 million yuan

LID monitoring (calculated based on 6 rainstorms per year): 0.9 million yuan.

Monitoring costs involved in operation period of the proposed project are RMB 6.18 million in total, including costs for monitoring of water and soil conservation RMB 3 million and that for monitoring of environmental protection RMB 3.18 million.

(4) Total Estimated Costs

According to the above monitoring plan during construction period and operation period of the project, RMB 7.57 million is required in total as monitoring costs of the proposed project, including RMB 3.5 million for monitoring of water and soil conservation and RMB 4.70 million for monitoring of environmental protection. Since point position may change during implementation and operation periods of the project, specific monitoring and implementation costs shall be subject to the officially signed contract between the project implementation organization and monitoring unit.

5.5 Reporting System of Monitoring

Monitoring unit shall submit official monitoring report after completion of each monitoring task and the report should be submitted to the upper level superior as per relevant procedures. During construction period, monthly report, quarterly report and annual report shall be provided, while during operation period, quarterly report and annual report shall be provided. In case of emergency accident, the monitoring unit shall report it to the superior immediately. In the project, monitoring report procedures are listed in Fig. 5-1.

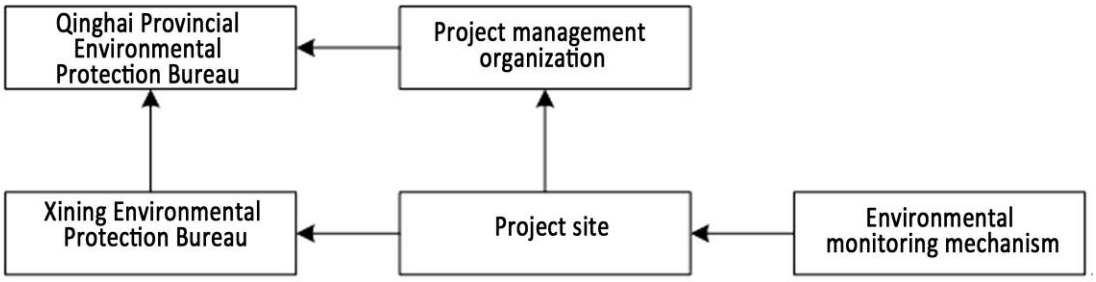


Fig. 5-1 Monitoring Report Procedure

6 Environmental Supervision System

Because various operations and activities during project construction period will generate a certain impact on ecological environment, in order to minimize the impact of constriction on environment and reduce occurrence of accident, environmental management shall be strengthened, and various environmental protection measures and safety measures shall be put into practice. It is recommended to introduce environmental supervision system for the project. The supervisor's performance in undertaking environmental protection supervision responsibilities during construction period directly relates to implementation effectiveness of environmental protection measures at the stage.

6.1 Purpose of Environmental Supervision

Implementation of environmental supervision on the proposed project aims to make environmental supervision and management responsibilities clear on construction site, and make objective clear, as well as implement supervision in the whole construction course of the project, so as to ensure that various environmental protection measures put forward in environmental protection design and environmental impact report can be successfully implemented, and that contract conditions regarding environmental protection as stated in construction contract can be put into practice.

6.2 Tasks of Environment Supervisor

During construction of the project, tasks of environment supervisor include:

1) Management, i.e., management for collecting, classifying, handling, feeding back and storing information on supervision, environment and quality.

2) Coordination, i.e., coordination and organization between the owner and the contractor, the owner and design unit, various departments involved in the project construction.

3) Control of quality and progress.

6.3 Framework of Environmental Supervision

1) Establish and strengthen organizational system for environmental supervision

Environmental supervision has dual natures. From the perspective of independence, professional mechanism must be set and full-time personnel with relatively high

professional quality must be allocated. It is recommended to incorporate the environmental supervision of the project into engineering supervision, in which full-time environmental protection personnel are required. As a result, the project quality can be comprehensively managed with dual requirements of project quality and environmental protection quality. In the project, environmental protection and supervision must be conducted under the supervision of regional and local environmental protection bureaus.

2) Formulate relevant environmental protection & management measures and implementation rules

Based on national environmental protection policies, laws & regulations, and according to environmental monitoring & supervision plans formulated as per the environment assessment report of the project, relevant environmental protection systems of the project shall be established.

3) Establish a completed environmental supervision system

① Work record system, i.e., “supervisor diary”. Patrol inspection and environmental problem shall be described, causes for problem and responsible unit shall be analyzed, and preliminary handling comments shall be put forward.

② Reporting system, including “monthly report” of environmental supervision engineer, “quarterly report” and “half-year schedule assessment report” of engineer, and “monthly report on environment” of the project contractor.

③ Document notification system: Only working relationship should exist between environmental supervision engineer and the contractor, and affairs between the two parties should be communicated and confirmed by delivering documents. In case of emergency works, oral notification is firstly made, and a written document will be submitted for confirmation after the next day.

④ Regular environmental meeting system: It means that environmental protection meeting shall be held once a month to review and summarize the work of environmental protection for the last month. At the meeting, engineer, environmental supervision engineer and other relevant personnel shall gather together to discuss problems and rectification requirements, so as to unify thought and form implementation scheme.

6.4 Requirements on Environment Supervisor

Since environmental supervision is a new topic, whether it can work or not greatly depends on the quality of environment supervisor. For this reason, the following requirements are put forward for the environment supervisor:

1) Possess corresponding professional environmental protection quality and have

long working experience in environmental protection.

2) Master national environmental laws, regulations and policies, and be aware of requirements and environmental standards of local environmental protection departments.

3) Be familiar with EA report, and be aware of environmentally sensitive problems of the project and corresponding measures.

6.5 Responsibilities of Environment Supervisor

Environment supervisor shall be responsible for on-site construction supervision, with main responsibilities as follows:

1) Review environmental protection schemes submitted by construction bidders and corresponding expenses involved in environmental protection, and ensure that "environmental management scheme" is put into practice on construction site.

2) Review construction contract, and supervise the owner to write environmental protection contents, related costs and corresponding penalties in the construction contract.

3) Report current situation of construction environment management to relevant departments in a timely manner, and put forward rational suggestions specific to problems found.

4) Prevent the behaviors causing environmental pollution or future trouble including the behavior of violating environmental laws & regulations, and give penalties for the behavior generating great impact on environment.

6.6 Construction Preparation and Requirements for Environment Supervisor

After civil works contract is awarded and before the construction is commenced, in the municipal project office, the environment supervisor should provide the contractor with the results of environmental impact assessment carried out for each individual project, including environment assessment report, Environmental Codes of Practice, environmental management plan, and a copy of approval document on environmental assessment report by local environmental protection bureau. The environment supervisor should require the contractor to investigate construction site environment, so as to verify and identify the description of surrounding environment on construction site provided in environmental impact assessment of each individual project and environmental constraints within the project area. For environmentally sensitive problems newly identified during the environmental investigation before construction, the supervisor should put forward corresponding environmental protection &

prevention & relief measures, and no construction shall be performed without prior approval of the environment supervisor.

During project construction, the environment supervisor shall inspect whether environmental protection & prevention measures for construction meet the requirements as specified in Environmental Codes of Practice. Environment supervisor shall inspect construction site at least once a week; fill out checklist of environmental protection inspection during construction (attached table 1) and keep it in a file; send environmental protection rectification notice (attached table 2) to the contractor relating to environmental problems in construction process; supervise the contractor to take corresponding rectification measures; and submit half-year report to project office and specialists of the World Bank. After completion of the construction and prior to environmental protection acceptance, the environment supervisor should inspect the site environment, and fill out and file the environmental checklist before environmental protection acceptance (see attached table 3 for details).

The workflow of environmental supervisor during construction period is shown in Fig. 6.6-1.

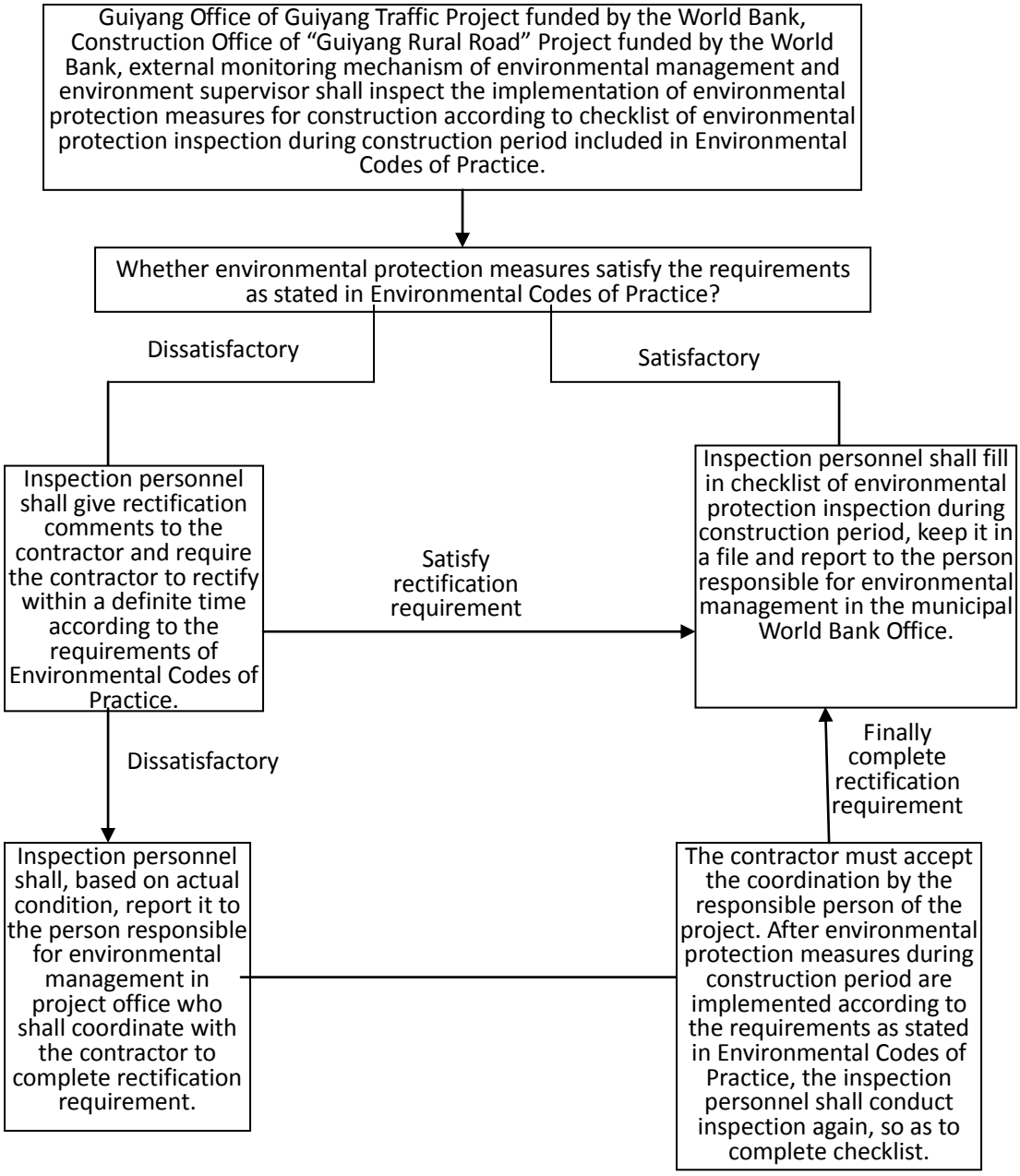


Fig. 6.6-1 Workflow of Environmental Supervision

7 Capacity Building and Training

7.1 Training Purpose

Environmental management training is intended to ensure that environmental management can be carried out smoothly and effectively, familiarize relevant personnel with contents and procedures of environmental management, improve ability of environmental management, and make sure that various environmental protection measures can be efficiently put into practice. Environmental capacity building is mainly for environment manager and environment supervisor. The training is part of technical assistance under the project. During implementation of the project, training shall be provided to the owner and construction personnel. Before construction commencement, all contractors, management units and building supervision personnel are compulsively required to attend training involving environment, health and safety.

7.2 Trainees

Trainees include staff of the project office and implementation unit of each sub-project, all environment supervisors, representatives of environmental monitoring unit and main contractors and etc.

7.3 Contents of Training

(1) Understanding and application of environmental policies of the World Bank, domestic environmental protection laws & regulations and environmental standards;

(2) Environmental management model for projects funded by the World Bank and environmental clauses as specified in the Loan Agreement;

(3) Environmental management plan of the project;

(4) Responsibilities of environment manager, environment supervisor, environmental monitoring personnel and the contractors, and their correlations;

(5) Preparation of environmental management report, environmental supervision report, environmental monitoring report, contractor log and monthly report, interim report and annual report as technical documents for "three-simultaneity" acceptance.

7.4 Training Plan

The main adverse impacts caused by the project are environmental impacts during construction, therefore, training must be provided to relevant environmental protection personnel when the project is implemented, so as to improve technical level of environmental management of the project. In the project, specific training objects and costs involved are shown in Table 7-1.

Table 7-1 Training Plan for Environmental Protection Personnel in the Project

Project Components	Organized by	Number of Trainee	Post			Training Stage	Training Time	Training Duration	Training costs (yuan)	Training Method	Training Place	Objectives and Contents of Training
			Prior to Implementation	During Implementation of the Project	After Implementation of the Project							
Urban Wastewater Collection Pipe Network	Project office	6	Huangshui River Basin (Xining Section) Integrated Management Committee	Environmental supervision and management for construction of works	Executive Offices of Xining Water Supply and Drainage Company and Xining Huangshui Investment Management Co., Ltd.	Before construction	Three month before construction of the project	One week	60,000	Invite environmental protection experts to conduct unified training.	Huangshui River Management Committee	Objectives: observe environmental laws & regulations, prevent pollution and protect ecological environment, and continuously improve environmental performance requirements. Strictly implement the environmental measures as stated in EMP, and build knowledge on environmental management of the project; ② basic knowledge of environmental monitoring; ③ relevant provisions of environmental monitoring enforcement; ④ supervision technology of environmental engineering; ⑤ training of environmental management standard system and basic quality of management personnel. Contents: ① environmental protection laws & regulations and standards.
Low-impact Development and River Bank Environmental Improvement	Project office	6							60,000			
Reuse of Reclaimed water	Project office	3							30,000			
Integrated Gully Improvement	Project office	6							60,000			
Training plan for construction personnel	Contractor of each bid section	All construction personnel	Each bid section of corresponding works				month after the contract is signed	One week	20,000 for each bid section, paid by the contractor and included in construction contract.			Objectives: observe environmental regulations, prevent pollution and protect ecological environment. Contents: environmental protection laws & regulations, behavioral norms and rules of environmental protection.

8 Cost Estimate

The proposed project has a total investment of RMB 1524.1771 million, including total investment in environmental protection being RMB 10.815 million, or 0.71% of the total investment of the project.

(1) For urban wastewater collection pipe network works and environmental restoration works for river bank, environmental protection investments mainly include expenses for post-construction greening restoration, environmental management and environmental protection on construction camp. See Table 8-1 for details.

Table 8-1 Estimates for Environmental Protection Investment in Intercepting Main Sewer and Integrated River Bank Improvement of Beichuan River

S/N	Name of Environmental Protection Investment	Environmental Protection Measures	Expenditure Estimate (RMB Ten Thousand)	Remarks
1	Costs for greening		8	For greening of temporary occupied land of construction
2	Sound proof wall of 400m at sensitive receptor sites		52	Noise abatement
3	Management costs	Supervision costs	30	Supervision at construction period
4		Costs for management personnel	15	Labor costs
5		Equipment procurement costs and material costs	5	Office costs required during management
6	Construction camp	Set seepage-proof pit toilet and sedimentation tank for construction camp, and dispose garbage.	10	Prevent pollution on construction camp
7	Monitoring costs	Construction period	55	Construction period 5 years
		Operation period	132	Operation period 30 years
8	Monitoring of soil and water conservation		360	
9	Contingency costs		33.35	Calculated as 5%
10	Total		700.35	/

(2) In comprehensive management project for ditch, environmental protection investments mainly include expenses for greening restoration of occupied land for construction, environmental management and environmental protection on construction camp. See Table 8-2 for details.

Table 8-2 Estimates for Environmental Protection Investment in Comprehensive Management Project for Ditch

No.	Name of Environmental Protection Investment	Environmental Protection Measures	Expenditure Estimate (RMB Ten Thousand)	Remarks
1	Costs for greening		30	Greening for temporary occupied land
2	Domestic wastewater treatment on construction camp	Set seepage-proofing pit toilet and sedimentation tank for construction camp, and dispose garbage.	15	Reduce water quality pollution and protect water resource at early stage of the project
3	Management costs	Supervision costs	15	Supervision at construction period
		Costs for management personnel	10	Labor costs
4		Equipment procurement costs and material costs	5	Office costs required during management
5	Monitoring costs	Construction period	12	Construction period 5 years
6	Contingency costs		4.35	Calculated as 5%
7	Total		91.35	/

(3) In reclaimed water plant, the environmental protection investments mainly include expenses for plant area greening, noise& dust nuisance control, as well as contingency costs. See Table 8-3 for details.

Table 8-3 Estimates for Environmental Protection Investment in Reclaimed Water Plant

No.	Environmental Protection Investment	Environmental Protection Measures	Expenditure Estimate (RMB Ten Thousand)	Remarks
1	Prevention of dust nuisance	Spray water to reduce dust pollution during construction period, and spray water on road during operation period.	3	Prevent dust by spraying water
2	Noise prevention during operation period	Low-speed submersible pump Cover by water pool	15	Reduce noise
3	Costs for greening		30	Greening within plant area
	Management costs	Supervision costs	15	Supervision at construction period
5		Costs for management personnel	10	Labor costs
6		Equipment procurement costs and material costs	5	Office costs required during management
	Monitoring costs	Construction period	12	Construction period 5 years
		Operation period	186	Operation period 30 years
7	Contingency costs		13.8	Calculated as 5%
	Total		289.8	/

9 Public Complaint Mechanism

Project complaint mechanism involves each implementation period of the project, relating to project resettlement, disturbances during construction period and supervision during operation period.

(1) Public complaint for resettlement: In case of any problem, the affected person can file a petition to Office of Project Leading Group, and the project office shall make decision on petition handling within 2 weeks.

If the affected person is not satisfied with the decision made by the Office of the Project Leading Group, he/she can, after receiving the notice of decision, complain to administrative organs with jurisdiction level by level for arbitration according to Administrative Procedure Law of the People's Republic of China.

In case the affected person is still not satisfied with the arbitration result, he/she can, after receiving arbitration decision, file a lawsuit to civil court according to Civil Procedure Law.

(2) Public complaint during construction period: Each and every implementing unit of the proposed project shall pay close attention to project progress to learn about inconvenience caused to people living in surrounding area of the project construction site, and assign specific personnel as contact to receive people coming to complain. Such specially assigned personnel's telephone number should be publicized, so as to obtain public opinions in a timely manner. For people consulting over telephone or visiting for filing petition, Book of Public Opinions shall be prepared, with names & contacts of the people and impacts brought by construction recorded, so that the public opinions can be collected and reported. It is required that questions raised by the public should replied within three working days, and that corresponding solutions shall be put forward and implemented within ten to fifteen working days based on difficulty of problem handling. The implementation process and final result of problem solving by coordination shall be added to the Book of Public Opinions. In order to address inconvenience caused by project construction on people's life, implementation units are required to submit once a month the Book of Public Opinions to Xining Environmental Protection Bureau at the end of month, for its review and supervision, so as to ensure timely solution to problems if any.

(3) Supervision during operation period: In case of any problem, people can file a petition to Office of Project Leading Group, and the project office shall make record and discuss, and reply within three working days. The project office shall also put forward corresponding solutions within ten to fifteen working days based on difficulty of problems and implement such solutions. The project office is required to submit Book of Public Opinions to Xining Environmental Protection Bureau once a

month at the end of month.

The above complaint approaches will be notified to the public through meeting or by other means, so as to ensure full awareness of the public of their right to complain. Public media will also be used to promote publicity and reporting. Service by the complaint handling organizations shall be free of charge, and any cost incurred due to complaint handing shall be covered by contingency costs of the project office.

Work flow of complaint handling is shown in the following table.

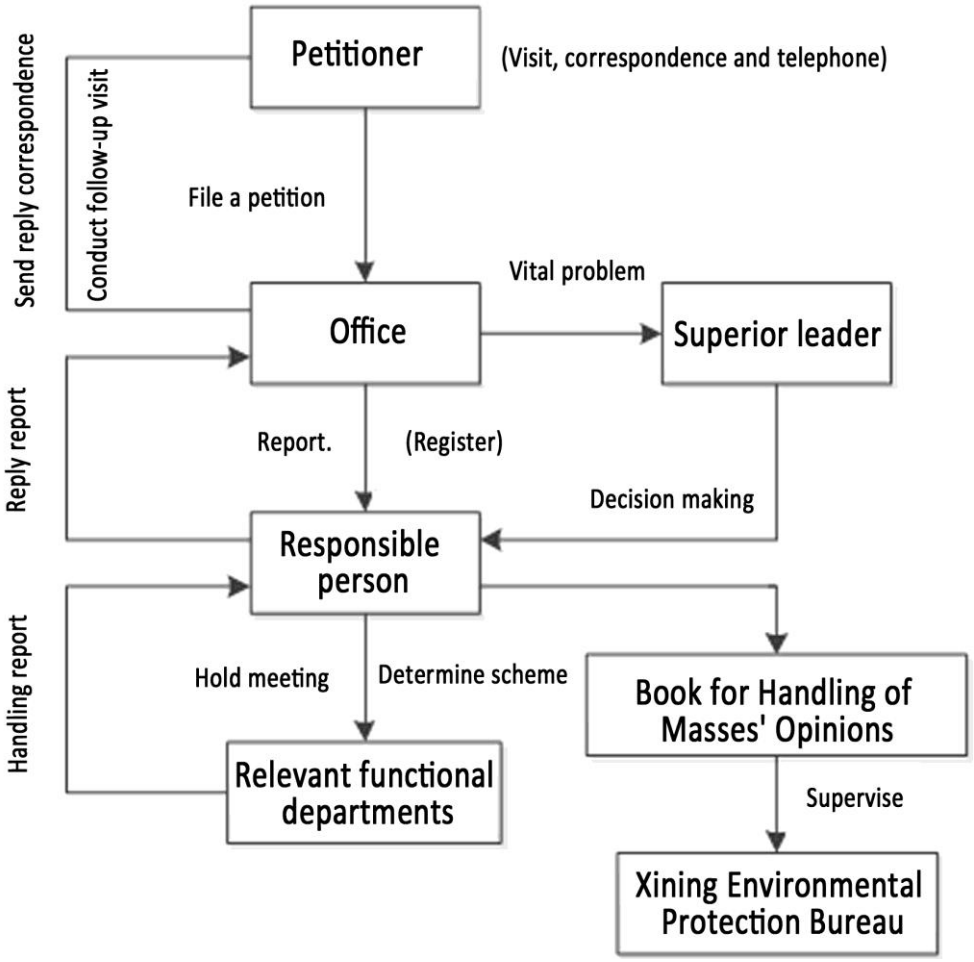


Fig. 9-1 Work Flow of Complaint Handling

10 Reporting Mechanism

During implementation of the project, the municipal project office and environmental supervision unit shall record project progress, EMP implementation progress and monitoring results of environmental quality, and report to relevant departments. More specifically:

(1) After completing monitoring task entrusted, monitoring unit shall submit monitoring report to municipal project office and environmental supervisor engineer in a timely manner.

(2) Environmental supervision engineer of the project shall record the details of EMP implementation and submit weekly report and monthly report to municipal project office in a timely manner, in which execution of environmental protection measures, implementation of environmental monitoring and monitoring data shall be included.

(3) Huangshui Investment Management Co., Ltd. and Xining Drainage Company shall record the details of project progress and EMP execution and submit quarterly report to municipal project office in a timely manner, at the same time, submit the copy of quarterly report to Xining Environmental Protection Bureau.

(4) Municipal project office shall submit EMP execution report to the World Bank once every 6 months. EMP execution report shall include the following main contents:

a. Implementation progress of the project;

b. Implementation of EMP in accordance with current progress, including:

● Arrangement of organization

● Implementation of environmental protection measures;

● Implementation of training plan on capacity building and etc.;

● Implementation of monitoring plan;

● Implementation status of supervision;

● Whether there is complaint from the public shall be clarified. In case of a complaint, its main content, solution and public satisfaction index shall be record.

c. Whether there are other environmental problems.

(5) In case of a vital violation relating to environmental protection, environmental supervision engineer and municipal project office shall report to local administrative competent departments of environmental protection, and report to the superior level by level if necessary.

Attachment 1:

Regulations on Environmental Protection at Design Stage

At the next stages of preliminary design and construction drawing design, detailed design based on the current feasibility study should be conducted with attention paid to the following aspects as described in the following section.

1. Protective Measures for Social Environment

(1) In selecting site for wastewater reclamation plant and layout of roads and pipeline, comprehensive consideration shall be given to natural and social environment along the alignment, so as to save arable land as much as possible, and pass around some environmentally sensitive areas involving residents, school and hospital, as well as minimize interference on electricity, telecommunication and water conservancy facilities along the line and demolition. The route shall be laid far away from or by bypassing natural scenic spot, cultural relics & historic sites, water source area and national key project facilities.

(2) The routing should allow for use of existing space as much as possible to reduce the damage of new route on environment.

(3) Structures shall be set rationally to reduce inconvenient impact of project construction on production and living of masses along the line.

(4) Construction shall be appropriately organized and designed to minimize impact of the construction on environment.

2 Protective Measures for Surface Water Environment

Interface between intercepting main sewer and wastewater pipe network on both sides should be properly arranged to ensure that wastewater can be fully collected on both banks of rivers and reduce impacts of domestic wastewater on surface water.

3 Protective Measures for Ecological Environment

(1) On the premise that technical requirements are met in design, road shall be laid by complying with topographic relief to reduce filling and excavation quantity for subgrade, so as to decrease new water and soil loss caused by road construction.

(2) In site selection for wastewater treatment and reclamation plant, the site range shall be determined according to project scale so as to avoid oversizing land occupation, limit construction within project boundary, and reduce damage on surrounding farmlands.

(3) Transport should be limited within economical haul distances by proper selection of quarry or borrow area, and quantities of excavation and backfilling should be under strict control and the excavated earth shall be reused for backfilling as much as possible, earth borrowing should be conducted in combination with land improvement and reclamation. Wherever condition permits, building waste residue meeting technical standard shall be adopted as much as possible to fill subgrade, so as to reduce land for soil borrowing.

(4) In construction of pipe network works, excavation scope shall be strictly controlled. Area of excavation shall not be arbitrarily enlarged, and water & soil loss shall be reduced.

(5) In designing low-impact system and environmental restoration works for river banks, the following principles shall be followed:

1) Environmental restoration for river banks shall aim to improve aquatic ecological environment on river banks, upgrate water environmental service, and improve overall water environment in Xining;

2) Rainwater volume shall be reduced at source and treated locally, to decrease pollution of initial rainwater on river course, improve aquatic ecological system, and promote its adjustment and control capacities;

3) Achieve the goal that water ecology is in harmony with environment;

4) Create high-quality regional water-loving life and regional space with sustainable development;

5) Realize the goal of controlling pollution, protecting & stabilizing river banks, adjusting micro-climate and beautifying environment.

6) Achieve ecological benefits and adhere to sustainable development.

7) In line with design for Integrated Xichuan River(core section) Improvement Phase 1 Project-Ecological River Channel Development Project, for rainwater discharge after LID treatment, rainwater outlets must be connected with the rainwater discharge outlets of above mentioned project, so that rainwater can be smoothly discharged into Beichuan River, without causing scoring impact on the flood control works.

4. Protective Measures for Acoustic Environment

(1) In design of road network in Beichuan area, consideration shall be given to impact of traffic noise on surrounding school and residential area. Besides, the planning of Beichuan area shall be referred to so as to ensure proper layout and classification of the roads, thus reducing future impact of traffic noise on residents

and work places.

(2) Site selected for wastewater reclamation plant shall be far away from places with dense population, appropriate protective distance shall be provided to reduce impact of noise and odors on residents.

5. Protective Measures for Landscape Environment

Specific to the damage of project construction on environment, the following measures shall be taken in design of proposed project:

(1) In designing Beichuan road network, the roads should be harmonized with urban landscape as much as possible to avoid large scale of filling and excavation.

(2) In paving of road subgrade, construction wastes generated by other works of the project shall be used as much as possible to reduce earth borrowing.

(3) Borrow pit shall be specially designed, for which greening and drainage facilities shall be provided to prevent new water and soil loss.

(4) Wastewater reclamation plant shall be far away from downtown area to avoid impact on urban landscape.

(5) For river bank improvement, urban planning and local plant species shall be considered to rationally lay landscape and select locally suitable plants, so as to make such works in harmony with surrounding environment.

6 Design of Road Traffic Safety Facilities

In order to ensure traffic safety, the road works of proposed project shall be provided with guide sign, indication sign, warning sign and prohibition sign as well as pavement marking.

(1) Pavement Marking

The pavement marking shall be designed based on *Road Traffic Signs and Markings* (GB5768-2009). Marking shall be hot-melt material with good durable performance and light reflecting performance, being labeled with number 2.

Based on different setting positions, markings can be divided into marking of traffic lane (edge line and boundary of traffic lane), marking of pedestrian sidewalk, marking of traffic diversion, indication marking and orientation arrow.

The edge line of traffic lane is white full line with width of 15cm. The boundary of ground traffic lane is white dotted line with width of 15cm. The full line is 6m long with space of 9m and ratio to the dotted line being 2:3. In order to strengthen light

reflecting performance in the night, light-reflecting glass beads shall be mixed in advance. Coating thickness of markings: On asphalt pavement, the thickness is 1.8-2.0mm.Marking surface shall be covered by glass beads, which shall be evenly distributed with content of 0.3-0.34kg/m^2.

Markings shall be of equivalent width, equivalent space, regular line shape, neat edge and smooth line.

(2) Traffic Signs

1) Design Principle

Traffic signs shall be laid according to *Road Traffic Signs and Markings* (GB5768-2009), and shall have complete types and perfect functions. The above design is provided for drivers unfamiliar with the route.

In marking layout of main line, important signs shall be repeatedly promoted. It is prohibited to make markings clutter, so as to avoid information overload. At one position, guide signs shall not be more than 3.Guide sign and prohibition sign cannot be set at one position.

For important signs, drivers' reflection time shall be checked to ensure that the signs are laid rationally.

Marking layout for main line shall be designed in such manner that the information on marking can be timely identified by drivers traveling at designed speed. The layout shall be made conspicuous and beautiful as much as possible.

Prohibition sign shall be set at appropriate position in front of the road section in which speed is limited and non-motor vehicle & pedestrian are not allowed to pass through.

The sign of keeping to the right shall be electronically controlled.

2) Layout Design

The text on traffic sign layout shall be Chinese character and with corresponding phonetic letters, According to designed driving speed, on marking of main line, the Chinese character shall be the height of 40cm with width ratio being 1:1, and the phonetic letter (capital letter) shall be the height of 16cm, with a minimum space between Chinese character and phonetic letter being 12cm.

3) Material of Sign Board and Light-reflecting Film

Aluminum plate plus joist or the aluminum plate formed by extrusion shall be adopted for sign board. The width (or length) of sign board shall be modulus times of

15cm and 30cm for convenience of processing and standard unification. Light-reflecting film of sign shall be of Grade 1.In the project, light-reflecting film color of the sign can be differentiated based on different categories. Thereinto, guide sign is of blue background and white words, prohibition sign is of white background and black words circled by red line, and indication sign is of blue background and white words.

4) Structural Design

Based on different ways being supported, sign structure includes column-type structure, cantilevered structure and attached-type structure, which are adopted in design according to traffic composition, layout size and laying position.

In the preliminary design, according to actual road traffic conditions, traffic signs are set at different sections and positions, to ensure driving safety of vehicles and reduce & prevent traffic accident.

(3) Design of Safety Facilities at Level Crossing

Design of main level crossing is included in the design of works. Relatively complete safety facilities and pavement canalization facilities shall be provided for main level crossing. Advance signs including sign for level crossing entry ahead shall be provided at intersection.

Lines shall be set at level crossing including boundary line of traffic lane, edge line of traffic lane, orientation arrow & traffic diversion line, crosswalk line, advance marking sign line of crosswalk, deceleration line for letting other vehicles pass through, stop line and guide lane line, etc.

Level crossing is the most dangerous place where traffic conflict occurs. In design of traffic works, traffic management measures are taken to reduce danger at level crossing. When sign, marking and traffic signal system are set, electronic police system and safety monitoring system shall also be set.

Attachment 2:

General Rules of Environmental Protection during Construction Period

1. Bid Invitation and Bidding

1) In bidding document, environmental protection object for each bid of works shall be clarified, and the contractor's responsibility and obligation for environmental protection object in project area shall also be clarified. Environmental protection measures and relevant suggestions defined in Environmental Assessment Report approved by environmental protection departments shall be fully incorporated in contract conditions.

2) The bid shall include the contractor's obligations of environmental protection. Subcontractors of the contractor shall commit to perform the obligation of carrying out environmental protection for environmental protection object within the project area. The design and plan of construction organization shall contain the contents involving implementation of environmental protection measures.

3) In the bidding document and bid, it shall also be clearly specified that household waste generated during construction shall be stored in a concentrated way and transported regularly to Yinjiagou Landfill of Xining City for unified treatment.

2. General Regulations

1) The owner shall appoint special personnel to handle environmental protection problems occurring during construction and operation periods, handle environmental problems between the contractor and environmental protection object, and supervise implementation of environmental protection measures during construction period. The contractor is required to appoint at least one main administrative leader to be responsible for environmental protection, so as to cooperate with the owner to put environmental protection measures into practice.

2) The contractor shall optimize construction scheme, adopt the most advanced construction process & scientific management method, and accelerate construction schedule on the premise of ensuring construction quality. Besides, the contractor shall also strengthen equipment management and maintenance, and prevent leakage of petroleum material and construction materials being transported, so as to reduce possibility of pollution on surface water area within project area.

3) The owner shall prepare, print and publicize data on environmental protection to distribute to each contractor, and give education on environmental protection to all construction personnel to improve their environmental protection awareness.

4) During construction, it is prohibited to stack randomly soil residues at

excavation position or dump them into nearby rivers. It is also prohibited to discharge household wastewater generated by workers and household waste into rivers.

5) During construction, advanced equipment shall be adopted as much as possible to reduce interference of construction noise on normal life and rest of nearby residents. During construction, equipment with big mechanical noise shall stop operating during 22:00 PM to 06:00 AM of the next day, so as to ensure normal life of residents at night. Except that necessary preventive measures are taken to relieve interference, the contractor shall post notice at entrances & exits and in residential area. The contractor shall ask for pedestrians' or residents' understanding and support, give psychological comfort to people affected by construction and give their support in action, so as to reduce incoordination.

6) Requirements on environmental protection measures for construction personnel's camp shall be subject to provisions in this report.

7) Water must be sprayed on construction site and construction assess roads in accordance with weather conditions and time of subgrade filling of connection works. For construction materials scattered on nearby roads, the construction contractor of each bid section shall appoint special personnel to sweep timely, so as to reduce pollution of dust nuisance on ambient air quality.

3. Environmental Protection Regulations on Site Preparation

During construction, required temporary sites mainly include material yard, factory for prefabrication, maxing yard, construction road, etc. Setting and usage of temporary sites involve such ecological problems as land occupation, vegetation destruction, water & soil loss and landscape impact, and pollution on water environment, acoustic environment and air pollution, as well as some social problems including temporary land acquisition and influence on masses' normal life. Therefore, it shall be seriously treated.

(1) Common Environmental Requirement for Selection of Temporary Site

1) It is prohibited to set temporary site within scope of natural reserve, water & soil conservation forest and protective forest of river & canal & embankment;

2) Temporary sites shall be kept away from rivers and not be set within 200m from river bank generally;

3) Temporary land shall be set as much as possible in wasteland or dry bench with sparse vegetation.

4) Temporary land occupation should be minimized and strictly controlled, so as to reduce occupation of farmland. Temporary site can be set within scope of permanent occupied land of road. In addition, a piece of land can be used for

multiple purposes, e.g., one piece of land can be used as material yard, mixing yard and factory for prefabrication, also can be used as spoil area and then mixing yard based on construction sequence, so as to reduce quantity of temporary occupied land.

(2) Special Environmental Requirements on Selection of Temporary Sites

Since different temporary sites will generate different environmental impacts, environmental requirements on selection of different sites are diversified:

1) Stock ground: shall be set far away from residential area and beyond 300m downwind of perennial dominant wind direction at environmentally sensitive point

2) Cement-concrete mixing yard: Cement-concrete mixing yard shall be set beyond 300m downwind of perennial dominant wind direction at sensitive point.

3) Factory for prefabrication

① Factory for prefabrication on subgrade: If it is difficult to set factory for prefabrication in other places, subgrade can be considered. Relatively long flat slope shall be available at bridge head, with wide subgrade (shall be more than 24m generally).

② Factory for prefabrication under bridge: When there is large filling and excavation quantity or gradient of approach road is big, it is ideal to set factory for prefabrication under bridge. According to field conditions, factory for prefabrication on wide river beach and narrow factory for prefabrication within river levee are included.

③ Special factory for prefabrication: If there is no enough land for setting factory for prefabrication, special type of factory can be adopted, e.g., long-distance factory for prefabrication, factory for prefabrication on bridge or factory for prefabrication on river beach.

④ Factory for prefabrication shall be set far away from residential area and beyond 200m from downwind direction of perennial dominant wind direction at environmentally sensitive point.

4) Access road for construction: Existing roads and county- and town-level roads shall be fully used. Newly built access road shall be far away from residential area as much as possible and away from some ecologically sensitive areas including forestland, and avoid intersecting with traffic roads.

(3) Before mobilization, the construction site shall be investigated in advance to ensure rational layout according to local environment at the construction site.

4. Regulations on Social Environmental Protection

(1) Management on Land Acquisition and Demolition

① Permanent and temporary land occupation results in reduction of arable land, decline of output and decrease of income, for which the owner should give corresponding economic compensation in a timely manner to reduce impact on lives of residents along the line. For young crops and crops, compensation shall be given based on current-season yield. If no young crops are involved, compensation shall be given based on actual investment of current season. Land compensation and resettlement fees shall be given strictly according to relevant provisions as specified in *Land Administration Law of the People's Republic of China*, *Land Administration Method in Qinghai Province* and *Tentative Method for Lump Sum Fees for Unified Land Acquisition in Qinghai Province.*

② Land acquisition and resettlement involved in the project shall be under the charge of local government, and shall be undertaken through negotiation between state-owned land and resource administrative departments of all levels and villages & towns along the line. The project ower shall, before construction, prepare rational plans for land acquisition, demolition, and resettlement as well as execution schedule. Besides, the owner shall pay fees for land acquisition and demolition according to relevant policies.

③ Compensation fees shall be earmarked for specified purposes, and shall be distributed in a timely manner to villages and individuals concerned as per relevant provisions. In addition, effective publicity means shall be adopted to vigorously publicize national policies involving economic resettlement compensation.

④ Farmers with land being occupied can use compensation fees to adjust planting structure or engage in the tertiary industry or go to work outside home. At the same time, training, education and management for people turning to other industries shall be strengthened, so as to prevent new environmental problems. During construction, farms with land being occupied can be employed firstly, so as to provide them with income for living in short term.

(2) Management Measures for Influence on Irrigation and Water Conservancy along the Line

① Parallel operation method shall be adopted in borrowing soil for construction, i.e., excavation, leveling and protection shall be simultaneously conducted so as to recover landscape in a timely manner.

② In order to guarantee smooth flow of water in farmland canal and prevent water and soil loss, works involving change of farmland canal, small bridge and culvert shall not be conducted during irrigation period as much as possible. What' more, after completion of such works, dirt in the culvert shall be cleaned in a timely manner to ensure smooth flow of water in river and canal during irrigation period.

③ In case of inevitable removal or alteration, the existing irrigation canal or water conservancy facility must be removed after alternative irrigation canal is constructed and can be put into service.

(3) Management Measures for Impact on Infrastructures like Current Traffic Facilities

① For all public utilities and structures affected by or under influence of proposed project, the contractor shall, during construction period of the proposed project, take all appropriate measures for protection.

② Before commencement of construction, local roads bearing main transportation tasks shall be reinforced. When local roads are blocked due to project construction, temporary access shall be set to connect with original roads, so as to guarantee smooth flow of traffic.

③ Infrastructures within the scope of subgrade including road, communication, electricity and pipe network shall be removed or reconstructed in advance with the coordination of relevant departments, so as to avoid many adverse effects.

④ During construction period, transportation of raw and auxiliary materials or bulky machine may damage local roads, therefore, such roads shall be repaired in a timely manner in the course of and after construction, and alternatively, compensation fees shall be given to local road administration departments for repairing.

⑤ The owner shall fully negotiate with local traffic departments and public security departments to strengthen management of traffic transportation and reduce interference of road construction & pipeline layout on existing traffic facilities. The owner is also required to work out transportation plan. Transportation of road building materials shall not be carried out in rush hour of traffic, so as to avoid traffic jam and reduce traffic accidents.

⑥ For excavation near public utilities, the contractor shall notify relevant departments and invite their representatives to come to the site when the excavation is carried out. The contractor shall submit copies of the above notice and invitation to supervision engineer for future reference.

(4) Regulations on Traffic Environment Protection

The project has longer construction period and generates relatively obvious impact on traffic, besides, layout of wastewater interception pipe network and reclaimed water pipe involves many main traffic lines. Therefore, a series of feasible construction measures and traffic improvement measures shall be prepared to improve traffic conditions during project construction.

① Since the construction will inevitably lead to interaction with some existing roads, excavation of road will seriously affect traffic conditions in the whole area. The owner shall giver full consideration to the above factor. For road section with busy traffic, bicycle lane can be used as temporary passageway to reduce traffic pressure.

② Construction of the works shall be conducted section by section as much as possible. Excavation, pipe burying and backfilling shall be completed in possible shortest period. In road section with extremely busy traffic, construction is required to avoid rush hour.

③ Surface asphalt waste residues excavated during construction shall be timely cleaned & transported, and collected & recycled in specified point, as well as delivered to appointed place for site leveling. Strict control shall be provided for road acquisition by stacked soil in construction and greenbelt & road acquisition & rolling by vehicles, to guarantee a certain traffic capacity of road.

④ Pipes shall be laid in combination with urban construction. Negotiation shall be conducted with planning department, so as to avoid separate construction of pipes. Giving important consideration to pipe layout in annual pavement renovation plan of urban construction departments, can not only reduce damage on pavement, but also lower construction costs.

⑤ Construction method shall be determined section by section combining contents and scale of works, to reduce investment and ensure quality of works. The construction method combining project schedule and excavation shall be implemented to avoid traffic interruption and traffic jam.

⑥ Specific to impact on traveling of target population caused during construction, sign board shall be appropriately set around construction point. Besides, negotiation shall be conducted with relevant traffic departments, and the owner shall appoint relevant personnel to disperse traffic at busy sections and entrances of walking streets, so as to ensure safety of pedestrians.

⑦ The contractor shall post notice in project construction area one week prior to implementation of the project, to let citizens understand impact caused by construction ahead of time so as to obtain their pardon.

⑧ When smooth traffic of road needs to be maintained all the time in special sections including hospital, construction scheme shall be appropriately prepared. Traffic corridor shall be reserved and normal traffic road in the section shall not be completely occupied due to implementation of the project, so as to ensure that patients can go to the hospital without delay.

(5) Analysis of Impact on Appearance and Landscapes of the City

During construction of the project, certain impact may be caused on urban landscapes, therefore, the contractor shall take such measures as protection &

greening of side slope of subgrade, restoration of residue field, removal of temporary works and cleaning of construction site, so as to recover landscapes along roads and add new landscape belt for the city.

(6) Social Impacts and Environmental Mitigation Measures

Social impacts of the proposed project and environmental mitigation measures are shown in the following table.

Summary of Social Impacts of the Project & Environmental Mitigation Measures

Subproject Name	Project Impact	Mitigation Measures	Implementation Time
Pipe Network Works for Wastewater Collection	①Risk caused by affordability of population of lowest life guarantee; ②Risk caused by that part of wastewater treatment fees cannot be charged; ③Risk from pipe network connecting fee; ④Risk from operation and maintenance of pipe network; ⑤Road operation & drainage and road safety.	①Before operation of the project, the owner and relevant government departments commit to prepare water fee reduction policy or provide fee subsidies for population of lowest life guarantee; ②Charge wastewater treatment fees against residents who do not use tap water as source of domestic water; ③Based on full negotiation with residents and in combination with economic income of local residents, determine the construction and installation fees of branch pipe network acceptable to the residents; ④Establish emergency maintenance mechanism and publicize special telephone number of wastewater pipe network maintenance. ⑤Regularly maintain drainage pipe network in road area to ensure smooth discharge of water; strengthen traffic management and set warning sign and safety barriers.	①Construction period ②Construction period and operation period ③Construction period and operation period ④Operation period Operation period
Reclaimed Water Reuse Works	Rick caused by water quality and quantity;	Establish standard self-inspection system to regularly or irregularly inspect water quality produced by reclaimed water treatment pant; build buffering tank for water users to ensure stable water supply.	Operation period
Environmental Renovation Works for Beichuan River Bank	①Risk caused by poor environmental awareness of residents;	①Strengthen publicity of environmental protection knowledge to enhance masses' environmental awareness; strengthen supervision on pollution discharge of enterprises and residents along both banks of rivers, and	①Construction period and operation period ②Operation period

	②Risk of later-stage maintenance of the project; ③Risk caused by citizens' living habits; ④Impact on landscape facilities including toilet, garbage can, scenic road and greening	depend on administrative forces to ensure water in rivers is clean and tidy. ②Make clear responsibilities of environmental protection departments, urban management personnel, water conservancy departments and municipal administrative authorities; conduct scientific management; and encourage all citizens to participate and supervise the works; ③Set notice board at dangerous area. ④Strengthen management of scenic road, regularly clean garbage can, build clean-type toilet, avoid constructing toilet besides major landscape, adopt suitable plants for greening and ensure their survival rate;	③Operation period ④Construction period and operation period
Comprehensive Management Works for Ditch	①Risk caused by poor environmental awareness of residents; ②Risk of later-stage maintenance of the project;	①Publicize by various means to improve masses' environmental awareness; ②Establish and perfect sanitation system;	①Operation period; ②Construction period and operation period

5. Preservation and Management Regulations for Cultural Relics and Historic Sites

If cultural relics and historic sites are found or suspected during construction period, the contractor shall immediately protect the site according to *Law of the People's Republic of China on the Protection of Cultural Relics* (December 29, 2007) and requirements as stated in material culture and resource policies of the World Bank, report to local Cultural Relics Bureau for handling, and carry out construction again after the handling by Cultural Relics Bureau. Report procedure for cultural relics is shown in Fig.5.1-1.

When cultural relics and historic sites are found or suspected in the course of construction, the contractor shall:

(1) Stop construction at position where cultural relics are found and strengthen protection for the site;

(2) Report in a timely manner to police department and competent department of cultural relics for identification and handling;

(3) Delimit protection range immediately once cultural relics are determined by experts;

(4) Conduct rescue excavation for cultural relics in case of tight construction period or natural damage risk;

(5) Let professional personnel to conduct rescue excavation for cultural relics by using special equipment, and do not excavate them randomly;

(6) Conduct demonstration about whether alternative site shall be selected for continuous construction once major cultural relics are identified.

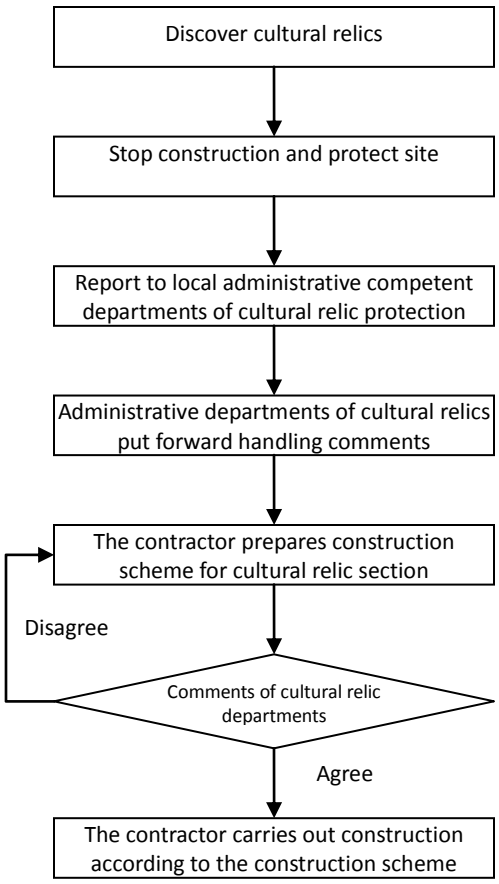


Fig. 5.1-1 Handling Procedure for Cultural Relics Found During Construction Period

6. Environmental Protection Regulations on Noise Pollution Prevention

During construction period, the major source of noise is mechanical noise generated by such construction equipment as excavators, cutting machines and transport vehicles, with sound level being more than 85dB(A). Whether shield is provided or not, areas within 30m, 80m and even 150m of construction site will be affected by construction noise at different levels. The following measures are taken to improve acoustic environment quality of the said main protection objects.

(1) Environmental management on construction site shall be strengthened, and *Noise Limits for Construction Site* shall be strictly followed. In order to reduce impact of construction on surrounding residents, when route reconstruction is conducted near acoustic environmental sensitive objects listed in environment assessment and residential area, it is prohibited to carry out construction during 22:00 PM to 6:00 AM of the next day in noise sensitive points near to the route. Except for protection objects at noise sensitive point, for other routes to be reconstructed, construction time can be arranged according to project schedule and impact on traffic.

(2) In main traffic road, residential area and site of wastewater treatment and reclamation plant involved in layout of pipe and route, a notice to reassure the public can be posted, in which construction period shall be indicated. This can not only reassure the masses and get their understandings, but also supervise the contractor, which is conducive to completing construction on schedule.

(3) In school and other sensitive points, high-noise equipment shall not operate during school hours. In residential area, high-noise equipment shall not operate during lunch time. In hospital and government office and other sensitive areas, operation time of high-noise equipment shall be shortened as much as possible. As for construction equipment and method, low-noise machine shall be adopted as far as possible, e.g., small machine.

(4) The construction method of "concentrate efforts and carry out construction section by section" shall be adopted to shorten construction period and relieve impact of construction noise on acoustic environment in local sections. Except in busy sections, joint calking for pipe connection in other sections shall be carried out simultaneously in different batches.

(5) Preventive measures for noise pollution shall be taken when route construction is carried out at sensitive points. Guardrail with a height of 1.5-2.0m can be used to shield construction noise at construction site.

(6) In partial intensive residential areas and teaching areas, pipeline may be laid by man, so as to minimize impact of construction noise on residents and schools.

(7) Isolating and protective measures shall be appropriately taken for construction site, so as to achieve good effect of noise reduction.

(8) During road construction, noise is mainly generated by construction machines and transport vehicles. In order to ensure health of construction personnel, according to *Sanitary Standard for Noise of Industrial Enterprise*, it is recommended that the contractor shall rationally arrange schedule for workers and let them operate high-radiation strong-noise construction machines in turn to reduce their time of receiving high-noise. At the same time, the contractor shall pay attention to maintain machines and operate them correctly, so as to maintain the noise of road building machines at minimum sound level. It is recommended that operators and relevant personnel shall ware personnel protective articles, such as earplug and helmet.

7. Environmental Protection Regulations on Air Pollution Prevention During Construction

During construction, main pollution factors for impact of proposed project on ambient air are construction waste gas and dust nuisance, for which, the waste gas mainly includes the exhausts from various construction machineries and transport

vehicles; during construction, the dust nuisance is mainly produced from subgrade excavation, site excavation and backfill, discarding of soil and stone, and loading, transportation of knocked-down construction garbage, transportation, loading and unloading of construction materials, and construction. And, few dust nuisance is also generated by site leveling, and the main pollutant is TSP.

(1) Preventive Measures for Dust Nuisance Pollution

From pavement excavation, pipe trench excavation, foundation excavation for structures on site to backfilling and covering, in order to prevent dust nuisance, construction site shall be embosomed (in the environment assessment, closed embosoming or semi-closed embosoming with color plate is recommended). If there is successive sound weather and wind during construction of pipe network, temporary storage area of excavated earth shall be watered or covered with green covering screen, to prevent dust nuisance.

The contractor shall dispose spoiled soil timely as per plans, cover the compartment of vehicle transporting residual soil (keep the vehicle closed during transportation) during transportation and spray water on transportation route containing non-soil pavement. Besides, the contractor shall avoid excavating earth and handling materials under wind. The transport vehicles shall not be overloaded. Relevant measures shall be taken to prevent dropping of residual soil being transported during transportation. Before departure, soil attached on wheels of vehicles shall be swept out with broom to prevent falling off of spoiled soil to affect environmental cleanness. Besides, clean-keeping system shall be implemented for road under construction, to ensure spoiled soil can be timely cleaned up once being found.

During construction, the major impact on ambient air is from dust. Dust is generated during excavation on dry ground surface and hole drilling, part of which will suspend in the air and other part will drift with wind and down to nearby ground and surface of buildings. In case of strong wind, dust will fly during pile-up of excavated soil, part of which will fly and fall off during handling & transportation of such excavated soil. The soil entrained by rushing rainwater is scattered on ground surface, and will generate dust nuisance due to movement of vehicles or wind after being dried. Backfilling of excavation earth will also generate a large amount of dust nuisance. Handling, transportation and stacking of construction materials will inevitably cause falling off and flying of dust.

Hazard of dust pollution during construction shall not be neglected. If construction personnel and surrounding residents imbibe dust floating in the air, various respiratory diseases will be caused. What's more, since dust contains lots of pathogenic bacteria infecting various diseases, health of construction personnel and surrounding residents will be seriously influenced. In addition, because flying dust will reduce visibility, traffic accident will be easily caused. Dust drifts down to buildings and trees and their leaves, affecting landscape. Therefore, the owner shall strengthen management and take

appropriate measures to strictly control dust generated during construction. In order to minimize impact of project construction on surrounding environment, the following preventive measures are recommended:

1) Special personnel shall be allocated to be responsible for constriction site, so as to realize scientific management and civilized construction. During construction of foundation, relevant measures shall be taken as much as possible to accelerate project schedule, and earth-rock shall be transported out to specified place to shorten hazardous period of stacking.

2) Floor of construction site must be hardened, and concrete floor may be adopted if conditions permit.

3) During excavation, hole drilling and demolition, water shall be sprayed to keep construction site wet in a certain degree. Specifically, loosen and dry surface soil on construction site shall be watered regularly to prevent dust; when soil is backfilled, dry surface soil shall be watered appropriately to prevent dust from flying.

4) To strengthen management for stacking yard of soil to be backfilled, measures for compacting, regular watering and covering of earth surface shall be prepared. Needless soil and construction materials shall be carried away in a timely manner, and should not be stacked for a long time.

5) Anti-spraying equipment shall be provided for truck transporting soil and transport vehicle of construction materials, and the load should not be too full, so as to ensure soil and materials will not be scattered during transportation. Running route and schedule shall be planned appropriately to avoid driving in such sensitive areas as busy area, intensive traffic area and residential area. In section with high environmental requirement, transportation shall be conducted at night based on actual conditions, so as to reduce impact of dust on environment.

6) Top of transport vehicle shall be covered, and handling site shall be washed cleanly before handling to prevent soil carried by wheel and chassis from falling on road surface.

7) Soil scattered on pavement during transportation shall be swept timely to reduce dust during running of transport vehicles.

8) Sand and cement, which are stacked outdoor and will easily generate dust nuisance, shall be covered with canvas and plastic cloth to prevent dust from spreading.

9) During construction, it is prohibited to use discarded construction materials as fuel.

10) Fence on demolition construction site shall be complete.

11) After completion of construction, road and vegetation on the land occupied by construction shall be restored timely.

12) Demolition and road construction sites shall be embosomed with color steel plate.

13) Transportation shall be rationally arranged. Bulky members and massive materials as well as spoiled soil required during construction shall not be transported in rush hours, so as to relieve traffic pressure and minimize automotive emission.

(2) Preventive Measures for Tail Gas Pollution Caused by Construction Machines and Transport Vehicles

Construction machines & equipment and transport vehicles conforming to national health and protection standards shall be adopted so that the gas emissions can meet relevant national standards. Overload limit, speed limit, exhaust purifier installation, and other measures can be taken to reduce impact of the exhaust from transport vehicles and construction machines on the surrounding residential area.

8. Environmental Protection Regulations on Water Environment Impact

(1) Stacking of construction materials including asphalt, cement, oil fuel and chemicals shall be managed properly, and coverings shall be added during stacking. Such construction materials shall not stacked besides rivers, when necessary, fence shall be provided to prevent such materials form being rushed into rivers along rainwater runoff to cause pollution in case of rainy season or rainstorm.

(2) During construction of pipes along or crossing rivers, it is prohibited to dump waste from pipe installation into the rivers nearby. Such waste shall be transported to specified filling position of subgrade or to specified location for disposal.

(3) Intercepting ditch shall be provided around machine storage yard within maintenance area, to prevent mechanical grease dirt form being rushed into surrounding environment along rainwater to cause pollution. Wastewater collected in the intercepting ditch shall be naturally evaporated after oil and precipitation treatment. Household waste generated shall be managed properly, and collected regularly and transported to specified location for disposal. Machines in maintenance area shall be maintained to prevent pollution by mechanical grease dirt.

(4) Heavy grease leakage from construction machines shall be prevented. It is prohibited to discharge oily water produced during running of machines into nearby water bodies. It is also prohibited to discharge oily water produced during maintenance of construction machines into water bodies.

(5) In addition, the proposed project is municipal construction project, folk houses, unused plant and warehouse can be rented and used as construction camp. During

construction, household wastewater generated by construction personnel can be discharged into municipal wastewater pipe network, and finally delivered to wastewater treatment plant to be treated until standard is met, and then discharged, so as to reduce pollution on environment.

(6) Without prior written consent of supervision engineer, the contractor shall not, for any purpose, interfere natural flowing of river course, water channel or existing irrigation system or drainage system, so as to avoid occurrence of flushing and deposition.

9. Environmental Protection Regulation on Solid Waste Disposal

The solid wastes produced during construction period of the project mainly include construction waste, household waste, and waste from the environmental management of river bank and the ditch clearance and transportation, and sludge from ditch clearance.

Most construction wastes generated during construction period are inorganic wastes which mainly compose of offcut in construction such as discarded mound, tiles, concrete blocks, etc. There are also a small number of organic wastes which mainly include various packing materials such as discarded old plastics, plastic foams, discarded paint and coatings, etc. Surrounding landscape and environmental quality will be affected if these wastes are not disposed properly as they are non-perishable and insoluble. In order to avoid these problems, it is suggested in the EIA that construction wastes generated during construction period shall be transported at any time to the Yinjiagou domestic solid waste landfill for unified disposal or comprehensive utilization. Discarded earth and stone work excavated in construction shall be returned to nature by means of disposal on the spot and be properly filled and compacted.

The household waste mainly composes of organic waste including leftovers and feces. If being piled in construction site without timely and effective disposal, these solid wastes will rot, stink and breed flies, and even trigger infectious diseases when it becomes worse, affecting the health of construction personnel. The household waste during construction period of the proposed project is disposed in a unified manner by stacking in specified places and transporting to Yinjiagou landfill in a timely manner.

The waste from the river bank environmental improvement and gully clearance includes mainly construction waste and household waste, both being ordinary solid waste and can be transported to Yinjiagou Landfill after being collected.

Canal clean-up will be done for Chaoyangdianqu canal as part of gully improvement component. Chaoyangdianqu canal used to be a water channel with function of power generation, now it is mainly for agricultural irrigation. It is surrounded by villages and farmer households, without industrial enterprises. The wastes discharged into the canal are mainly domestic wastewater and household waste. The sludge in the canal is of

general composition, which will be delivered to Xining Landfill.

During clearance and transportation of solid waste, management shall be strengthened to avoid secondary pollution in the process.

(1) The Owner and relevant departments should jointly formulate proper spoil disposal and transportation plan. Transportation of waste slag at peak traffic times shall be avoided. The transportation of soil residue in bustling downtown sections is prohibited and such transportation should be arranged at night as far as possible.

(2) The contractor of the project shall timely carry away waste slag according to spoil disposal plan. Overload shall not occur. Loader carrying slag shall be slow during driving to reduce spill and leak and keep the city clean.

(3) The Owner shall go hand in hand with the relevant departments undertaking transportation to properly educate drivers about professional ethics, and urge proper waste transport according to the specified route, places and time. Non-scheduled inspection shall also be made.

10. Environmental Protection Regulation on Ecological Environmental Protection

(1) Protection Measures for Vegetation

① The current farmland and trees shall be properly protected. It is recommended that construction personnel should receive relevant training before temporary land is used. Civilized operation without damage except the works shall be emphasized. Management shall be strengthened. Strict protection of the trees and vegetation within the temporary land is required to reduce damage to the ecological environment along the project as far as possible.

② The construction of the project, landscape engineering, slope protection, and drainage ditch shall be performed at the same time. It is best to simultaneously carry out utilization, leveling, greening and reclamation. But in view of feasibility, leveling and greening shall remain to be the focus after completion of the works.

③ The land temporarily occupied shall be leveled and reclaimed or greened and renovated in time after completion of the works.

④ The green vegetation outside the land in use shall be protected to the greatest extent. If the current green vegetation is damaged due to construction of temporary works, reclamation shall be undertaken when temporary works are demolished.

⑤ The area of vegetation damaged by the works during construction period shall be strictly controlled. No human destruction shall take place other than inevitable land occupation and tree cutting for the works.

⑥ The education about protection of natural resources and wild animals shall be strengthened among construction personnel. Cutting trees at random is prohibited in employment contract.

(2) Protection Measures for Cultivated Land

① Since the proposed project is located in Xining Municipality and its surrounding area, the construction of pipe network and road is bound to have certain impacts on agricultural development along the project. The unnecessary land shall be occupied as little as possible or not occupied in construction. Operations shall be performed within reach of land used for the project according to greening design requirements.

② The cultivated land shall be occupied as little as possible. The process of taking and removing soil shall be combined with the agricultural development and planning design and the farmland capital construction to provide convenience for developing local economy and solving local practical problems.

③ The requirements of relevant policies shall be carefully implemented for greening of the project. The width of greenbelt shall be strictly controlled if the project is surrounded by cultivated land.

(3) Greening Measures

① Greening measures for main road: Certain amount of vegetation is damaged by slope surface of the proposed highway, temporary land occupation, etc. The vegetation damaged thereby is mainly restored by revegetation. When greening tree and grass species are selected, the basic principle of “matching species with the site” shall be followed to determine the species of trees and grass. Priority shall be given to native trees and grass. Secondary are the introduced trees (grass) that have become accustomed to the local natural environment after being planted for many years. According to the conditions of areas passed through by the proposed highway, the selected trees shall be hardy variety with high survival rate and be characterized by cold resistance, drought resistance, tolerance to barren soil, developed root system, and strong ability in stabilize soil. The grass shall be local grass variety easy to survive. The leanness-resistant hardy grass prone to humus shall be selected.

② Plant measures for areas directly impacted: The areas directly impacted include several types, i.e. cultivated land, barren slope (wasteland), and grassland. The principle for greening of areas directly impacted is to restore the original land use types after completion of the main works. Therefore, land remediation and reclamation to farmland are carried out for cultivated land after completion of the works. Land remediation is carried out for barren slope and grassland after completion of the works to create mixed forest of arbor and shrub or plant grass of quality.

③ Greening measures for other occupied land: They are mainly to restore the

farmland and vegetation damaged by borrow pit.

11. Environmental Protection Regulation on Water and Soil Conservation

The excavation method of earth and stone work shall be reasonably arranged in construction. Earth and stone work shall not be discarded nearby at random. No waste disposal area is provided for the project. All the earth and stone work shall be reused. The earth and stone work involved in the project must borrowed and stacked at the borrow pit and temporary waste yard specified in the scheme.

(1) Borrow Pit

The borrow pit site was not specified during feasibility study period of the proposed project. Borrowing earth will unavoidably change surface condition, disturb soil structure, and damage vegetation. With respect to the negative impacts caused by the project construction, the following preventive measures must be properly taken to try best to minimize water and soil loss.

① Before excavation of borrow pit of the project, the surface humus soil is stripped and stacked in a centralized manner in proper location near to the site and is used for follow-up greening.

② Rainfall concentrated period shall be avoided as far as possible to borrow earth. In the process of excavation, in order to reduce rainfall runoff intrusion that increases weight of loose soil and leads to gravitational erosion, ditches shall be arranged at two sides of borrow pit to allow the surface runoff to discharge in time.

③ Earth covering shall be carried out in the pit after completion of borrowing and then revegetation is performed. The type of revegetation depends on the original land vegetation. Meanwhile, according to the rock and soil types of back wall after excavation, slope cutting and stepping is carried out for it. Water conservation measures are provided accordingly. With respect to rock slope, slope shall be cut at the grade below 1:1 and wire mesh shall be hung on slope surface to plant grass. With respect to soil slope, slope shall be cut at the grade below 1:1.5 and grass and shrubs shall be planted on slope surface. Intercepting ditch shall be set at slope top of back wall of borrow pit.

(2) Temporary Waste Yard

The surface humus soil of land occupied by project construction is stripped and stacked in a centralized manner in proper location near to the site and is used for follow-up greening. This portion of spoil is stacked at temporary waste yard.

Before stacking earth, stacking scope is strictly divided, simple walls to retain water and wind shall be provided, and drainage ditches shall be dug. The temporary waste bank shall be timely used over implementation of greening to avoid prolonged exposure. After completion of greening, leveling shall be performed, and spontaneous recovery or

plant protection shall be carried out depending on local conditions.

Various prevention and control measures adjusted to local conditions shall be taken for the water and soil loss within scope of responsibilities of this project to effectively control newly increased water and soil loss amount and gain effective management of original natural water and soil loss.

After completion of construction, clearance and remediation shall be carried out for land temporarily occupied. Temporary buildings shall be demolished, ground shall be cleaned, the soil compacted after being rolled shall be loosened again, low-lying land shall be filled up by earth covering, and greening shall be performed in time to minimize the level of water and soil loss.

(3) Water and Soil Conservation for Main Works

In order to prevent and control slope erosion and avoid slope runoff, drainage ditches shall be constructed at slope surface on two sides of subgrade of road works or at gully slope of main works such as wastewater treatment and reclamation plant. Slope runoff or water discharged from main works is led to bottom of ditch or low-lying ground to ensure its safety. Sedimentation basin is provided at outlet of drainage ditch by combining topography. Water flow is discharged to natural channels nearby after subsiding in sedimentation basin. Waterproof rain cloth is used to cover embankment slope at rainy season.

(4) Water and Soil Conservation for Temporary Works

a Construction Site

The land temporarily requisited during project construction shall be timely returned to farmers for reclamation after completion of utilization. The contractor shall ensure the conditions for recovery of temporary land to arable land.

b Construction Road

① When the main works are designed, the current roads shall be used to the fullest and be expanded to meet the requirements of construction. Construction roads shall be newly constructed for some road sections. The topography and landscape shall be combined as far as possible and the balance between excavation and filling shall be maintained.

② In order to prevent surface runoff from damaging construction road and reduce water and soil loss resulting from excavation of construction road, drainage ditches are constructed at sides of high slope of construction road to discharge water to natural channels nearby. The construction of drainage ditches and construction roads are simultaneous.

③ Based on subgrade protection engineering of construction road and drainage works, protection is carried out in sections by combining topographic and geological conditions and construction characteristics. According to the different situations of each road section, protection measures for plant are arranged. Based on the principle of "matching species with the site", consideration is given to the requirements of protection and greening and beautification, local conditions and characteristics of vegetation are combined, and thus local excellent native tree and grass species are selected for roadside greening according to comprehensive analysis of survival ratio and adaptability, so as to realize the purpose of preventing water and soil loss and improving greening environment.

④ If construction roads are unavailable in borrow pit, temporary waste bank and waste disposal area, or road width does not meet the requirements, supplementary design shall be performed for this scheme and road width shall be designed as 4.5m.In construction, construction vehicles shall be strictly required to drive on designed road to avoid random rolling that damages original surface and vegetation and leads to new water and soil loss.

(5) Standard Construction

a During construction period, the damage by the works to aboveground vegetation shall be reduced as far as possible. The selection of construction season shall be adjusted to local conditions and the seasons when plants grow fast shall be avoided. As for construction in forest land, manual work shall be adopted as far as possible to minimize area of operation.

b Efficiency of construction shall be improved to shorten construction time and reduce exposure duration of bare land.

c The operation specifications for excavation in layers, stacking in layers, backfilling according to layers (undersoil is at bottom and topsoil is at top) of soil during construction period shall be strictly implemented. The original survival conditions of plants shall be maintained as far as possible to facilitate the recovery of vegetation. Proper accumulation layer shall be provided during backfilling to prevent surface depression and water and soil loss caused by precipitation.

12. **Environmental Practice Regulation for Construction Camp**

(1) Under the premise of general planning for the project, the camp planning shall be integrally completed by project department, and the camp planning must reasonably take water supply, power supply, environmental health, fire facilities, publicity facilities and the like into consideration. It is prohibited to construct or demolish temporary buildings without permission.

(2) Project department shall make integrated planning for hanging banner, putting

up posters or warning signs, making propaganda column and the like, and the contents related to above banner, posters, signs, column and the like must be approved by project department and then specifically implemented by relevant departments. It is prohibited to conduct above issues without permission.

(3) The construction of building and road must meet the requirements for fire safety, and the road shall be clear. As for the place which fire vehicles can not access to, additional fire hydrants and the like shall be provided.

(4) It is prohibited to conduct other activities unrelated to the construction of project by any units and individuals without permission, which shall be arranged and managed by project department.

(5) According to the working environment of subordinate units, project department shall divide zone of responsibility in camp for each unit. The person in charge of each unit shall be the primary accountable person for the zone of its responsibility, and he/she must be responsible for the management of environmental health, fire safety, dormitory and the like in the zone of its responsibility in accordance with relevant requirements.

(6) The dustbin shall be reasonably arranged in camp, the rubbish shall not be piled in any corner of the camp, and the waste and the cigarette end shall not be thrown anywhere. Each unit shall timely clean the dustbin in responsibility area to prohibit the occurrence of rubbish overflow.

(7) Each water supply point shall be managed in accordance with responsibility area, and the occurrence of wasting water is prohibited.

(8) Each unit shall pay attention to the sanitation and hygiene of toilet and bathroom to make them no peculiar smell, accumulated water and debris.

(9) Project department shall always prepare different first-aid drugs, and shall strictly control the supply channel of drugs and regularly check the stock so as to supplement drugs or prevent the usage of expired drugs. In addition, the management of narcotic drugs and psychotropic substances must be executed in accordance with national drug control laws. Meanwhile, project department must establish special management system which shall be strictly executed.

(10) The selection of construction camp shall be in accordance with Table 12-1.

Table 12-1 Site Selection Requirements for Construction Site

No	Yes
• Sensitive point (such as residence, school and the like) and the land within 200m upwind • Basic farmland • Homestead • Forest land • The land within 200m of the land area of river • The land within 1000m in the upstream and 500m in the downstream of the water points for drinking water and the land within drinking water conservation district. Other environmentally sensitive areas (such as scenic area, forest park and the like) • Lowland or paddy field • Land with good vegetation cover • Danger area in respect of rock fall and landslide • Susceptible area of debris flow • land with special purpose	• Rent local house • Land of permanent land • Uncultivated land • Abandoned land • Relatively high parcel • Other inferior lands

(11) Environmental Practice Regulation for Construction Camp

According to the site selection requirements for construction site and the actual situation of project, the construction site selection shall meet following requirements:

① Rent the house along the project to the greatest extent, and arrange collection point for household waste or garbage collection bins. Electrical energy and other clean energies are used for residential energy resources and warming.

② Construction personnel shall abide by local village regulations and non-governmental agreements, perform civilized construction, and well handle the relationship with local residents.

③ Pit toilet and sedimentation basin for industrial wastewater shall be provided in production camp. The precipitated industrial wastewater shall be reused for production and can not be discharged outside. After disposed in pit toilet, the domestic wastewater (construction personnel going to the toilet) shall be used for agricultural irrigation by hired farmer in local. When the construction ends, the pit toilet shall be buried with soil. Furthermore, the construction waste in camp shall be recycled as much as possible, however, the waste can not be recycled shall be regularly transported to and piled in designated area and can not be littered.

④ Barren slope, brush land and inferior land are preferred to be selected as production camp, but the occupation of cultivated land is prohibited. When the occupation of cultivated land is inevitable, it is prohibited to occupy the basic farmland

for production camp. Before construction, the arable topsoil shall be stripped and temporarily piled in the relative flat area at the site, with temporary fence built with bagged soil. Temporary drainage ditch and desilting facility covered by dust screen shall be provided around. After the construction is completed, the stripped topsoil shall be used as covering soil for second ploughing or as planting soil for greening in the construction camp.

⑤ This project will not provide special concrete mixing station and asphalt mixing station, and all necessary concrete and asphalt are purchased outside.

13. Environmental Practice Regulation for Access Road

(1) Site Selection Requirements for Access Road

If access road will be constructed, the site selection shall be in accordance with Table 13-1.

Table 13-1 Site Selection Requirements for Access Road

No	Yes
• Basic farmland or other farmlands, paddy field and land for economic crops • Land of sensitive area (water conservation district, scenic area, forest park and the like) • Homestead • Forest land • The land within 200m of the land area of river • Lowland or paddy field • Land with good vegetation cover • Danger area in respect of rock fall and landslide • Susceptible area of debris flow • land with special purpose	• County, township and village roads • Uncultivated land • Abandoned land • Other inferior lands

(2) Environmental Impact Analysis for Access Road

The environmental impacts caused by access road are mainly as follows:

1) Dust nuisance caused by running vehicle and equipment.

2) Noise pollution caused by running vehicle.

3) Vegetation damage and water and soil loss caused by temporary land occupation.

(3) Environmental Practice Regulation for Access Road

1) Minimize the use of existing county, township and village roads as access road and rehabilitate the township and village roads.

2) If new access road will be constructed, minimize high filling and deep excavation and pay attention to conservation of water and soil to reduce water and soil loss and ecological damage. In addition, the pavement of newly built access road shall be hardened. For the road bearing heavy vehicle, it can be paved with reusable supporting bricks (members). For general road, it can be paved with reusable permeable bricks.

3) Before the construction of new access road, the arable topsoil shall be stripped and temporarily piled in the relative flat area at the site, with temporary fence built with bagged soil. Temporary drainage ditch and desilting facility covered by dust screen shall be provided around. After the construction is completed, the stripped topsoil shall be used for ecological restoration.

4) To reduce the quantity of road, the access road shall be mutually combined with the road in the construction camp.

5) The access road shall be regularly maintained and cleaned every day, and the sections producing dust shall be watered for dust suppression.

6) Measures (such as speed control, no horn, no transport during 12:00-14:00 and 22:00-6:00) shall be taken to reduce the noise impact on environment.

7) Before the construction is completed, the ecological condition of newly built access road shall be at least restored to the pre-construction state.

8) For the local road occupied or damaged, it shall be made change or protective treatment, and its pavement shall be restored or greened. In addition, certain amount of compensation shall be paid for local government to maintain the legitimate interests of local government and residents.

14. Environmental Practice Regulation for Borrow Pit

(1) Site Selection Requirements for Borrow Pit

Borrow pit is needed in this project, and the site selection shall be in accordance with Table 14-1.

Table 14-1 Site Selection Requirements for Borrow Pit

No	Yes
• Basic farmland or other farmlands, paddy field and land for economic crops • Homestead • Forest land • The land within 200m of the land area of river • Land of sensitive area (scenic area, water conservation district, forest park and the like) • Lowland or paddy field • Land with good vegetation cover • Danger area in respect of rock fall and landslide • Susceptible area of debris flow • land with special purpose	• Uncultivated land • Abandoned land • Other inferior lands

(2) Potential Environmental Impact of Borrow Pit

1) Damage to vegetation and increase of water and soil loss

The vegetation diversity of sloping field is more than that of flat ground, and the vegetation includes shrub wood, underbrush, dryland crops and the like. After excavated, aboveground vegetation disappears and soil erosion modulus in local range increases due to certain gradient (height difference). After being excavated, quarry area and borrow pit are easy to cause water and soil loss if without timely restoration and greening.

2) Impact on landscape

Borrow pit will damage vegetation and change original terrain, landform and natural landscape.

3) Mechanical noise produced by earth borrowing has impact on acoustic environment.

4) Dust nuisance caused by borrow pit has impact on ambient air.

5) If the excavated topsoil of borrow pit is not piled well, the water and soil loss is easy to happen.

(3) Environmental Practice Regulation for Borrow Pit

According to site selection requirements for borrow pit and its impact on environment, the setting of borrow pit shall meet the following requirements:

1) Exploit nearby and take full use of the spoil from the project, use existing legal borrow pit in local as much as possible, and reduce the impact on ecological environment caused by exploitation of rock material and earth borrowing.

2) During soil borrowing, the side ditch collecting rain shall be constructed to avoid the occurrence of water and soil loss, debris flow and the like in rainy season.

3) During construction, deep excavation is avoided, the excavated earth and rocks and filled earth and rocks shall keep balance, and if borrowing of earth and rocks is required, coordination shall be performed for the soil spoiled from other construction items within the project area to avoid separate establishment of a borrow pit, which can eliminate the impact of borrow pit on environment fundamentally.

4) To reduce the quantity of borrow pit, the soil borrowing shall be centrally conducted for the project.

5) To reduce dust pollution caused by earth excavation, during soil borrowing, water shall be sprayed for dust suppression.

6) To prevent water and soil loss and the lost sediment directly discharging into surface water following the runoff in the drainage ditch to affect the water quality, intercepting drain and drainage ditch shall be constructed in borrow pit.

7) During excavation, the topsoil shall be kept and then applied to the land rehabilitation. In addition, the topsoil shall be temporarily piled in the relative flat area at the site, with temporary fence built with bagged soil. Temporary drainage ditch and desilting facility covered by dust screen shall be provided around. After the construction is completed, the topsoil shall be applied to the ecological restoration of borrow pit.

8) Through following the principle of simple and easy to be maintained, adopting greening method of integration of trees, shrub and grass which will form plant communities landscape, restore the natural ecology of quarry area and borrow pit and reduce the water and soil loss.

9) Strictly control construction time. If there is sensitive target (such as settlements and the like) within the scope of noise impact, then it is prohibited to conduct quarrying and soil borrowing during 12:00-14:00 and 22:00-6:00.

15. Regulations on Construction Safety and Environmental Protection

(1) It is not allowed to drink during working and it is not allowed to go to work if drinking under special circumstance.

(2) It is prohibited to gather together to gamble, go whoring, steal and fight.

(3) Labor protection appliance (such as helmet, protective clothing and the like) shall be offered to workers.

(4) During working, construction personnel shall dress as specified, wear labor protection appliance and correctly wear helmet.

(5) It is not allowed to smoke at the place (no smoking) of the construction unit.

(6) Often carry out safety education for staff, actively prevent the occurrence of fire, explosion, poisoning and the like, and strictly implement each rules and regulations.

(7) The construction personnel shall be in good health and without infectious disease, and project department is responsible for conduct investigation for the health of construction personnel to prevent the spread of disease.

Attachment 3:

Administrative Regulations on Protective Measures for Bridge Construction

1. Environmental Protective Measures at Design Stage

(1) Bridge Positioning and Bridge Approach

The selection of bridge location shall coordinate with general urban planning, transportation and socio-economic development, and keep in line with general thought of transportation development of China.

(2) Landscape Design

Bridge location selection needs to be done by taking into account landscape design of bridge to make it coordinate with local cultural landscape.

(3) Solid Waste Yard

The proposed bridge involves relatively large volume of earth and rock, and all pier foundations may produce some solid waste, so one proper site must be selected to dispose the spoiled earth and rocks. Otherwise, water and soil loss will occur or the cultivated land will be polluted. Therefore, the solid waste yard shall be designed in design stage and ask for the advice of local environmental protection department and government sector for the design.

2. Environmental Protection Measures at Construction Stage

(1) Environmental Protection Measures during Construction of Main Bridge

1) The Owner shall appoint special personnel to handle environmental protection problems occur during construction and operation periods of main bridge, handle environmental problems between the Contractor and environmental protection object (approach bridge), and supervise implementation of environmental protection measures during construction period. The Contractor is required to appoint at least one main administrative leader to be responsible for environmental protection, so as to cooperate with the Owner to put environmental protection measures into practice.

2) The Contractor shall optimize construction scheme, adopt the most advanced construction process & scientific management method, and accelerate construction schedule on the premise of ensuring construction quality. Besides, the Contractor shall also strengthen equipment management and maintenance, and prevent leakage of petroleum material and building materials being transported, so as to reduce possibility of pollution on water area.

3) The Owner shall prepare & print and publicize data on environmental protection to distribute to each Contractor, and give education on environmental protection to all construction personnel to improve their environmental protection awareness.

4) During construction of main bridge, it is strictly prohibited to discharge muck of bored pile, construction waste, domestic wastewater produced by workers on water platform and solid wastes (such as household wastes) into Beichuan River. Toilet and dustbin shall be set on the platform and cleaned by specially-assigned person. It is not allowed to discharge or throw anything into the River, so as to reduce pollution on water quality.

5) From the prospective of environmental protection, the following principles are proposed to treat such solid wastes:

① The solid wastes produced during construction of main bridge pier must not be thrown into Beichuan River. This shall be stipulated with clear clauses in bidding documents. Specific penalty system shall be defined for all contractors who are found that they discharged solid wastes into river course. In addition, the design unit shall set solid waste yard properly within the land requisitioned for road, stacking method and proposal for treatment of waste surface based on quantity of earthworks, and confirm jointly together administrative competent departments of environmental protection and local government.

② Before stacking the solid wastes, a dam shall be built around such wastes to prevent them invading ambient environment in the form of mudflow and polluting environment. The Contractor shall solidify and stack the solid wastes that may flow, e.g. mixing with appropriate cement and leveling the waste surface after stacking.

③ For solid waste yard or slope of such wastes, the Contractor shall cover the yard surface with straw curtain before local rainy season, so as to reduce water and soil loss caused by surface exposure of the stacked wastes.

④ When works about pier is completed and the solid wastes need not to be stacked, top surface or slope surface of the stacked solid wastes shall be renovated, and greened after earth backing, such as planting trees or grasses, so as to increase vegetation coverage of the surface of the stacked solid wastes and reduce water and soil loss.

6) When filling subgrade, water shall be sprayed as required by material compaction. The Contractor must also spray water frequently after the material compaction, ensuring the material will not fly in the air.

(3) Measures for Environmental Protection during Construction of Approach Bridge and Connection

1) During construction, advanced equipment shall be adopted as much as possible to reduce interference of construction noise on normal life and rest of nearby residents. During construction, equipment with big mechanical noise shall stop operating during 22:00 PM to 06:00 AM of the next day, so as to ensure normal rest of residents at night. It is worth mentioning that construction of such a large project in suburban area must produce much interference on normal life and convenient travel of local residents. Except that necessary preventive measures are taken to relieve interference, the Contractor shall post notice in entrances & exits and residential area. The Contractor shall ask for pedestrians' or residents' understanding and support, give psychological comfort to people affected by construction and give their support in action, so as to reduce incoordination caused by construction. This is conducive to promoting progress of works.

2) Solid wastes drilled (excavated) during construction of bored pile of approach bridge pier must not be stacked anywhere and shall be disposed as required by the report. New water and soil loss must be prevented.

3) Requirements on environmental protection measures for construction personnel's camp shall be subject to provisions of the report.

4) Water must be sprayed based on weather conditions on construction site and access road as well as when subgrade is filled in connection works. For construction materials scattered on urban roads, the construction contractor of each bid section shall appoint special personnel to sweep timely, so as to reduce pollution of dust nuisance on ambient air quality.

Attachment 4:

Management Regulation on Protection Measures for Intercepting Main Sewer Construction

1. Environmental Protection Measures at Design Stage

(1) Pipeline Layout

Layout of intercepting main sewer shall be harmonious with overall planning of the city, with access entry reserved by combining development of social economy at both sides.

(2) Stacking of Solid Waste

Earth-rock works involved in the intercepting main sewer works mainly includes temporary waste bank and few spoil, so a yard shall be set for earth-rock works reasonably. If not, water and soil loss would be caused or farmland would be polluted. Therefore, the temporary waste yard shall be designed for the intercepting main sewer at the design stage. It is also required to consider recovery of land temporarily occupied and prevention of dust and water and soil loss of the temporary waste bank, and seek for opinions of local environmental protection department and government.

2. Environmental Protection Measures at Construction Stage

(1) If the intercepting main sewer works is constructed nearby village, temporary enclosure shall be set (see Table 4 for details) to prevent wind and dust and keep the construction site clean concurrently.

Table 4 List of Measures for Environmental Protection in Construction Period of Intercepting Main Sewer Works

Environmental Problem	Area	Mitigation Measures for Environmental Impact	Unit Price (RMB)	Qty.	Total Price (RMB 10,000)	Implementation Agency	Supervision Agency
Construction noise and flying dust	Chengbei District	1.8m (H) × 800m (L) temporary color steel fence shall be set for works in Shuangsubao Village	300	800	24.0	Contractor	Xining Environmental Protection Bureau
		1.8m (H) × 1000m (L) temporary color steel fence shall be set for works in Guojiata Village	300	1000	30.0		
		1.8m (H) × 50m (L) temporary color steel fence shall be set for works in Hetan Village	300	50	1.5		
		1.8m (H) × 500m (L) temporary color steel fence shall be set for works in Qinglu Residential Area	300	500	15.0		
	Chengxi	1.8m (H) × 400m (L) temporary color	300	400	12.0		

Environmental Problem	Area	Mitigation Measures for Environmental Impact	Unit Price (RMB)	Qty.	Total Price (RMB 10,000)	Implementation Agency	Supervision Agency
	District	steel fence shall be set for works in Zhangjiawan Village					
		1.8m (H) × 100m (L) temporary color steel fence shall be set for works in Yinshantang Village	300	100	3.0		
		1.8m (H) × 100m (L) temporary color steel fence shall be set for works in Duoba Town	300	100	3.0		
Total		/	/	/	88.5		

(2) During construction of intercepting main sewer works, it is required to complete construction planning strictly and set red line for construction, and not allowed to expand range of disturbance by construction.

(3) During construction, the construction personnel shall have normative words and deeds and must not destroy crops at will.

(4) If sandstone road is occupied during construction, traffic shall be controlled well, without any interruption. Temporary access shall be set for the convenience of travel of villagers nearby.

(5) If location of construction is close to residential area, it is required to inform the villagers and obtain their understanding, with construction arrangement completed and operation of high noise equipment during spare time prohibited.

(6) Safety warning sign shall be set to remind the villagers nearby, preventing accidental personal injury.

Attachment 5:

Management Regulations on Protection Measures for Reclaimed Water Reuse Works Construction

1. Environmental Protection Measures at Design Stage

(1) Site Selection

Site selection of reclaimed water works shall be planned in a reasonable manner by combining layout of wastewater treatment plant that is relied on by the Project.

(2) Determination of Scale of Water Supply

For design of reclaimed water reuse works, users of the reclaimed water shall be determined, and development needs and requirements on water quality of downstream users shall be considered.

2. Environmental Protection Measures at Construction Stage

During construction of civil works and pipeline of the reclaimed water works, temporary enclosure shall be set (see Table 5 for details) to prevent wind and dust and keep the construction site clean concurrently.

Table 5 List of Measures for Environmental Protection in Construction Period of Reclaimed Water Works

Environmental Problem	Mitigation Measures for Environmental Impact	Unit Price (RMB)	Qty.	Total Price (RMB 10,000)	Implementation Agency	Supervision Agency
Construction noise and flying dust	Fence shall be set in plant area under construction at construction stage of No. 5 wastewater treatment and reclamation plant, and 2.0m (H) × 1800m (L) temporary color steel enclosure wall shall be set.	360	600	64.8	Contractor	Xining Environmental Protection Bureau

Attachment 6:

Management Regulations on Protection Measures for Ditch Management Works Construction

1. Environmental Protection Measures at Design Stage

(1) Impact on Landscape

Greening of works and design of road shall be combined with rural environment characteristics along the line, coordinating the works with ambient environment.

(2) Determination of discharge flow in Chaoyangdianqu

Sufficient discharge flow shall be retained in Chaoyangdianqu to ensure water demands of irrigation of farmlands at both sides.

2. Environmental Protection Measures at Construction Stage

(1) Solid waste in ditch shall be cleaned. A few household wastes will be produced and shall be cleaned during ditch management. All these wastes shall be transported to household waste landfill of Xining for sanitary landfill.

Besides, there are many construction wastes in the ditch, which are produced by demolition of cities nearby. These wastes do not contain any toxic and hazardous substances, and can be hardened after compaction or greened by covering with topsoil based on requirement of works.

(2) During construction of Chaoyangdianqu, impact of construction period on irrigation water for farmlands along the line shall be considered. Construction shall be performed in non-irrigation period as far as possible, and temporary water channel shall be built when necessary, ensuring irrigation water for farmlands.

Table 6 List of Measures for Environmental Protection in Construction Period of Chaoyangdianqu Works

Environmental Problem	Mitigation Measures for Environmental Impact	Unit Price (RMB)	Qty.	Total Price (RMB 10,000)	Implementation Agency	Supervision Agency
Water for canal	Chaoyangdianqu in Chengbei District supply water for irrigation of farmlands around, so the construction shall be performed in non-irrigation period as far as possible and temporary water channel shall be built when necessary.	/	/	/	Contractor	Xining Environmental Protection Bureau

Attachment 7:

Management Regulation on Protection Measures for Construction of Road Network and Pipe Network Works in Beichuan Area

1. Environmental Protection Measures at Design Stage

(1) Determination of Road Network Scheme

Road network in Beichuan area shall be designed by combining development planning of Xining Municipality and Beichuan area, and concurrently considering connection with the existing peripheral road.

(2) Determination of Line Design Standard

Design standard for each line in Beichuan area shall comply with functional orientation of planning of Beichuan area and meet demands of different functional zones on traffic conditions, with requirements of social economy for increase of traffic volume considered at the same time.

(3) Impact on Landscape

Beichuan area is one of the typical urban development areas, so the road shall be designed reasonably by combining requirement of overall urban landscape, reflecting new features of rapid development of Xining.

(4) Solid Waste

The proposed road will involve more earth-rock works and mainly involve soil borrowing, and subgrade will be filled after allocation of earth-rock works, which do not produce any spoil, therefore, a reasonable borrow pit and temporary waste yard shall be selected for construction of the Project. If not, there will be water and soil loss or farmland will be occupied. For this purpose, solid waste yard and borrow pit shall be designed at the design stage, with opinions of local environmental protection department and government sought.

2. Environmental Protection Measures at Construction Stage

(1) Construction time shall be arranged reasonably, avoiding subgrade excavation and filling in windy and rainy days.

(2) Temporary waste bank produced in construction shall be allocated and utilized timely to fill subgrade and harden surface after compaction.

(3) After the subgrade is filled, vehicle shall be arranged for regular watering,

preventing road being dried, floating dust being blown by high wind and city sanitation being affected.

(4) Construction at connection with road nearby shall be noticed to traffic police brigade in advance, so as to complete control of vehicle operating in the connecting section and prevent congestion or traffic accident caused by the project construction.

(5) Transport vehicles for construction shall be dispatched reasonably, avoiding material transportation in rush hours.

Attachment 8:

Labor Protection and Safety Production

1. Labor Protection

The principle of "Safety First, Precaution Crucial" shall be carefully implemented to ensure that the project construction and use are consistent with national safety requirements, and ensure that workers are not injured during production and their health is not affected.

2. Analysis of Main Hazard Factors

There are mainly two types of hazard factors of the Project. The first is hazards and adverse effects caused by natural factors mainly including earthquake, unfavorable geology, summer-heat, lightning stroke, storms, etc; the second is hazards formed during production including hazardous gas and dust, fire and explosion, mechanical injury, noises and vibration, electric shock accident, high-attitude falling, collision, etc.

(1) Analysis of natural hazard factors

1) Earthquake

Earthquake is a natural phenomenon which can cause great destruction especially on structures and buildings. As the impact scope is large, earthquake can be a great threat to safety of equipment and personnel.

2) Storm and flood

Storms and flood can threat safety of wastewater treatment plant. Though their impact scope is large, they rarely happen.

3) Lightning stroke

Lightning stroke can damage buildings, structures and equipment and might cause fires and explosion. But it rarely happens and the action time is short.

4) Unfavorable geology

Unfavorable geology can cause great damage to buildings and structures and even threaten personnel security. But damage to buildings and structures by the unfavorable geology in the same region happens only once with short action time.

5) Wind direction

It is very unfavorable for personnel downwind the hazard sources as the wind direction has obvious effect on transmission of hazard substances.

6) Temperature

Human body requires appropriate scope of ambient temperature. If such scope is exceeded for certain extent, the human body will feel uncomfortable. If temperature is too high, human body might suffer heat-stroke; if temperature is too low, human body might be injured by extreme cold. Effect of temperature on human body is large with long action time. But the harmful consequence is slight.

In a word, natural hazards are basically inevitable as they are generated naturally. However, relevant protective measures can be taken to relieve injuries or damage to personnel and equipment.

(2) Analysis of production hazard factors

1) High-temperature radiation

When intensity of high-temperature in work place is larger than 4.2Jm2·min, human body will be overheated leading to series of physiological function changes such as unbalanced thermoregulation and water and salt metabolic disturbance. The digestive and nervous system are also affected. These changes are showed as inattention, poor coordination and precision of actions which can easily induce accidents.

2) Vibration and noises

Vibration can cause vibration disease which is mainly showed as dizzy, asthenia, sleep-disorder, palpitation, cold sweat, etc.

Noises can not only damage hearing organ but also cause unfavorable impact on nervous system and cardiovascular system. After long-time exposure to noises, people can get headache and dizzy, feel fatigued easily and become forgetful. Incidence of coronary disease is also increased.

3) Fire alarm and explosion

Fire is a kind of fierce combustion. Out-of-control combustion can cause fire accident which will lead to great personnel and property loss.

Like fire hazard, explosion can also cause great casualties and property loss.

4) Other safety accidents

Pressure vessel accident can cause damage to equipment and threaten personnel safety.

In addition, electric stroke, collision, high-attitude falling, mechanical injuries, etc. can cause personnel injuries and even casualties.

3. Fire safety

(1) Protective measures for fire safety during construction period

Construction site shall be divided into hot work zone, combustible and explosive materials zone and living zone. Fire protection spacing shall be kept as per relevant specifications. Visible fire protection signs shall be provided on the site. The staff shall receive fire protection education once a month. Fire protection inspection shall be carried out at regular intervals. Fire protection work files shall be established.

Electricians and welders shall have relevant operation certificates and hot work permits for installation of electrical equipment and operations of electric welding and gas welding. Combustible materials nearby shall be removed before hot work. Fire watcher and fire-fighting devices shall be designated and provided. Fire protection measures shall be strictly performed when using electrical equipment and combustibles and explosives. Special person in charge of fire protection shall be designated and fire fighting apparatus shall be provided to ensure construction safety.

Requirements of burglary and fire prevention shall be met when establishing temporary structures needed for construction. Combustible materials shall not be used. Stacking and storage of construction materials shall conform to fire safety requirements. Warehouse shall be established with non-combustible materials. Combustibles and explosives shall be stored separately by category in special warehouses. Ventilation of the warehouse shall be guaranteed and hot work shall comply with fire protection specifications. It is prohibited to mix paint, dilute combustible and explosive liquids in the project site or in the warehouse.

Electric heating devices and equipment are not allowed to be used in construction site and living zone without prior permission by security guard department.

The system of fire protection and safety clarification shall be implemented throughout construction of the project. Specific fire protection requirements shall be especially provided for electric welding, gas welding, painting or dangerous operations requiring water proofing.

(2) Protective measures for fire safety during period of use

According to requirements of fire protection specifications, sufficient fire passages and stairs are reserved for the Project and fire-fighting device systems including fire hydrant and fire-fighting pump are provided. Safety management shall be strengthened on locations prone to fire accident during period of use. Personnel education shall be strengthened. Fire-fighting equipment shall be maintained timely to guarantee their effective operation condition.

4. Analysis and Prevention of Hazards

(1) Measures for labor safety and protection during construction period

The principle of “Safety First, Precaution Crucial” must be insisted during construction. Safety production responsibility system shall be established and perfected. *Labor Law of the P.R.C.* and *Regulation on Labor Safety and Hygiene Inspection for Designed Project (Engineering)* shall be strictly executed. Personnel education about labor protection and general knowledge of safety and sanitation shall be strengthened. Physical examination shall be performed for workers at regular intervals. Appliances for labor protection shall be distributed as per relevant specifications.

Visible safety signs shall be hung according to provisions of *Safety Colors* (GB2893-2001) and *Safety Signs* (GB2894-1996) at dangerous facilities and locations such as lifting equipment, temporary electrical facilities, scaffold, access, stairway, orifice and opening of holes, edge of pits, and storage for hazard gas and liquid. Safety managers, special operation personnel and other constructors on the construction site shall receive safety production training and be provided with effective appliances for labor safety. Effective technical safety measures shall be taken to intensify management of labor safety. Appliances for safety protection, electrical products, safety measures, machines and tools that erected and mechanical equipment used on the construction site must meet specified technical safety indexes and requirements of safety performance.

(2) Factors that can ensure labor safety during operation period shall be fully considered during design stage for item with measures for labor safety and protection during operation period. Such item shall not generate poisonous and hazard substances and free of dangerous and explosive articles. The item shall have good lighting and ventilation conditions. The ventilation and sanitary fixtures shall be designed according to national sanitary standard to comply with requirements of every specification. Water tank shall be made of stainless steel finished products to guarantee water quality. Grounding of power supply shall adopt TN-C-S system. All exposed conductive parts of electrical equipment shall be reliably earthed under normal condition. Lightning strips mounted around roof shall be adopted as lightning protection measures, with main reinforcement in the column as downlead and foundation reinforcement as earthed body. Various potential hazards shall be inspected and eliminated during daily use as personnel engaged in the Project are relatively concentrated.

(3) Earthquake prevention and protection

Structural design shall be conducted strictly based on national specifications. Staff shall receive earthquake relief and escaping education in daily life to master relevant basic knowledge and methods.

(4) Prevention of burglary and security monitoring

Automatic alarm system for burglary prevention shall be installed in critical

locations. Television monitoring system shall be provided around the structures and buildings.

During project construction and operation, occupational accidents such as mechanical injuries can be effectively prevented and reduced as long as relevant personnel are required to strictly comply with related national specifications, standards and professional operation specifications; relevant personnel receive safety production training and education at regular intervals; and the concept of Safety First is firmly insisted. Even if accident occurs, relevant effective measures can be taken timely to reduce loss caused by the hazard to the most extent.

5. Safety Production

According to Article 53 Clause 2 of the *Labor Law*, "sanitary fixtures for labor safety of the newly-built, rebuilt and expanded project must be designed, constructed and put into production and use simultaneously with the main project". The *Hygienic Standard for the Design of Industrial Enterprises, Code of Design on Building Fire Protection* and other specifications and standards shall be strictly followed during design.

The following preventative measures shall be taken for the Project against issues affecting personnel safety:

(1) Relevant specifications of the *Code of Design on Building Fire Protection* shall be strictly implemented. Sufficient spacing shall be kept between buildings for fire protection. Fire hydrants and other fire-fighting facilities shall be provided according to the specification.

(2) Safety protective covers shall be provided for exposed electrical equipment of buildings and structures and visible dangerous signs shall be set.

(3) Safety design such as lightning protection shall be implemented according to *Technical Specification for Electric Power Design of Plant*. Three-phase and four-wire system shall be adopted for lighting system. Safety factors shall be fully considered during mode selection of electrical equipment.

(4) Handrails shall be set for all overhead passageways, sidewalk slabs of treatment structure in the reclaimed water plant and stairs of the structure. Anti-skid stairs shall be adopted.

(5) Technical personnel shall be trained before working. Strict safety protective measures shall be provided when worker is working in water. Supervision organization for safety protection and security staff shall be provided to supervise and implement position management system, strengthen responsibility of operators, formulate safety operation specification and perfect requirements of normal operation and emergency operation.

(6) Visible signs shall be set on the construction site to prohibit access of unrelated persons. Workers shall wear safety helmet when entering construction site.

(7) Study of operation specifications shall be strengthened. Construction machinery shall be operated strictly according to operation specifications. Safety production education shall be strengthened for staff to enhance their awareness of safety protection.

(8) Prevention against fire and explosion

Sufficient spacing shall be kept for fire protection for each production area, devices and structures. Road design shall satisfy requirements on curved section for fire fighting truck.

During the design, natural and mechanical ventilation facilities shall be set in rooms where combustible and explosive gas might exist to reduce concentration of such gas below the lower limit of explosion.

Mobile fire extinguishers shall be provided in substation and blower room.

Corresponding fire supply pipe network and outdoor fire hydrant shall be designed and provided for the plant.

(9) Electrical safety design

The following safety measures shall be taken for electrical design of the Project:

1) High voltage switchgear installation

10KV switchgear installation shall be provided. Special person on duty shall be designated to take charge of the operation and maintenance. Patrol inspection shall be carried out by more than two persons.

Maintenance during power-off and cleaning shall be carried out once every half year. Live working is prohibited. Power supply must be cut off before maintenance of the electrical equipment. Warning board “No switching-on, work is in progress” shall be hung on the power switch. Hanging and removing of such warning board shall be carried out by designated person.

Disconnecting switch shall be inspected once quarterly. Supporting insulator shall be free of cracks and discharging. Binding post and bolts shall be free of looseness. The blade shall be free of deformation and is tightly contacted.

Lightning conductor shall receive a preventative test before thunderstorm season. Value of earth resistance shall be measured. The supporting insulator, connecting wire and earth lead of the lightning arrester shall be checked for completeness after

thunderstorm.

2) Low voltage switchgear installation

Insulation resistance of low voltage switchgear installation and equipment shall not be less than 0.5MΩ. Maintenance personnel shall inspect it with tramegger at regular intervals. Unacceptable ones shall be replaced timely.

Normal and stable operation of low voltage electric appliances in humid engineering environment shall be guaranteed. Protection level of indoor switchgear and distribution board is IP4X, while that of the outdoor control box and power case is IP55.

3) Power transformer

Patrol inspection shall be carried out by person on duty on the transformer more than once a day and once at night every week to see whether any part is abnormal, whether outgoing line bushing is clean, whether there is any crack or discharge trace, whether the operation has any abnormal sound, and whether the grounding is good.

4) Power cable

In order to prevent the fire from spreading, setting fire door or fire partition, applying fireproof coating on the cable surface, blocking the hole passed by the cable with fire resistant materials, and other measures shall be taken in the important position of cable facilities.

5) Electric shock resistance to ensure personal safety

In the Project, earthed network shall be provided within the water reclamation plant, so as to connect all earthing devices into a whole. The grounding resistance of earthing device shall be less than 4Ω, and it is connected to natural earthed body. Earthing fault protection and neutral protection are connected to the earthed network. Each earth point of electrical equipment shall be connected to a single grounding line and grounding main line.

Five-prevention function is applied for 10KV switchgear. The switch interlocked with door is applied for all 0.4KV distribution cabinet. The cabinet cannot be opened in case of power off, and the cabinet cannot be locked without closure, so as to prevent the operators from getting an electrical shock by misoperation.

The protective grade of switchgear installation is above IP4X. All of them are of closed type. Operators have no opportunity to contact live conductors so as to ensure personal safety.

Insulating rubber slabs are laid on the floor before the operation panel of switchgear installation. Operators shall wear isolating gloves and insulating rubber

boots.

6) Switchgear installation structure

In the Project, all doors of switchgear structure are open to outside, so that people can evacuate from the site quickly and safely in case of electrical accident. All windows shall be of one yarn per glass. All cooling ventilation windows shall be of louver and steel wire mesh, and access to the outdoor cable tunnel. All of them are blocked with cement mortar so as to avoid entering of animals, causing short circuit between live conductors. “No entry, high voltage danger!” shall be written on the door of transformer room, so as to prevent others going by mistake, causing electric shock.

(10) Others

Earthing fault protection shall be provided for metal case of normal and uncharged equipment of above 1KV; neutral protection shall be provided for the metal case of equipment of above 1KV; and leakage protectors shall be equipped on the equipment.

In order to avoid mechanical injury and falling accident, the ladder, platform and high place in the production site shall be equipped with safety rails, with the height and strength confirming to provisions of the national labor protection.

Enough safe distance and space shall be left for the layout of mechanical equipment and electrical equipment. In the Project, selection, production, installation and use of hoisting equipment in reclaimed water treatment plant shall be in strict accordance with the provision of labor department, and must be reported to the local competent department of labor before use, thus, realizing qualified design, site manufacturing, installation by the team with installation certificate, and use after issue of permit by labor department.

For all activities of the Project in the design, the corresponding safety regulations shall be performed before operation, and operators shall receive necessary specialized technical training before they start working, so as to make sure normal and safe operation of each Project item.

Attachment 9:

Regulation on Environmental Protection of Road and Pipe Network Works during Operation Period

1. Protective measures for social environment

1) Before completion and operation of construction, complete the connection with relevant road and setting of safety signs.

2) Perform regular maintenance for the road, so as to ensure the normal traffic.

3) Clean and transport the waste residue removed from road maintenance and other solid waste immediately, and send to the designated location for landfill treatment.

4) Enhance traffic safety management, and play the full functions of road, so as to reduce traffic accident.

5) Provide a reasonable number of waste bins along the road, for convenience of pedestrian littering, so as to maintain urban environmental health.

6) After construction of wastewater pipe network along Xichuan River and Beichuan River, recover the occupied sandstone road.

2. Protective measures for ecological environment

1) After road construction, perform soil conservation, control and beautification in the area affected by road, and recover the destroyed vegetation, so as to reach harmony and unity in soil erosion control and road greening and beautification. Plant measures layout of road shall conform to soil conservation, reasonable layout, each characteristic, and combination of point, line and plane, so as to form a complete greening system.

2) Pack the household waste along the road in bags by classification for centralized treatment.

3) During operation period, try best to avoid destroying original landform for road maintenance.

3. Protective measures for acoustic environment

1) Strengthen traffic management, and reduce noise source.

The traffic noise is one of the main sources of urban noises, so further enhance motor vehicles and road traffic management in the whole urban area. Perform strict quality control for annual vehicle audit, to eliminate tricycles. Meanwhile, set speed limit

and no horn signs in the road section near the important sensitive points (for example, school, and village close to the road), so as to mitigate the effect of noise. Remove roadblocks immediately to ensure carriageway and sidewalk clear. Maintain the evenness of road surface, to avoid the traffic noise increased by pitching of vehicle for poor road conditions. For motor vehicles, perform civilized driving, reduce number of honking, and decrease the intensity of mobile noise, so as to decrease the impact of traffic noise.

2) Make the public participant in the environmental noise pollution prevention consciously through publicity.

Environmental protection department shall vigorously promote Noise Pollution Prevention Law, Environmental Quality Standard for Noise, relevant regulations and systems, and support the public participant in the environmental noise pollution prevention with the help of social opinion. Improve the citizen's awareness on noise pollution hazard through publicity, so as to reduce or resist strong noise pollution source.

3) Enhance urban landscape engineering, in combined with urban renovation, enhance urban landscape engineering, and choose suitable seeds of trees, plant density and width of vegetation, so as to absorb sound waves and reduce noise. Plant street trees on both side of the road timely, and carry out effective maintenance and management, so as to form a green screen, which can effectively reduce the noise pollution and beautify the environment.

4) When planning house building on both side along the road, consideration shall be given to the impact of traffic noise of the proposed project. It is suggested that the residential area faxing the road directly shall not be planned within 35m away from the red line of road, and the construction of school shall be 150m away from the center of road, so as to ensure that the traffic noise of the Project will not affect he people's life along the line.

According to the specific environmental characteristics and functions of Beichuan area, in combined with the future economic development characteristics, it is suggested to strengthen the monitoring on the road sections near residential district, office building, school, hospital, etc. to be built in the area. And necessary protective measures for acoustic environment shall be taken, according to monitoring results and impact degrees.

5) Sound proof wall shall be set up surrounding the Kunlun College of Qinghai University and No.4 High School of Xining City to reduce impact of construction under the project on teaching activities of the college and school. Details of the planned sound proof walls are shown in Table 9-1 and location of the walls are shown in Figure 9-1 and Figure 9-2.

Table 9-1 Details of the Planned Sound Proof Walls

Sensitive Receptors	Location of the Sound Proof Walls	Type of the Wall	Height	Noise Abatement Capacity	Cost (yuan/m)	Length
Kunlun College of Qinghai University	Northeastern corner of the college site North side	Upright	3m	6 ~ 8dB (A)	1300	100m
	Northeastern corner of the college site Eastern side	Upright	3m	6 ~ 8dB (A)	1300	100
No.4 High School of Xining	Northern side of the school, teaching area	Upright	3m	6 ~ 8dB (A)	1300	200
Total					Length	400m
					Cost	520 thousand yuan

Figure 9-1 Location of the Sound Proof Wall for Kunlun College of Qinghai University

Figure 9-2 Location of the Sound Proof Wall for No.4 High School of Xining

4. Protection measures for water environment

1) Forbid various vehicles with leakage and overload in bulk on the road, to avoid water pollution caused by loss of goods on the road; try best to collect the oil leaked for traffic accidents, so as to reduce the pollution of ground water, natural vegetation and crops.

2) Check and maintain the facilities for soil conservation works and drainage works along the line regularly, and repair immediately in case of damage. Check the sediment deposition in the culvert along the line regularly, and desilt timely.

3) In case of heavy wind, heavy fog, icy pavement and other serious conditions, remind the drivers to slow down, so as to reduce the rate of the traffic accidents.

4) According to the requirements for bridge maintenance in *Technical Specification of Highway Maintenance* JTJ073-96, enhance the safety inspection and monitoring for bridge project, and ensure the safety of the section in important water areas.

5) Perform water quality monitoring plan, and take additional environmental protection measures according to the water quality monitoring results. The measures are as follows:

① The water drained from bridge surface is introduced to wastewater pipe network, and do not enter the river directly. Warning board shall be set to remind the driver of

carefully driving.

② Engineering protection measures, such as, guard rail reinforcement, shall be taken on both sides of the crossing bridge, so as to avoid the vehicles falling into river for sudden accidents and pollute the water.

③ For hazardous materials transportation, strict management measures shall be taken, and the vehicles shall be equipped with complete certificates, and qualified for hazardous materials transportation. Obvious signs of vehicle for hazardous goods shall be marked on the vehicles. In special weather, such as, snow and fog, vehicle for hazardous goods shall be forbidden on the road.

5. Ambient air protection measures

1) Enhance vehicle management. Environmental protection and traffic police department shall enhance supervision and monitoring, strictly enforce the inspection system for vehicle emission, and forbidden the vehicles with the discharge of pollutants exceeding the current vehicle emissions standards according to relevant regulation on the road or specify its drive route.

2) Enhance management for transport vehicles, and forbid the vehicles without covering on the road which may cause raising dust during transportation.

3) Enhance road management and road surface maintenance, and maintain good operation of road, so as to reduce traffic jam.

4) Plant more trees and grasses on both sides of the road, which can not only absorb and purify the pollutants in the vehicle emissions, but also beautify the environment and improve landscape along the road.

5) Carry out the ambient air monitoring program, and take corresponding environmental protection measures according to monitoring results.

6. Measures on solid waste disposal

1) Develop and promote laws and regulations to forbid the passengers and pedestrians littering on the road, so as to ensure traffic safety and cleanliness on both sides of the road.

2) Set trash container or garbage can on bus stop and both sides of the road for convenience of passengers. Forbid to build an exposed dump of refuse.

3) Enhance management, clean and transport waste timely, transport the stacked waste to Yinjiagou household waste landfill in Xining for centralized treatment, and forbid littering at random.

Attachment 10:

Regulations on Environmental Protection of Reclaimed Water Plant during Operation Period

1. Ambient air protection measures

(1) Carry out greening in and around the site, try to expand the area of green land and plant evergreen arbor and shrub, and flowers and plants which have certain function of absorbing the stench.

(2) The greening area in the site shall be more than 30% of the total area of plant area in the feasibility study design.

2. Protective measures for acoustic environment

(1) Use low speed water pump;

(2) Provide a cover for recycled water basin.

3. Protection measures for water environment

Daily maintenance of water reclamation plant shall be carried out during the operation period to ensure normal operation of the plant and reclaimed water treatment equipment and reduce possibility of abnormal discharge. Meanwhile, supervision of the quality of water shall be strengthened. Special emergency response scheme shall be prepared for the reclaimed water treatment plant and there shall be special personnel in charge. In case of abnormalities, handling measures shall be taken immediately to ensure that the effluent quality reaches the standards for discharge.

4. Measures for mitigation of impact on ecological environment

After construction of water reclamation plant, greening will be carried out in the plant area. According to the preliminary scheme of feasibility study, the greening area in the plant area shall not be 30% smaller that that of the plant area. Meanwhile, greening will be carried out within the protection range of atmospheric environment of the wastewater treatment plant. Therefore, the construction of water reclamation plant will improve the surrounding ecological environment at the plant site.

Attachment 11:

Regulations on Integrated Pest Management (IPM)

Since greening and tree planting are included in the project component relating to low impact development and river bank environmental improvement, use of pesticides may increase in the process of maintenance of greening and tree planting areas and thus IPM tasks will be intensified in the project area. To address the challenge to ecological safety and promote sound development of agricultural and forestry ecological systems, this regulations on IPM is prepared based on the pest and plant disease control and management system existing in the project area. Implementation of this regulations will be organized by the PMO.

1 Main pests and plant diseases in the project area

Pests that are widely distributed and causing serious damages in Xining are: yellow spot long-horned beetle, rust spot peg-like long-horned beetle, spruce Adoxophyes orana, Dioryctria reniculelloides Mutuura, birch inchworm, Cytospora chrysosperma, and plateau zokor and etc.

2 Current status of pest and plant disease management in the project area

(1) Institutional Arrangement

One municipal level and 3 county level forest pest and disease control quarantine stations are now functioning in Xining, i.e. Xining Municipal Forest Pest and Disease Control Quarantine Station, and Datong County Forest Pest and Disease Control Quarantine Station, Huangzhong Forest Pest and Disease Control Quarantine Station and Huangyuan County Forest Pest and Disease Control Quarantine Station. Each of these 4 stations has one national level central monitoring and forecasting site established.

(2) Main Responsibilities

These stations are responsible for organization of and supervision on hazardous pest control and quarantine, monitoring activities, as well as implementation of control and prevention of pests.

(3) Main Control Measures

Quarantine measures, monitoring measures, physical control measures, chemical control of yellow spot long-horned beetle, induced cell control of Sphecia siningensis, hole punching meditation and etc.

3 Design of Comprehensive Control Measures

(1) Principle

'Prevention First and Comprehensive Control' is the principle of plant protection in the project area. Implementing combined agricultural, biological, physical and chemical control and prevention measures to optimize ecological system and promote sustainable development is the strategy for pest and plant disease control and prevention in the project area.

(2) IPM for Shelter Tree Belts (Farmland Protection Tree Belts

The project county (district, municipality) should identify monitoring and furcating priority of pest and disease types based on structure and varieties of the shelter trees within its territory, and assign professional staff, formulate methodologies for unified pest and disease monitoring and investigation, conduct accurate forecasting of pest emergence period and quantity, and popularize and organize integrated pest management for forest.

- Agricultural control: select and breed resistant tree varieties and strains, such as Italian Poplar, and promote planting of mixed forest to improve tree belt structure and strengthen cultivation and management.

- Biological control: use BT, insect karyotype polyhedral virus, polyhedral orgya pseudotsugata NPV, Adoxophyes orana worm and biomimetic pesticide for biological control. Where appropriate, artificial reproduction and release of natural enemies, e.g. parasitic wasp, can be adopted. Meanwhile, pesticides that are less lethal to natural enemies should be used to ensure protection and utilization of natural enemies in control of pests.

- Physical control: Phototaxis of pests can be used to control pests and trap lamps can be arranged in farmland to attract and kill lepidopera pests, including clostera anachoreta, micromelalopha troglodyte, poplar adoxophyes orana and poplar sesia molybdoceps, so at to reduce occurrence degree and quantity of pests.

- Chemical control: new, effective, low toxic and non-polluted pesticide that are environmentally friendly should be chosen for use, such as Acetamiprid for control of various pierecing-sucking mouthpart pests (aphide, aleyrodid), Avermectin for spider mite, pyrethroids and organophosphorus pesticides (beta-cypermethrin, deltamethrin) for control of Lepidoptera pests. Meanwhile, multi-functional high pressure sprayers and other new medicine application machines should be used to upgrade effectiveness and control quality.

4 Proper Application and controlled use of chemical pesticides

Pesticides that are banned by the national government should not be allowed for use in the project area. Great efforts should be made to promote use of IPM approaches and safer pesticide application techniques, as well as use of highly effective, low toxic and residue pesticides. Pesticides, bactericides and herbicides that are allowed for use in

the project area are:

Pesticides: dimehypo, monosultap, triazophos, abamectin, B.t.emulsion, imidacloprid, Regent, deltamethrin, and beta-cypermethrin.

Bactericides: validamycin, ningnanmycin, trichloroisocyanuric acid, triazolone, carbendazim, metalaxyl, tricyclazole, mancozeb.

Herbicides: acetochlor, paraquat, isoproturon, butchlor, bensulfuron methyl, tribenuron-methyl, Starane.

Control of pesticide dosage: monitoring of pest and disease should be strengthened. As less as possible pesticides use, improvement of application techniques, proper use of pesticide and upgrading of application efficiency , reduction of frequency and quantity of pesticide use are recommendable, and compliance with safety interval of pesticide use should be strictly imposed.

5 Pest and Disease Control and Management Measures for the Project

(1) Strengthen organizational institution and IPM implementation

Based on existing pest control institutions, Xining Pest Control Headquarter will be established to conduct unified command and guidance, and Xining Agricultural Pest Emergency Preparedness Plan should be prepared for urgent mobilization of pest control. Division of responsibilities among departments and of staff members should be done to ensure efficiency, and fund should be guaranteed for pest disaster control. Municipal, county forest pest control stations and municipal agricultural technique extension station should be prepared to add staff when necessary, and ensure clear responsibility division of personnels to ensure efficiency.

(2) For afforestation, site selection should strictly follow requirements in the ‘ Flow chart for Screening of Sites for Afforestation’. Native vegetation should be maintained, and tree varieties selected should be reasonable to avoid singular variety tree planted in vast area, so as to maintain biodiversity.

Increased use of organic fertilizer, balanced fertilization for soil improvement is to be applied in the process of tree cultivation.

Use of chemical fertilizer should be controlled, while use of high toxic and high residue pesticide is strictly banned. Use of biological bacterial fertilizer and no-tillage technique should be promoted to improve soil quality.

(3) Upgrade level of ‘mass prevention and mass treatment’

- Strengthen capacity building of farmers, farmer organizations and relevant institutions in the project area through training, and ensure quality of training,

so that the trained parties are capable of solving problems encountered in the local area and organizing community-based control activities.

- By upgrading knowledge and skillfulness of farmers, promote collective use of sustainable farming techniques, so as to realize improvement of eco-environment and living standard of farmers.

- Establish linkage and communications between farmers and external technical supporting staff, so as to ensure quality of training and implementation of control measures;

(3) Monitoring and Evaluation

- Establish pest monitoring sites in Beichuan Area.

Pests to be monitored: yellow spot long-horned beetle, rust spot peg-like long-horned beetle, spruce Adoxophyes orana, Dioryctria reniculelloides Mutuura, birch inchworm, Cytospora chrysosperma, and plateau zokor and etc.

- Conduct regular quarantine work.

- Undertake pest disaster investigations: organize professional plant quarantine staff to conduct once a year investigation of frequent pest disasters in the local area.

- Establish level by level and step by step check and acceptance of performances of afforestation units in the municipality.

(4) Training

- Training of technical management staff should be conducted.

Attachment 12

Control and Prevention Measures against Environmental Risk Accident of Wastewater Interception Pipe Network

According to the relevant information, accidental discharge of wastewater pipe network is mainly caused by the following reasons:

(1) Spillover of wastewater caused by pipe rupture.

(2) Pump house accident, i. e. spillover of wastewater caused by suspension of operation.

(3) Blockage of discharge outlet caused by breakage of discharge pipe;

Generally, in the first situation, spillover of wastewater in the pipe is caused by excavation of other works. The amount of spillover is related to the wastewater volume transported by pipe, and repair schedule. In case of such accidents, first-aid repair shall be organized timely to reduce the wastewater spillover and the impact on surrounding environment as far as possible.

In the second situation, precaution shall be considered during the design. Standby power shall be provided in the wastewater pump station (power shall be supplied by double return circuit), so as to avoid shutdown of pump station because of power failure. Besides, standby units shall be provided in the pump station, to deal with the repair and mechanical failure of water pump.

In the third situation, generally flotsam collision for non-human factors and storms cause breakage of discharge pipe, blockage of discharge outlet or weaken diffusion effect, thus polluting the water quality around the discharge outlet. Therefore, relevant departments shall strengthen management of wastewater pipe network. In case of breakage of pipe network, emergency measures shall be taken immediately to repair and maintain, so as to avoid the accidental spillover of wastewater causing relatively large environmental impact.

Attachment 13:

Control and Precaution Measures for Road Environmental Risk Accident

Since the transportation risk of hazardous substances is caused by sudden traffic accidents, certain management means can be taken for prevention. With regards to the environmental impact that might be caused by traffic accident of vehicles for transporting hazardous substances, in order to avoid the occurrence of hazardous accidents, control the range and degree of influence after accident and mitigate the losses caused by accident, the following measures are hereby put forward:

(1) The vehicles without certificate, signs, or with leakage, overload of dangerous chemicals in bulk is forbidden on the road;

(2) Consigner must submit to relevant departments of public security organ timely for application, approval and supervision of public security organ.

(3) The unit delivering the cargo shall be qualified for transportation of hazardous substances. Driver delivering the cargo and supercargo shall be qualified to perform duties, and improve skill of driver, enhance education on safe driving and courteous driving. Carrier vehicles and vessels shall conform to relevant national standards.

(4) In case of transportation of highly toxic chemical, transportation shall be performed according to “Road Transport Pass for Highly Toxic Chemical” approved and issued by public security organ;

(5) Under adverse weather conditions, such as, heavy fog and heavy wind, vehicles for hazard transportation shall be forbidden on the road;

(6) Visible signs shall be provided on the road close to river, so as to draw the attention of drivers for hazardous substance transportation. Speed limit signs and speed bumps shall be provided, so as to reduce accident rate;

(7) After accident, drivers and carriers shall report immediately and indicate all important related matters.

(8) After receiving the report, the traffic administration and highway management department shall report to municipal government, and start emergency plan for emergency treatment of accident;

(9) For the drivers for transporting hazardous substances, relevant department shall carry out business training for eliminating traffic accident of vehicles for transporting hazardous substances regularly, so as to enhance awareness of unexpected development of employees, and minimize the accident risk for transporting hazardous substances.

Attachment 14:

Emergency Preparedness Plan for Transportation Risk of Dangerous Goods

In recent years, with the increasing volume of dangerous goods year by year, road and bridge shoulder a hard transportation task of vehicles transporting such dangerous goods as fuels and chemicals. The probability of leakage and explosion of dangerous goods during transportation is greatly increased. *Emergency Plan for Transportation Risk of Dangerous Goods* is prepared to strengthen effective control on transportation accident of dangerous goods, reduce accident hazard at the most extent, ensure people's safety of lives and properties, and protect environment.

(1) Guiding thought and principle of emergency rescue plan

The guiding thought of emergency rescue plant is to reflect the people-oriented idea and to implement the policy of "safety first, precaution crucial". Once traffic accident occurs that is harmful to environment, rescue can be carried out at the fastest speed to the best effect orderly, so as to reduce casualties and property losses to the largest extent, minimize the accident hazard, and safeguard the living safety and stability of the masses along the line.

The principle of emergency rescue for risk and accident is to respond rapidly, obey unified command, realize graded responsibility, and achieve the combination of unit self-help and social rescue.

(2) Establishment and responsibility of discipline group for site rescue

It is recommended that the local government should establish rescue command department for traffic accident, and establish the following rescue discipline groups based on actual situations:

1) Danger source control group: be responsible for site rescue work under emergency and timely control of danger source, as well as immediate organization of special protective equipment and tools according to the nature of dangerous goods.

2) Rescue group for the injured: be responsible for setting up temporary medical assistance station in a safe area near the site, conducting emergency treatment for the injured and escorting the heavy injured to hospital for further treatment.

3) Fire-fighting rescue group: be responsible for fire-fighting on site, research and rescue of the injured on site, cooling of equipment and vessels, rescue of the injured and post-accident decontamination of contaminated area.

4) Safety evacuation group: be responsible for protection and guiding of people on site and around, evacuation of people, transfer of surrounding materials and the like.

5) Safety alert group: be responsible for laying out safety alert line, forbidding irrelevant personnel and vehicles to enter dangerous area, performing security patrol in evacuation area of personnel.

6) Material supply group: be responsible for organizing the supply of emergency materials and arranging vehicles to transport.

7) Environment monitoring group: be responsible for monitoring such environments as atmosphere, water and soil in real time, determining the composition and concentration of hazardous substances, confirming area and range of contamination, assessing environmental impact caused by accidents, formulating environmental restoration scheme and organizing implementation. The group consists of environmental monitoring mechanism and chemical detection mechanism, and is under the charge of Environmental Protection Agency.

8) Expert consultation group: be responsible for putting forward emergency rescue scheme and safety measure for accidents, and providing technical advice for site command and rescue work.

Attached table 1:

Checklist of Environmental Protection Inspection during Construction Period

Inspection Factor	Implementation		Inapplicable	Remarks
	Implemented	Unimplemented		If any problem is identified in the inspection or anything is not in accordance with stipulations, suggestions on rectification and prevention shall be proposed.
1. Air pollution control				
1.1 Whether construction dust nuisance is reduced by watering at the construction site.				
1.2 Whether the stacking site for powder materials is covered or the dust is reduced by watering.				
1.3 Whether vehicles for transporting powders is covered or watered before leaving the site.				
1.4 Whether dustfall by water spraying is adopted in demolition and relocation works.				
1.5 Whether transportation with closed containers is adopted for clearance of construction wastes.				
1.6 Whether barricade type fence is used when the construction via environmental sensitive points (area).				
1.7 Whether the earth on construction site is centralized piled up and whether covering measures are taken.				
1.8 Whether vehicles have been cleaned up the clay on the surface before leaving the construction site.				
1.9 Whether stacking site for materials and large touch plates etc. at the construction site is flat and solid.				
1.10 Whether the main sources of dust, such as stacking site for fine particle loose materials, are arranged at down-wind direction beyond 300m away from the surrounding environmental				

Inspection Factor	Implementation		Inapplicable	Remarks
	Implemented	Unimplemented		If any problem is identified in the inspection or anything is not in accordance with stipulations, suggestions on rectification and prevention shall be proposed.
protection objectives, considering the predominant wind direction and environmental protection objectives.				
1.11 Whether dusty roads are hardened, covered with sand grains or watered frequently.				
1.12 Whether speed limit is required on access roads and whether there are speed limit signs.				
1.13 Whether fuel construction machineries and vehicles are used under the normal state and whether black smoke is found during operation.				
1.14 Whether there is burning of various wastes.				
1.15 Others (please note clearly)				
……				
2. Water pollution control				
2.1 Whether the construction site wastewater treatment system (such as temporary sedimentation tank) is under normal use and maintenance.				
2.2 Whether construction wastewater is effectively treated and utilized.				
2.3 Whether construction wastewater is discharged to rainwater channel.				
2.4 Whether there are facilities (such as ditch between low earth banks or U-shaped groove) for collection and guidance of construction wastewater into sedimentation tank.				
2.5 Whether sludge discharge is performed for U-shaped groove.				
2.6 Whether sludge discharge is performed for temporary sedimentation tank.				
2.7 Whether vehicles and equipment are cleaned				

Inspection Factor	Implementation		Inapplicable	Remarks
	Implemented	Unimplemented		If any problem is identified in the inspection or anything is not in accordance with stipulations, suggestions on rectification and prevention shall be proposed.
before leaving and entering the construction site.				
2.8 The maintenance condition of washing facilities and whether there are prevention measures for sediment spillover.				
2.9 Whether the silt at washing facilities is settled and eliminate periodically.				
2.10 Whether public roads/ places around [1] the construction site, the entrance, hoarding etc. are kept clean without turbid water.				
2.11 Whether domestic wastewater is treated properly.				
2.12 Whether excrement in the pit toilet is cleaned in time.				
2.13 Whether it is forbidden to stack construction materials near the water, such as asphalt, oil and chemicals.				
2.14 Whether low-water period is selected for construction of bridges and culverts and whether the construction time is as short as possible to reduce disturbance on the water.				
2.15 Others (please note clearly)				
……				
3. Noise control				
3.1 Whether valid construction noise permit is hold in the period when noise is forbidden and limited.				
3.2 Whether the construction noise permit is posted at the entrance and exit for construction.				
3.3 Whether the idle equipment in the construction site is in				

[1]

Inspection Factor	Implementation		Inapplicable	Remarks
	Implemented	Unimplemented		If any problem is identified in the inspection or anything is not in accordance with stipulations, suggestions on rectification and prevention shall be proposed.
shutdown or throttling and vibration damping state.				
3.4 Whether effective noise reduction measures (vibration damping, silencing, noise barrier etc.) are taken.				
3.5 Whether low-noise equipment is selected.				
3.6 Whether construction time is reasonably arranged.				
3.7 Whether the mechanical equipment producing louder noise is set at the side of construction site far away from the residential area.				
3.8 Whether periodical and effective maintenance and repairs are carried out for all mechanical equipment.				
3.9 Whether it requires strictly on management of construction intensity, machinery and vehicle operators, operation instruction etc.				
3.10 Others (please note clearly)				
……				
4. Solid waste management				
4.1 Whether the construction site is clean and tidy.				
4.2 Whether construction wastes are comprehensively utilized combining the project.				
4.3 Whether construction wastes are watered in advance during transportation.				
4.4 Whether household wastes are uniformly transported to household waste landfills where projects are located for treatment after bag-type collection via garbage cans.				
4.5 Whether there is burning of toxic and hazardous substances at the construction site.				
4.6 Whether there is grease dirt overflowing and whether				

Inspection Factor	Implementation		Inapplicable	Remarks
	Implemented	Unimplemented		If any problem is identified in the inspection or anything is not in accordance with stipulations, suggestions on rectification and prevention shall be proposed.
the polluted soil is cleaned immediately.				
4.7 Whether asbestos wastes are delivered to registered professionals for treatment.				
4.8 Others (please note clearly)				
5. Hazardous wastes and chemical wastes				
5.1 Whether chemicals are properly stored and labeled.				
5.2 Whether hazardous goods are stored according to requirements on storage type and data etc. specified in the storage certificate.				
5.3 Whether grease dirt etc. are collected by using special container during repair of mechanical equipment etc.				
5.5 Others (please note clearly)				
……				
6. Protection of animals, plants and cultural relics				
6.1 Whether disturbance on terrestrial plant is reduced to the minimum and whether plants are protected.				
6.2 Whether rare animals are found.				
6.3 Whether cultural relics are discovered by accident in construction. If any is discovered, it is ensured that protective measures are taken.				
6.4 Others (please note clearly)				
7. Resource protection				
7.1 Whether water pipe cracking and waste is prevented.				
7.2 Whether diesel-powered equipment is shutdown when not used, to reduce fuel consumption.				
7.3 Whether energy-saving measures are taken.				
7.4 Whether metals or other alternative products are used to reduce the use of wood.				
7.5 Whether material storage conditions are				

Inspection Factor	Implementation		Inapplicable	Remarks
	Implemented	Unimplemented		If any problem is identified in the inspection or anything is not in accordance with stipulations, suggestions on rectification and prevention shall be proposed.
favorable enough to prevent material degradation or waste.				
7.6 Others (please note clearly)				
……				
8. Water and soil conservation				
8.1 Whether slope finishing of bare slope is performed in time to reduce slope exposure duration.				
8.2 Whether water retaining barrier or supercritical flow chute is provided.				
8.3 Whether the leveled site is hardened or covered in time.				
8.4 Whether plant measures (greening of native species) are taken.				
8.5 Whether measures such as slag retaining, slope protection and drainage are taken around the temporary spoil (waste slag).				
8.6 Whether low-impact development construction is carried out according to design.				
8.9 Others (please note clearly)				
……				
9. Construction safety and emergency measures				
9.1 Whether the integrity of all structures in the construction site is ensured.				
9.2 Whether proper first-aid appliance is provided at construction site.				
9.3 Whether correct sign boards are hung at dangerous area, on devices, for materials, safety measures, at emergency exit etc.				
9.4 Whether the Contractor provides constructors with suitable personal protective equipment.				
9.5 Whether the Contractor establishes procedures and systems for reporting and				

Inspection Factor	Implementation		Inapplicable	Remarks
	Implemented	Unimplemented		If any problem is identified in the inspection or anything is not in accordance with stipulations, suggestions on rectification and prevention shall be proposed.
recording occupational accident and diseases, dangerous situations and accidents.				
9.6 Whether health education is performed for constructors.				
9.7 Whether accidents or emergencies are reported and verified and whether suggestions on rectification and prevention are proposed and recorded.				
9.8 Others (please note clearly)				
……				

Construction stage during inspection:_____ Inspection date: _____
Inspection time: _____
Weather record:_____

Signature of on-site inspector: _____ Signature of the person in charge of environmental supervision: _____

Notes: ① As for the column of Remarks, it can be filled out with problems identified in the inspection, description of unqualified issues and information about suggestions on rectification and prevention etc.
② Whether environmental supervisor shall immediately issue an Environmental Protection Rectification Notice to the Contractor and record No. of the Notice in the column of Remarks when measures are found to be unqualified or need to be improved. Detailed information about the Contractor's rectification needs to be recorded separately.
③ This Table is a general checklist of construction site environment for Qinghai Xining Water Environment Management Project. For specific subitems and specific environmental issues, appropriate adjustment and environmental protection measures can be taken combining the local environmental conditions and development content.

Attached table 2:

Environmental Protection Rectification Notice

<table>
<tr><td>Project Name:</td><td></td><td>Name of Project Construction Site:</td><td></td></tr>
<tr><td>Contract No. and location of the subitem:</td><td></td><td>Current construction stage:</td><td></td></tr>
<tr><td colspan="4">Problems existing in on-site inspection:</td></tr>
<tr><td colspan="4">The Contractor analyzes causes and proposes improvement measures:</td></tr>
<tr><td colspan="4">Rectification opinions of environmental protection department (if necessary):</td></tr>
<tr><td colspan="4">Environmental Supervisor: MM/DD/YY
Specified period of rectification: Completed within days Received by: MM/DD/YY</td></tr>
<tr><td colspan="4">Review conclusion:

Reviewed by: MM DD YY</td></tr>
</table>

Attached table 3:

Checklist of Environmental Protection Acceptance

Project Name:		Weather of the inspection date:	
Name of project construction site:		Environmental inspector:	
Current construction stage:		Contract No. and location of the item:	
Environmental protection inspection date:		Specific time:	

Inspection item	Implementation		Inapplicable	Remarks
	Implemented	Unimplemented		If any problem is identified in the inspection or anything is not in accordance with stipulations, suggestions on rectification and prevention shall be proposed.
1. Whether all rubbishes at the construction site have been transported to the designated household waste landfill in Xining.				
2. Whether measures are taken for acoustic environmental protection objectives near the project area.				
3. Whether acoustic environment of acoustic environmental protection objectives meets requirements of corresponding standards.				
4. Whether ecological restoration measures are taken at temporary spoil (waste slag) yard.				
5. Whether conditions of the existing township road (acting as the access road) become worse and whether the				

Project Name:		Weather of the inspection date:	
Name of project construction site:		Environmental inspector:	
Current construction stage:		Contract No. and location of the item:	
Environmental protection inspection date:		Specific time:	

Inspection item	Implementation		Inapplicable	Remarks
	Implemented	Unimplemented		If any problem is identified in the inspection or anything is not in accordance with stipulations, suggestions on rectification and prevention shall be proposed.
traffic is smooth.				
6. Whether temporary sedimentation tank and grit chamber are torn down.				
7. Whether land reclamation, second ploughing or greening measures are taken on the land temporarily occupied as sedimentation tank and grit chamber.				
8. Whether temporary water retaining barrier, supercritical flow chute and drainage ditch are torn down and whether corresponding ecological restoration measures are taken.				
9. Whether the temporary construction camp has been withdrawn.				
10. Whether restoration is carried out for the land occupied as temporary construction camp.				
11. Whether mellow topsoil stripped and				

Project Name:		Weather of the inspection date:	
Name of project construction site:		Environmental inspector:	
Current construction stage:		Contract No. and location of the item:	
Environmental protection inspection date:		Specific time:	

Inspection item	Implementation		Inapplicable	Remarks
	Implemented	Unimplemented		If any problem is identified in the inspection or anything is not in accordance with stipulations, suggestions on rectification and prevention shall be proposed.
stored is used for ecological restoration.				
12. Whether the road drainage system is complete.				
13. Whether visual pollution exists along the road.				
14. Whether the pipe network newly built this time has been completely connected with the existing relevant pipe network.				
15. Whether species planted for greening is suitable for the area.				
16. Whether there is environmental supervisor and whether environmental supervision report is submitted as required during project construction.				
17. Whether monitoring is performed on environmental quality of the construction site and whether monitoring report is submitted during project construction.				

Project Name:		Weather of the inspection date:	
Name of project construction site:		Environmental inspector:	
Current construction stage:		Contract No. and location of the item:	
Environmental protection inspection date:		Specific time:	

Inspection item	Implementation		Inapplicable	Remarks
	Implemented	Unimplemented		If any problem is identified in the inspection or anything is not in accordance with stipulations, suggestions on rectification and prevention shall be proposed.
18. Whether relevant training and education is performed.				
19. Whether the local public is satisfied with the project under development.				

Notes: The Table is a general checklist of environmental protection inspection. For specific subitems, local environmental conditions and relevant environmental protection measures, it can be appropriately added or adjusted if necessary.

* When any “Unimplemented” is recorded, it shows that things against stipulations or need be improved may exist. At this time, environmental supervisor shall immediately issue an Environmental Protection Rectification Notice to the Contractor and record No. of the Notice in the column of Remarks. Detailed information about the Contractor’s rectification needs to be recorded separately.

Signature of on-site inspector: Time:

Signature of the person in charge of environmental supervision: Time: