E4637 V5 REV

**Sichuan-Chongqing Cooperation: (Guang'an) Demonstration Area Infrastructure Development Project**

***Linshui Component***

# Environmental Management Plan

**Linshui County People's Government**

**China Railway Eryuan Engineering Group Co., Ltd.**

**October 2014 Chengdu**

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# 1. OVERVIEW

The Environmental Management Plan (EMP) is applied to the Linshui component of the Sichuan-Chongqing Cooperation: (Guang'an) Demonstration Area Infrastructure Development Project, which is implemented by Guang'an Development and Reform Commission.

The project's environmental impact has been clarified in the *Environmental Impact Assessment Report (EIA) of the Linshui component of the Sichuan-Chongqing Cooperation: (Guang'an) Demonstration Area Infrastructure Development Project*. The Environmental Impact Assessment Report was compiled by China Railway Eryuan Engineering Group Co., Ltd. (hereinafter referred to as "China Railway Eryuan"). The EIA report consists of analysis of environmental legislations and policies, project overview and engineering analysis, regional environmental and social environmental situation, current environmental quality survey, project impact assessment, cumulative environmental impact assessment, information announcement and public consultation, risk evaluation and emergency response plan, environmental management. In aspect of cumulative impact, the EIA of the Project has fully integrated the research fruit in *Environmental Impact Report of Linshui Economic Technology Development Zone (LETDZ) in Sichuan*. Based on the current Chinese laws and regulations on environmental impact assessment, and the World Bank business policy OP/BP4.01 (environmental assessment), it is necessary to launch an all-round environmental assessment study.

*Environmental Management Plan* is in accordance with the requirements of national laws, regulations and technical guidelines, as well as the safeguard operation policies of World Bank, including *World Bank Group EHS Guidelines*. The *Environmental Management Plan* adopts the latest applicable and relatively economic measures to realize the impact mitigation objectives of the Project.

## 1.1 Project Background

The Sichuan-Chongqing Cooperation: (Guang'an) Demonstration Area Infrastructure Development Project meets the need to realize the national economic development strategy. As required in the notice issued by the National Development and Reform Commission, the Ministry of Finance, the World Bank loan shall be actively applied to the infrastructure construction for Sichuan-Chongqing Cooperation (Guang'an) Demonstration Area. In the latter half of 2011, Guang'an City launched the loan application for the Infrastructure Project for Sichuan-Chongqing Cooperation (Guang'an) Demonstration Area (including Qianfeng and Linshui Components) and in the early half of 2012; the Infrastructure Project for Sichuan-Chongqing Cooperation (Guang'an) Demonstration Area was included in the World Bank Loan Funded National Plan for 2013-2015.

According to *China's Memorandum for Proposed Infrastructure Project for Sichuan-Chongqing Cooperation Demonstration Area* dated June 2013, the Infrastructure Project for Linshui Industrial Park of Guang'an is one of the components in the Infrastructure Project for World Bank Loan Funded Sichuan-Chongqing Cooperation (Guang'an) Demonstration Area.


Fig. 1.1-1 Geographic Location of the Project

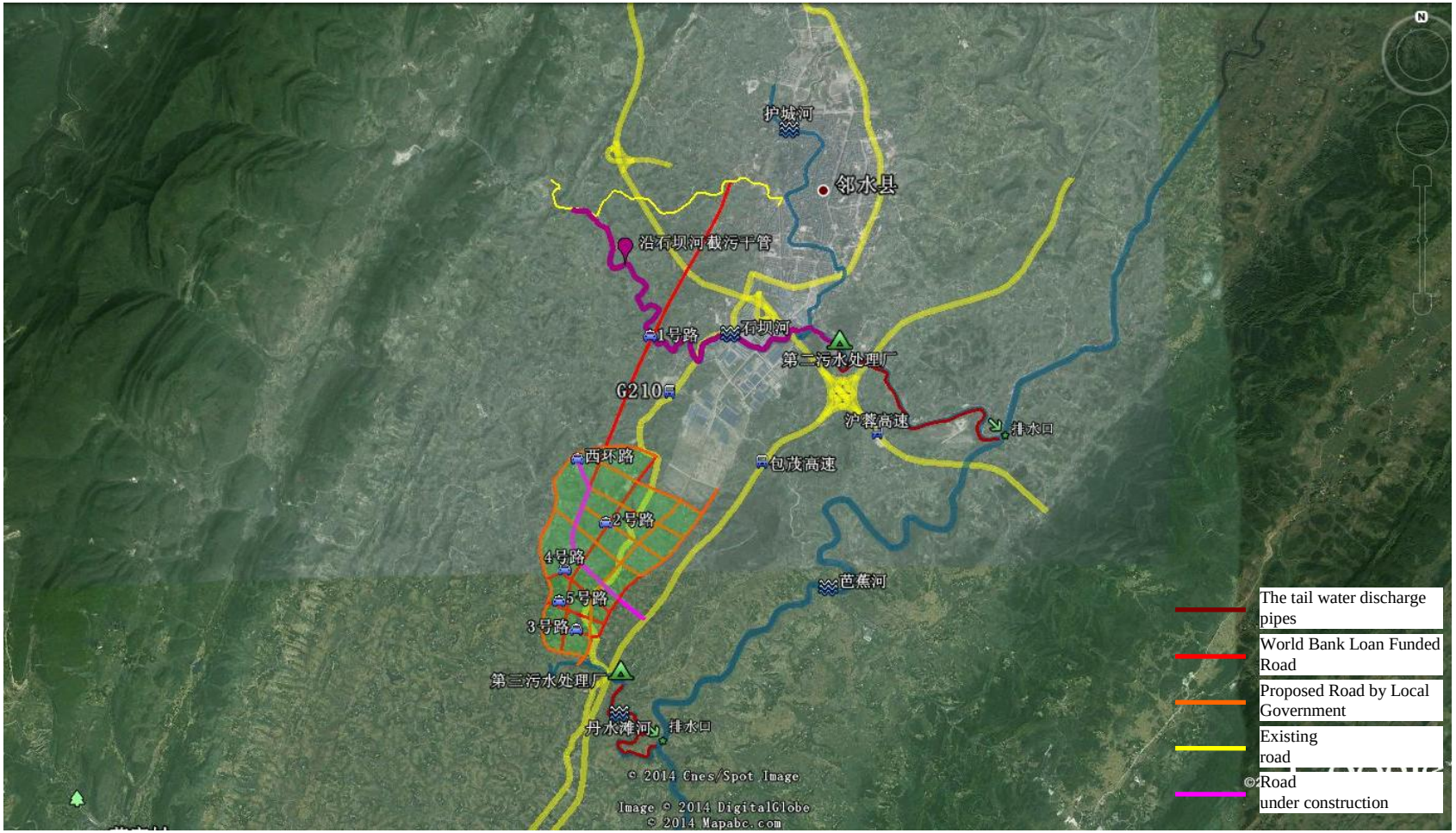


**Fig. 1.1-2** Location Relation of Project

## 1.2 Project Description

The development objective of the proposed project is *to support Linshui County and Qianfeng District of Guang'an Prefecture to improve transport, wastewater, skills and investment promotion services for current needs and projected growth.* For this purpose, the Project will support the following activities in Linshui County.

(a) Create a public transport corridor between low-income areas in the urban core and industrial areas and linking to the Guang'an-Chongqing highway; (b) construct storm water drainage, sewage interceptors, sewage pipelines and treated effluent pipelines for existing and new residents and industries; (c) increase wastewater treatment capacity; and (d) develop industry-linked skills training for low-income groups based on target industries.

## 1.3 Objectives of Environmental Management Plan

The *Environmental Management Plan* will adopt mitigation measures according to the identified environmental impacts, and supervise the effectiveness of the measures during the lifespan of the Project. The *Environmental Management Plan* based on the *Environmental Impact Assessment*, *Plan Environmental Assessment* is compiled according to the Chinese environmental laws and guidelines, safeguard policies of World Bank, and optimal practices of similar projects. The purpose of *Environmental Management Plan* is to ensure the consistency between *Environmental Impact Assessment* and *Environmental Management Plan*, so as to satisfy the relevant standards of environmental protection. The *Environmental Management Plan* can effectively satisfy the supervisory requirements, instructing the Project owner on management of contractors and subcontractors.

## 1.4 Structure of Environmental Management Plan

The key component of the *Environmental Management Plan* includes relevant procedures on environmental management during project construction and operation period. *Environmental Management Plan* mainly includes the following:

- Role and responsibilities of environmental management;
- Mitigation measures
- Supervision and monitoring plan
- Contractor's Environmental Specification
- Emergency response plan
- Water and Soil Conservation Plan
- Mitigation and follow-up plan of cumulative environment impact
- Public participation plan
- Environmental training and capacity building plan
- Implementation budget of Environmental Management Plan

Environmental Management Plan provides the Project owner, contractor and subcontractor with sufficient information on the implementation of Environmental Management Plan, with focuses on the following:

- Satisfy the environmental requirements of China, Sichuan Province and the World Bank;

- Satisfy the environmental and social economic conditions proposed in project documents, license and relevant policies of national and provincial, and municipal government;
- During the project implementation, develop, promote and facilitate the sense of responsibility towards the environmental and social performance;
- Through training and clarifying on roles and responsibilities of environmental and social management of all parties, improve the environmental awareness and knowledge of supervisory institutes and Administrative Committee of LETDZ (including its contractors);
- Monitor the environmental and social performance during the project period and adopt a proper management method to realize the continuous improvement and minimization of impact on environment of Linshui County;
- Cooperate with the local communities and affected stakeholders, making sure they can benefit from the project development;

  Notify, invite and allow local stakeholders to participate in the various periods of project supervision.

# 2. Environmental Laws, Policies and Regulations

Here is a summary of current regulatory and legal requirements of different levels of governments in China and the World Bank. Chapter 2 of *Environmental Impact Assessment Report* provides an overview of relevant laws, policies, guidelines, standards and plans relevant to the Project. *Environmental Management Plan* satisfies these legal requirements and implements these policies and procedures.

## 2.1 Related Domestic Laws and Regulations

### 2.1.1 Laws and regulations on environmental protection

1 Environmental Protection Law of the People's Republic of China (December 26, 1989);

2 Law of the People's Republic of China on Environmental Impact Assessment (Order 77 of the President of the People's Republic of China, September 1, 2003);

3 Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution (September 1, 2000);

4 Law of the People's Republic of China on Prevention and Control of Water Pollution (June 1, 2008);

5 Law of the People's Republic of China on Prevention and Control of Pollution from Environmental Noise (March 1, 1997)

6 Law of the People's Republic of China on Prevention and Control of Environmental Pollution by Solid Wastes (April 1, 2005);

7 Cleaner Production Promotion Law of the People's Republic of China (July 1, 2012);

8 Circular Economy Promotion Law of the People's Republic of China (August 29, 2008);

9 Law of the People's Republic of China on Protection of Cultural Relics (December 29, 2007);

10. Land Administration Law of the People's Republic of China (August 28, 2004);

11. Urban and Rural Planning Law of the People's Republic of China (January 1, 2008);

12. Law of the People's Republic of China on Water and Soil Conservation (March 1, 2011);

13. Law of the People's Republic of China on the Protection of Wildlife (August 28, 2004).

### 2.1.2 Ministerial Environmental Protection Regulations

1 Regulations on the Administration of Construction Project Environmental Protection (Order 253 of the State Council in 1998, November 29, 1998);

2 Regulations on the Implementation of the Land Administration Law of the People's Republic of China (Order 256 of the State Council in 1999, January 1, 1999);

3 Regulations on the Implementation of the Law of the People's Republic of China on Prevention and Control of Water Pollution (Order 284 of the State Council in 2000, March 20, 2000);

4 Regulations on the Implementation of the Law of the People's Republic of China on Water and Soil Conservation (Order 120 of the State Council in 1993, August 1, 1993);

5 Regulation of River Administration of the People's Republic of China (Order 167 of the State Council in 1994, December 1, 1994);

6 Circular on Further Enhancing Environmental Impact Assessment Management and Preventing Environmental Risks (HF [2012] No. 77);

7 Interim Measures for Public Participation in Environmental Impact Assessment (HF [2006] No. 28);

8 Catalogue for the Classified Administration of Environmental Impact Assessments for Construction Projects (Order of State Environmental Protection Administration, October 2008);

9 Decision of the State Council on Several Issues Concerning Environmental Protection (GF [1996] No. 31);

10. National Compendium on Eco-environmental Protection (November, 16, 2000);

11. Notice of State Development Planning Commission and State Environmental Protection Administration Regarding Issues on Regulating Charges for Environmental Impact Assessment (JJG [2002] No. 125);

12. Notice on the Implementation of Issues Concerning Environmental Impact Assessment System for Construction Projects (State Environmental Protection Administration, HF [1999] No. 107);

13. Several Proposals of Enhancing Construction Project Environmental Protection in the Western Development (State Environmental Protection Administration, [2001] No.4);

14. Regulations on the Implementation of the Land Administration Law of the People's Republic of China (Order 256 of the State Council, January 1, 1999);

15. Notice on Effective Urban Fatigue Dust Control (State Environmental Protection Administration and Ministry of Construction, HF [2001] No. 56);

16. Administrative Provisions on the Prevention and Control of Source Water Protection Areas (July 1989);

17. Environmental Protection Regulations of Sichuan Province (September 24, 2004);

18. Measures of Sichuan Province for Implementation of the Water Law of the People's Republic of China (July 1, 2005);

19. Measures of Sichuan Province for Implementation of the Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution (September 1, 2002);

20. Notice of Sichuan Provincial People's Government on the Division of Key Prevention Area of Water and Soil Loss;

21. Provisions on the Administration of Urban Construction Garbage (Order 139 of Ministry of Construction in 2005);

22. Standard for Pollution Control on Storage and Disposal Site of General Industrial Waste (GB 18592-2001);

23. Measures for the Administration of Environmental Protection of Transport Construction Projects (Order 5 of the Minister of Communications, May 2003);

24. Notice on Enhancing the Administration of Environmental Impact Assessment for International Financial Institutions (IFI) Financed Construction Projects, HJ [1993] No. 324, 1993).

### 2.1.3 Technical guidelines and specifications for environmental impact assessment

1 Technical Guidelines for Environmental Impact Assessment - General Principles (HJ2.1—-2011), January 2012;

2 Technical Guidelines for Environmental Impact Assessment - Groundwater Environment (HJ/T2.3 -93), September 1993;

3 Technical Guidelines for Environmental Impact Assessment - Atmospheric Environment (HJ/T2.2—-2008), April 2008;

4 Technical Guidelines for Environmental Impact Assessment - Acoustic Environment (HJ/T2.4—-1995), November 1995;

5 Technical Guidelines for Environmental Impact Assessment - Ecological Environment (HJT19—-2011), September 2011;

6 Technical Guidelines for Environmental Impact Assessment - Groundwater Environment (HJ610-2011), June 2011;

7 Technical Guidelines for Environmental Risk Assessment on Projects (HJ/T 169—2004) December 2004;

8 Code for Urban Land Use Classes and Standards of Planning Construction Land (GB50137-2011), January 2012.

### 2.1.4 Relevant planning and environmental function division documents

1 General Planning of Linshui County Downtown (2009-2030);

2 Regulatory Plan of City-production Integration Demonstration Zone in Southern Linshui County Downtown (September 2013);

3 General Plan of Linshui Economic and Technological Development Zone (2008-2030);

4 Notice of the People's Government of Guang'an on the Issuance of Scheme for Regionalizing Ambient Air Quality Function in Guang'an (GAFB [2007] No. 93);

5 Notice of the People's Government of Guang'an on the Issuance of Scheme for Regionalizing Water Environment Function in Guang'an (GAFBH [2007] No. 102);

6 Approval of the People's Government of Guang'an on the City-wide Adjustment of Urban Ambient Noise Function Zones (GAFF [2010] No. 125);

7 Guang'an Eco-function Plan.

### 2.1.5 Relevant technical documents for construction projects

1 Letter of Authorization for Preparation of Environmental Impact Assessment Report;

2 Feasibility Study Report of the Infrastructure Project for World Bank Loan Funded Sichuan-Chongqing Cooperation (Guang'an) Demonstration Area;

3 Notice of Environmental Protection Bureau of Guang'an on Executive Environmental Standards for the Infrastructure Project for Linshui Industrial Park (GSHF [2014] No. 129).

## 2.2 World Bank's Safeguard Policies

### 2.2.1 World Bank's ten safeguard policies and compliance

There are ten operation policies on social and environmental safeguards of the World Bank. Based on the nature, the engineering layout, the scope of assessment as identified by the EA and the field investigation, a review and screening was carried out to see whether those ten policies are triggered and the findings are shown in the table below:

**Table 2.2.1-1 Bank's Safeguard Operation Policies Triggered by the Project**

| SN | Description | Applicable (Yes/ No) | Reasons for Screening |
|---|---|---|---|
| 1 | OP/BP4.01 Environmental Assessment | Yes | Category A project;<br>A full EIA and EMP are prepared;<br>Two rounds of public consultation have been carried out as part of the EIA procedure. |
| 2 | OP/BP4.04 Natural Habitats | No | The project area does not involve critical natural habitat. The project will not result in significant degradation or conversion of natural habitats. |
| 3 | OP/BP4.36 Forests | No | The Project would not finance any activity that may involve a major change or degradation of the important forest area or related major natural habitat. |
| 4 | OP/BP4.09 Pest Management | No | No pesticide would be procured under the Project, causing no increase in the use of pesticide. No activity is needed according to the policy. |
| 5 | OP/BP4.11 Physical Cultural Resources | Yes | The Project is close to Lingbaoshan carved stones and the ancient stone bridge without crossing the protection scope and controlled zone for construction. The construction will involve the relocation of tombs, the procedures and compensation methods about which have been specified in the resettlement action plan (RAP). |
| 6 | OP/BP4.37 Safety of Dams | No | The project does not involve any dam. |
| 7 | OP/BP4.10 Indigenous Peoples | No | No indigenous group lives in the project area or is affected by the Project. |
| 8 | OP/BP4.12 Involuntary Resettlement | Yes | Triggered and a RAP is prepared. |
| 9 | OP/BP7.50 Projects on International Waterways | No | There is no international waterway involved in the project area. |
| 10 | OP/BP7.60 Projects on Disputed Areas | No | There is no disputed region involved in the project area. |

### 2.2.2 Compliance of the Project with World Bank Group General Environmental, Health, and Safety Guidelines and relevant policies

The *World Bank Group Environmental, Health, and Safety Guidelines* (the General EHS Guidelines), section on wastewater treatment of the *Environmental, Health, and Safety Guidelines for Water and Health*, the *Environmental, Health, and Safety Guidelines for Toll Roads*, section on waste collection and transport of the *Environmental, Health, and*

*Safety Guidelines for Waste Management Facilities* are also applicable to the Project. The mitigation measures included in the Project Environmental Management Plan (EMP) are fully consistent with the requirements of the above EHS Guidelines (especially the provisions on construction management). It is noteworthy that what the EHS Guidelines recommend is largely consistent with the China's laws, regulations, guidelines, and construction management rules.

**Table 2.2.1-2 Compliance with World Bank Group EHS Guidelines**

| General EHS Guidelines | Compliance of EIA/EMP |
|---|---|
| If the facility or project is close to an identified ecologically sensitive area (such as a national park), it shall minimize the increase in pollution level whenever and wherever feasible. In addition, appropriate mitigation measures may also include the use of clean fuels or technologies, and application of comprehensive pollution control measures. | Clean energy is used in the industrial park and can reduce the pollution level; there is no ecologically sensitive area inside the project area. |
| The most common pollutant involved in fugitive emissions is dust or particulate matter (PM). This is released during certain operations, such as transport and open storage of solid materials, and from exposed soil surfaces, including unpaved roads. | Dust-control methods, such as coverage, sprinkling for dust suppression or moderate wetting of the materials in open-air stack will be applied during the construction period. Sprinkling and suppression will be applied to the transport of materials on paved or unpaved roads. |
| **Environmental, Health, and Safety Guidelines for Water and Sanitation** | **Compliance of EIA/EMP** |
| No industrial wastewater, domestic wastewater, wastewater from operations of public works or storm water shall be discharged into a public or private wastewater treatment system unless it meets the pretreatment and monitoring requirements of such wastewater treatment system. | In LETDZ, the industrial wastewater is not allowed to enter the wastewater treatment plant (WWTP) unless it is subject to a pretreatment and meets the Level 3 discharge limits of the *Integrated Wastewater Discharge Standards* (GB8978-1996). |
| Storm water shall be separated from industrial wastewater and domestic wastewater in order to reduce the wastewater generation that needs treatment before emission. | Separate storm water and wastewater systems are applied in LETDZ, and separate storm sewers and wastewater pipes will be laid. |
| Noise prevention and control measures shall be applied if the predicted noise level at the most sensitive receiving point due to the operation of project facilities or operation activities will exceed the noise limits. | Low sound power level equipment will be selected; vibration isolation device will be installed for machinery and equipment;<br>Running time of certain equipment or operation will be limited, particularly mobile noise sources that will travel through in a community. |
| Design, construct, operate, and maintain wastewater treatment facilities and achieve effluent water quality consistent with applicable national requirements or internationally accepted standards. | The Level 1-A standards of the *Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant* (GB18918-2002) will be executed for wastewater discharge from the WWTP. |
| Odors from treatment facilities can also be a nuisance to workers and the surrounding community. Measures are recommended to prevent, minimize, and control air emissions and odors. | Odor emission units such as coarse screen and influent pumping station may be designed as enclosed chambers with covers at the top to constrain the odor diffusion space. For the sludge dewatering room that is of bigger space, odor will be collected for centralized biological treatment.<br>An isolation zone consists of tall trees that are strongly pollution resistant and capable of |

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| | absorbing harmful gases will be provided around the WWTP boundary to function as an absorptive barrier. Health protection distance will be specified. No residence, schools or other projects with relatively high population density shall be planned within the 100m scope surrounding the WWTP site, especially in areas at its downwind direction. |
| Sludge treatment and utilization. Following stabilization, the sludge can be dewatered and disposed of in a landfill or incinerator, or subject to further processing for beneficial uses. | Sludge will be dewatered by mechanical pressure filter and transferred to the Linshui sanitary landfill for disposal. |
| **Environmental, Health, and Safety Guidelines for Toll Roads** | **Compliance of EIA/EMP** |
| Siting roads and support facilities to avoid critical terrestrial and aquatic habitats (e.g. old-growth forests, wetlands, and fish spawning habitat) utilizing existing transport corridors wherever possible. | The area where the Project is located is not part of a critical terrestrial and/or aquatic habitat. |
| Minimizing removal of native plant species, and replanting of native plant species in disturbed areas. | A water and soil conservation plan has been specially prepared. Native plant species as appropriate will be planted according to the water and soil conservation plan. |
| Paving in dry weather to prevent runoff of asphalt or cement materials. | During the construction period, paving works are prohibited in windy weather and working sites will be laid out in a proper manner. |
| Where significant oil and grease is expected, using oil/water separators in the treatment activities. | Vessels of oily wastewater from construction machinery will be provided on the working sites for collecting the oily wastewater to be generated. The collected oily wastewater will be delivered to a facility with the treatment capacity for treatment. Direct discharge is prohibited. |
| Avoiding the generation of contaminated runoff from cleaning of asphalt equipment by substituting diesel with vegetable oil as a release and cleaning agent; containing cleaning products and contaminated asphalt residues; scraping before cleaning; and conducting cleaning activities away from surface water features or drainage structures. | The technical specifications of the Contractor will include special requirements on the storage of fuel, oil/grease, and other hazardous or toxic matter, and that all the fuel materials on the working sites be fenced for storage; the space for storage be 110% of volume of the fuel storage vessels. Fuel storage sites shall not to be located near any source waters (i.e., within 100m from the source water). |
| Insulation of nearby building structures (typically consisting of window replacements);<br>use of road surfaces that generate less pavement/tire noise such as stone-matrix asphalt. | There shall be restricting provisions on the functions of the areas along the arterial roadways during the operation period of the roads. Roadside buildings shall be rationally planned and laid out with optimal acoustic design and installed with sound-proof windows as appropriate. Asphaltic pavement is designed for all the road of the Project. |
| **Environmental, Health, and Safety Guidelines for Waste Management Facilities** | **Compliance of EIA/EMP** |
| Waste Collection and Transport | **Handed over to local waste disposal plant for unified treatment.** |
| Encourage use of containers or bags for waste at the | Wastes will be dumped at designated sites and |

| | |
|---|---|
| point of collection for each household and establishment; implement a regular collection schedule with sufficient frequency to avoid accumulation of garbage; cover collection and transfer vehicles along the entire route of transport to avoid windblown litter. | Local health department will be operating the equipment and facilities to collect and transport the refuse to the Linshui Urban Domestic Waste Treatment Plant. |
| Establishing frequent waste collection schedules;<br>Instituting a washing program for waste collection and transport vehicles and for company-owned waste collection and transfer containers;<br>Promoting the use of bags to reduce the odors from soiling of waste collection and transport equipment. | |
| Optimize waste collection and transport routes to minimize distance traveled and overall fuel use and emissions;<br>Implement transfer stations for small vehicles to consolidate waste into large vehicles for transport to a waste disposal plant. | |

### 2.2.3 Compliance with Domestic Laws and Regulations

Preparation of the environmental assessment documents is in full accordance with the above laws, regulations and guidelines. Compliance with domestic laws and regulations associated with the Project are summarized in the table below.

**Table 2.2.1-3 Compliance with China Laws and Regulations**

| China's Laws and Regulations | Compliance of the Project |
|---|---|
| Law of the People's Republic of China on Environmental Impact Assessment | The full EIA report was prepared by a certified EIA consultant and the project implementation unit, and has been approved by the Sichuan Provincial Environmental Protection Department.<br>Two rounds of public consultation have been carried out. |
| Notice on Enhancing the Administration of Environmental Impact Assessment for International Financial Institutions (IFI) Financed Construction Projects | The EIA report and EMP are in line with the Bank's Safeguard Policies. |
| Land Administration Law of the People's Republic of China | The LETDZ meets the requirements on land use planning in *Regulatory Plan of City-production Integration Demonstration Zone in Southern Linshui County Downtown*. |
| Law of the People's Republic of China on Prevention and Control of Water Pollution | The LETDZ will be developed with such sewer networks as to enable centralized wastewater treatment.<br>The WWTP outfall is not located in a surface water source reserve. |
| Law of the People's Republic of China on Water and Soil Conservation | A soil and water conservation plan is prepared, and submitted to the Sichuan Water Authority for approval. Water and soil loss prevention and control measures will be carried out in accordance with the approved soil and water conservation plan.<br>The sand, stone, soil, etc. abandoned during the building activities will be stacked on the spoil ground as specified in the water and soil conservation plan, and measures will be taken to ensure that no new hazards occur. |

| China’s Laws and Regulations | Compliance of the Project |
|---|---|
| | A water and soil loss monitoring program is prepared and the monitored results will be reported on a regular basis to Guang’an Water Authority. |
| Law of the People's Republic of China on Protection of Cultural Relics | Due to the location close to Lingbaoshan carved stones and the ancient stone bridge, special attentions shall be paid to protection measures during the construction. During the construction of the Project, in case of any buried cultural relics discovered by the contractor, the construction shall be suspended with site protected and report of the same submitted to competent department in accordance with the *Law of the People’s Republic of China on Protection of Cultural Relics*. |
| Law of the People's Republic of China on the Protection of Wildlife | An awareness campaign about the law on wildlife protection is carried out for the contractors; constructors must observe the *Law of the People's Republic of China on the Protection of Wildlife* and no hunting of wild animals is allowed in the construction and surrounding areas. |

# 3. Role and responsibilities of environmental management

## 3.1 Institutions Involved in The Process of Environmental Management

The implementation of this EMP requires the involvement of several agencies and institutions, each playing a different but vital role to ensure effective environmental management of the Project.

There are two groups of institutions involved in the process of environmental management: those responsible for organizing or implementing the EMP, and those that enforce the standards, laws and regulations relevant to the project, supervise the EMP and the overall environmental performance during the construction and operation period of the Project. Diagram of environmental management and supervisory agency structure of the Project as shown in the following figure.

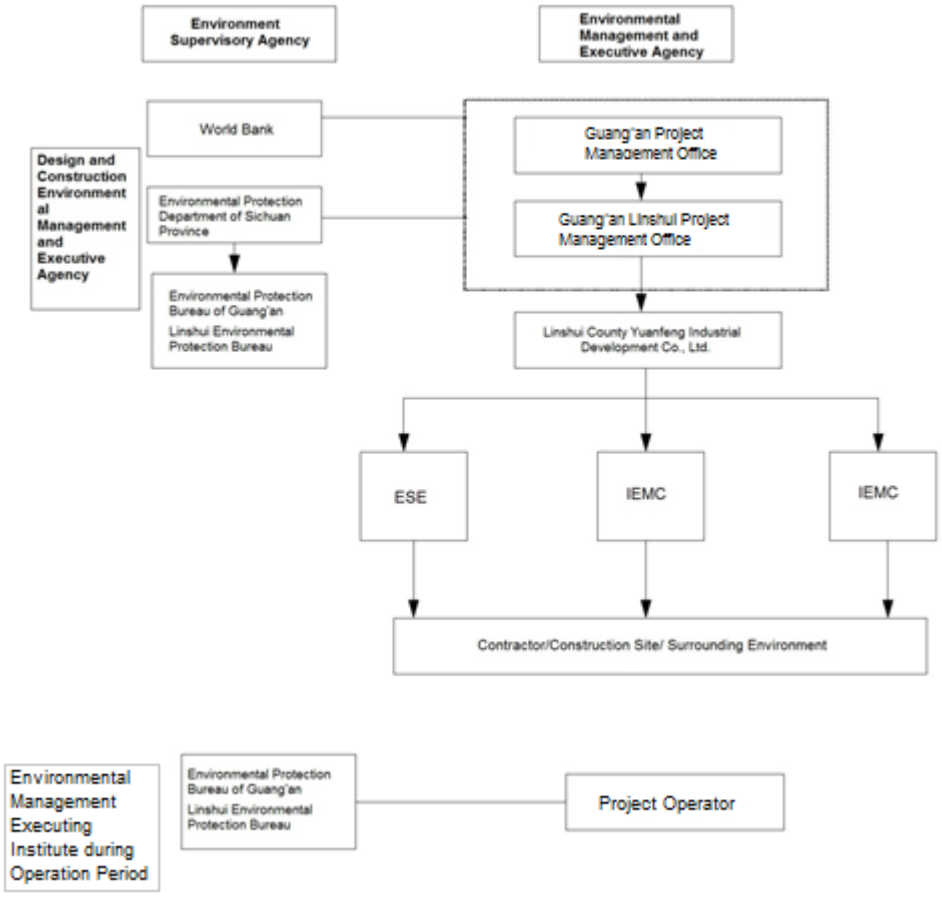


Fig. 3.1-1 Environmental Management and Supervisory Agency Structure

## 3.2 Responsibilities of environmental management institutions

The main environmental management responsibilities of the respective environmental management institutions are shown in the table below:

**Table 3.2-1 List of Environmental Management and Supervisory Responsibilities**

| SON | Agency/Unit | Responsibilities |
|---|---|---|
| 1 | Linshui County People's Government (WBPMO) | Take the overall responsibility for environmental management of the Project, involving the effective implementation, monitoring and supervision of mitigation measures; report the budget to World Bank and local environmental protection bureau.<br>Ensure that the measures involved in EMP are included in the bid documents and construction contract;<br>Carry out the supervision on the construction unit for the implementation of pollution prevention measures, and report any infringement to the construction unit;<br>Make sure that the supervision performed by Environmental Protection Bureau is included in the bid documents and contracts signed by the supervision engineer; monitor and engage in the supervision of the Project;<br>Entrust environmental monitoring institution to monitor the environment during the construction period; provide supports for environmental monitoring during the construction period;<br>Organize trainings related to environment for Contractors and ESE |
| 2 | Linshui Environmental Protection Bureau | Linshui Environmental Protection Bureau is responsible for environmental management and monitoring within the scope of LETDZ. On behalf of Sichuan Environmental Protection Bureau, carry out monitoring and supervision on environmental protection during the construction and operation period. Investigate and deal with public complaints during the construction and operation period. Ensure the "three simultaneousnesses". Ensure the normal operation of environmental protection facilities. |
| 3 | Linshui County Yuanfeng Industrial Development Co., Ltd. | Linshui County Yuanfeng Industrial Development Co., Ltd. is responsible for the implementation of infrastructure project funded by World Bank, including procurement, construction management, the implementation and compliance of safeguard policy, monitoring and reporting, etc. |
| 4 | Project operators | Operation of the environmental facilities and environmental management, etc. during the operation period. |
| 5 | Environmental supervision engineer (ESE) | Verify and assess whether the construction design meets the requirements for EIA and EMP, in particular, environmental management on the construction site and required mitigation measures;<br>Monitor contractors' environmental management on the construction site, and provide proper guidance;<br>Examine the implementation of contractors' EMP, verify and confirm environmental monitoring procedures, parameters, monitoring sites, equipment and results;<br>Report the implementation condition of EMP;<br>Based on the implementation of EMP, verify invoices or expenses. |
| 6 | Contractors | Prepare detailed contractors' environmental protection plan, as a part of the contract (including construction land plan related to access roads |

| SON | Agency/Unit | Responsibilities |
|---|---|---|
| | | to communities or commercial stores).<br>Report new environmental issues or cultural relics discovered during the construction period to the supervision engineer. Perform the continuous public consultations during construction. |
| 7 | Project operators | Operation of the environmental facilities and environmental management, etc. during the operation period. |
| 8 | Independent environmental management consultant (IEMC) | The IEMC, who is employed by the project owner, is independent of ESE and contractors. The IEMC is to assess the implementation of EMP during the construction period, to provide management suggestions and finally ensure that the Project satisfies the requirements for EMP. |
| 9 | Environmental quality monitoring consultant (EQMC) | The EQMC monitors the environment quality according to environment monitoring plan involved in EIA report. The project owner will engage an EQMC to implement the monitoring plan. |

## 3.3 Environmental Management Responsibilities during Construction

### 1 Linshui Project Management Office (LPMO), Linshui Yuanfeng Industrial Development Co., Ltd. (LYIDC) and Linshui Vocational School (LVS).

As the owners of the Project, Linshui Yuanfeng Industrial Development Co., Ltd. (LYIDC) and Linshui Vocational School (LVS) are in total charge of the management and coordination of project implementation. The World Bank Project Management Office (PMO) will be responsible for the daily management and coordination of project implementation, supervising the implementation and satisfying the World Bank's requirements. Linshui Yuanfeng Industrial Development Co., Ltd. (LYIDC) is the actual project executing institute, while Linshui Vocational School (LVS) is mainly in charge of the technical training of workers and farmers, etc. To ensure that Sichuan Provincial Environmental Protection Department and World Bank are responsible for the supervision of project implementation, LYIDC needs to take charge in making sure the project environmental management is in accordance with *Environmental Management Plan* and relevant legal requirements.

Environmental management responsibilities of LYIDC include, but not limited to the following:

1) Monitor the implementation of various mitigation measures and environmental protecting measures during project construction, including integrating these measures into bidding documents and contract, organizing training of contractors, implementing other environmental protection plans, and conducting regular inspection on construction sites.

2) Employ environmental management consultant (such as independent environmental management consultant and environmental quality management consultant) and monitor his/her implementation of environmental monitoring plans.

3) Employ independent environmental management consultant and monitor the provision of technical support, including managerial suggestions, training, regular field survey and compilation of various reports.

The construction investment company will appoint 1 to 2 specialized environmental personnel in charge of the overall coordination of implementation of *Environmental Management Plan*. These persons must be familiar with environmental management and environmental legislations, capable of understanding and

implementing *Environmental Management Plan*. Their responsibilities are as follows:

1) Ensure the environmental management of the Project is in accordance with *Environmental Management Plan* and relevant legal requirements. In case of incompliance, proper measures should be taken.

2) Maintain open and smooth communication with Linshui Project Management Office (LPMO), supervision engineer and contractors on environmental issues.

3) Review and approve the *Environmental Protection Implementation Plan* for key project activities compiled by contractor and that may cause major environmental impact.

4) Conduct field inspection on all construction sites regularly according to requirements in *Environmental Management Plan*.

5) Review and file all the reports on environmental management by contractor and environmental supervision engineer.

6) Report the environmental issues on the construction site to LPMO on a monthly basis.

## 2 Contractors

At any time, contractors and their employees shall firstly try to avoid any adverse impact of the project construction activities, and then follow the mitigation measures specified in *Environmental Management Plan* and contract, so as to minimize the damage and impact on local environment and communities.

Rectifying measures failed to be implemented effectively during construction shall be implemented after the completion and before completion acceptance.

The contractor shall establish a strong environmental management system, satisfying the requirements of mechanism, various onsite measures, supervision, training and report.

Chapter 6 covers detailed environmental specifications for contractors.

## 3 Environmental Supervision Engineer (ESE)

Environmental supervision engineer is a component of the responsibilities of supervision engineer. Each supervision engineer company will appoint at least one environmental supervision engineer to each contract/work team. Responsibilities of environmental supervision engineer include:

1) Review and make sure that the contractor's construction organization plan is in accordance with *Environmental Management Plan* and project construction requirements in aspect of environmental protection and impact mitigation.

2) Aiming at key project activities with potential environmental impact, the Project owner shall review the *Environmental Protection Implementation Plan* and *Environmental Protection Construction Organization Plan* of the contractor at each construction site before final approval.

3) Launch daily field inspection and make sure that contractor's activities are in accordance with *Environmental Management Plan* and other regulations; in case of unconformities or inconsistence, instruct the contractor to adopt rectifying measures within the time limit specified by environmental supervision engineer.

4) During the implementation of environmental monitoring and supervision, if necessary, assist LPMO in completing relevant tasks.

5) Monitor the implementation of contractor's environmental management system on a regular basis, including environmental personnel, procedures and reports, inspecting and confirming the environmental supervision procedures, parameters, monitoring locations, equipment and results. In case of any inconsistence, the environmental supervision engineer will instruct the contractor to adopt rectifying measures, including capacity building and substitution of environmental personnel of the contractor.

6) Compile environmental supervision report on a regular basis and submit it to LPMO for review and filing.

7) As a part of the supervision engineers, approve various invoices or payment according to the implementation of *Environmental Management Plan*.

## 4 Independent environmental management consultant (IEMC)

LPMO shall invite an independent environmental management consultant to provide technical support on environmental protection during construction period. Independent environmental management consultant is independent from environmental supervision engineer and contractor and reports directly to LPMO. The independent environmental management consultant will be led by a person capable of independent and professional inspection of various records, procedures and processes. He/she may require the establishment of a small team to assist him/her to inspect each construction site (independent environmental management consulting team). The independent environmental management consultant shall have abundant knowledge and experience (at least five years of experience) in environmental supervision and auditing, in order to provide independent, objective and professional opinions in environmental performance of the Project. Though reviewing various reports, the independent environmental consultant shall be familiar with the Project, including the *Environmental Management Plan*. In particular, the independent environmental consultant has the following responsibilities:

1) Review and audit all aspects of *Environmental Management Plant* in an independent, objective and professional manner;

2) Check and confirm the accuracy, monitoring equipment, monitoring locations, monitoring procedures and sensitive areas;

3) Launch random sampling and review the monitoring data and sampling procedures;

4) Launch random site inspection;

5) Review the suggestions and requirements of environmental impact assessment according to the implementation of protective measures;

6) Review the effectiveness of environmental mitigation measures and project environmental performance;

7) Check and verify construction methods, relevant design plans and the acceptability of submitted materials in environmental protection according to needs; if necessary, the independent environmental consultant shall search for an backup plan with minimum impact together with designer, contractors and Xuancheng Economic and Technological Development Zone;

8) Check the result of investigation on environmental nonconformities;

9) Check the effectiveness of quality performance and rectifying measures;

10) Based on the nonconformities handling procedures in Environmental Management Plan, and report the result to LPMO and environmental supervision engineer team, and propose suggestions of punishment, suspension and other punitive measures to supervision engineer (environmental supervision engineer);

11) Before and during the construction of Project, provide training to personnel of contractors, environmental supervision engineer and LPMO;

Assist in compiling of the semi-annual environmental supervision report submitted to Xuancheng Economic and Technological Development Zone and World Bank.

**5 Environmental quality monitoring consultant (EQMC)**

To closely monitor the environmental quality of the Project area and to reduce the impact of construction and operation on environment to a minimum level, LPMO will employ professional environmental supervision consultant to implement all environmental supervision plans formulated during the environmental assessment stage. The responsibilities include:

1) Familiarize oneself with the Project construction and *Environmental Management Plan*, particularly the environmental supervision plan.

2) Initiate environmental supervision in a timely and professional manner according to the environmental supervision plan.

3) Check and confirm the standards, monitoring equipment, monitoring locations, monitoring procedures and sensitive areas.

Submit the supervision results and suggestions to Xuancheng Economic and Technological Development Zone.

## 3.4 Contractor Management

During the construction, the contractor is responsible for controlling and reducing the environmental impact, and implementing the environmental protecting measures, including considering the following measures:

During prequalification period, environmental management shall be integrated in the certifying conditions of contractor qualification. Under the same conditions, bidders passing ISO9001 and ISO14001 have priority;

During each construction stage, at least one full-time person is assigned for environmental control and supervision, while implementing specific environmental protecting measures;

During the compilation of bidding documents, the Owner shall include in the contract terms every environmental protecting measure (as regulated in environmental impact assessment and environmental management plan approval project), so as to ensure that the detailed rules and responsibilities of environmental protection and corresponding budget estimation are fully understood.

Before construction, the contractor shall undergo environmental training. Each department shall have at least 1 senior manager and 1 professional environmental personnel receiving training; the training is provided by experienced consulting institute familiar with environmental protection and local authorities. Training shall include:

- Relevant national and local laws, regulations and discharge standards;
- Technical instruction on environmental protection;

- EIA and EMP of the Project;
- Specific requirements, methods and parameters of all monitoring positions;
- Specific requirements on monitoring reports and monitoring data feedbacks;
- Applicable mitigation measures;
- Emergency measures against any leakage of hazardous matters;
- Public participation and reply to public complaints during construction;
- Contractor's responsibilities in aspect of environmental protection.

Appoint environmental supervision engineer and designate construction supervision engineer company (companies) according to environmental supervision responsibilities. Requirements on environmental supervision shall also be included in the Bid, as well as the contract with supervision engineer company.

### 3.5 Environmental Management Institute during Operation Period

#### 1 Linshui Environmental Protection Bureau

(1) Responsible for supervision and implementing Development Zone environmental management plan;

(2) Responsible for formulating and establishing environmental system and policies in the Development Zone;

(3) Responsible for the environmental statistics, filing of pollution sources, and other reports;

(4) Responsible for the operation, maintenance of environmental protection public facilities in Development Zone and ensuring their normal and stable operation;

(5) Monitor, investigate and deal with public complaints during the construction and operation period. Ensure the "three simultaneousnesses". Ensure the normal operation of environmental protection facilities.

#### 2 Project operators

Set up specialized Environmental Management department in charge of the implement of Environmental Management Plan during operation period. The detailed responsibilities of Environmental Management Department include: (1) Manage the implementation of Project environmental protection measures; (2) Coordinate with environmental supervision departments and surrounding residents on environmental issues; (3) Comply with Project environmental supervision plan, and entrust municipal monitoring stations to conduct routine monitoring on project facilities discharge and regional environmental quality according to frequencies and locations required in the supervision plan; (4) In case of environmental accident, handle the environmental risks; (5) Submit the information on enterprise environmental management to municipal environmental protection bureau and Project Office; (6) Recording and filing of the information of enterprise environmental management.

## 4. Environmental Protection Measures and Their Economic and Technical Demonstration

Based on the key findings of Environmental Impact Assessment, the following chapter summarizes some outstanding environmental impact and mitigation measures. Table 4-1, 4-2 and 4-3 have listed the main activities and stages, identified potential environmental impact and typical mitigation measures of the Project, as well as

implementation and monitoring responsibilities. Table 5-4 has listed the mitigation measures in sensitive areas.

These mitigation measures are in accordance with applicable national laws, regulations, guidelines, standards and World Bank policies, and *General HSE Guidelines*, *Environmental, Health, and Safety Guidelines for Water and Sanitation*, *Environmental, Health, and Safety Guidelines for Toll Roads*, *Environmental, Health, and Safety Guidelines for Gas Supply System*, and section on waste collection and transport of *Environmental, Health, and Safety Guidelines for Waste Management Facilities*, based on which, the impact in design, construction and operation stages are dealt with.

Chapter 6 to Chapter 10 elaborate on contractor specifications, water and soil conservation scheme, emergency plan, cumulative environmental impact tracking scheme, training and capacity building, and other detailed management plans.

## 4.1 Environmental Protection Measures and Suggestions in Design Stage

**Table 4.1-1 Environmental Impact and Mitigation Measures during Design Stage**

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Executor | Supervisor | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| Land acquisition and resettlement | Potential impact on original residents of Linshui County | **Compile resettlement plan according to national policies and World Bank policies** | Resettlement Action Plan | Fanglue Company | Xuancheng Economic and Technical Development Zone, World Bank | Resettlement action plan approved by World Bank | Before assessment |
| Acoustic environment | Impact on construction workers | Due to a pretty large noise produced in the construction of building works and road works, reasonable noise isolation and reduction measures shall be taken in Project design to mitigate the impact of construction noise on the field construction workers. | Chapter 6 of *Environmental Management Plan* | Xuancheng Economic and Technical Development Zone. Environmental assessment consultant | Linshui Project Management Office (LPMO), Sichuan Environmental Protection Bureau | Environmental Impact Assessment approved by World Bank and Sichuan Environmental Protection Bureau | Before assessment |
| | Traffic noise impact on residents of sensitive areas along the line | The standard distance for the function area provided by the construction planning department shall be arranged rationally and no sensitive structure shall be built within the standard distance. | Chapter 6 of *Environmental Management Plan* | Environmental assessment consultant | Linshui Project Management Office (LPMO), Sichuan Environmental Protection Bureau | Environmental Impact Assessment approved by World Bank and Sichuan Environmental Protection Bureau | Before assessment |
| Air and water environment | Potential impact of wastewater treatment plant (WWTP) on receiving water bodies | New WWTP shall strictly implement pollution prevention principles and take positively clearer production measures in order to reduce pollutants from the source and reduce risks to human and the environment. | Chapter 6 of *Environmental Management Plan* | Environmental assessment consultant | Linshui Project Management Office (LPMO), Sichuan Environmental Protection Bureau | Environmental Impact Assessment approved by World Bank and Sichuan Environmental | Before assessment |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Executor | Supervisor | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| | | | | | | Protection Bureau | |
| | Impact of dust from transportation on surrounding residents | Raw materials shall be purchased locally. | Chapter 6 of *Environmental Management Plan* | Environmental assessment consultant | Linshui Project Management Office (LPMO), Sichuan Environmental Protection Bureau | Environmental Impact Assessment approved by World Bank and Sichuan Environmental Protection Bureau | Before assessment |
| Ecological environment | Impact of water and soil loss | The route and location of new roads and wastewater interceptors shall be further optimized and adjusted to balance as possible the excavation and backfilling, reduce excavation and backfilling quantities, reduce damage to surface vegetation and reduce new water and soil loss. | Chapter 7 of *Environmental Management Plan* | Environmental assessment consultant | Linshui Project Management Office (LPMO), Sichuan Environmental Protection Bureau | Environmental Impact Assessment approved by World Bank and Sichuan Environmental Protection Bureau | Before assessment |
| | | Make a good water and soil conservation plan which shall not only take into account sufficiently the type, mode and intensity of water and soil loss caused by the Project construction, but integrate the general plan of the management area of Project operation period. | Chapter 7 of *Environmental Management Plan* | Environmental assessment consultant | Linshui Project Management Office (LPMO), Sichuan Environmental Protection Bureau | Environmental Impact Assessment approved by World Bank and Sichuan Environmental Protection Bureau | Before assessment |
| | Land acquisition impact: | The Project design shall comprehensively consider the surrounding environment and | Chapter 7 of *Environmental Management* | Environmental assessment consultant | Linshui Project Management Office (LPMO), | Environmental Impact Assessment | Before assessment |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Executor | Supervisor | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| | | shall further refine the permanent land occupation design to use land reasonably. | *Plan* | | Sichuan Environmental Protection Bureau | approved by World Bank and Sichuan Environmental Protection Bureau | |
| | Landscape impact | Road landscaping design shall be conducted at the same time with the main works design. Meeting the regional planning requirement, the route of roads shall maintain the natural landscape and harmonize with the surrounding environment as much as possible. To reduce damage to the existing ecological environment, landscaping and ecological construction works shall be carried out simultaneously in Project design. | Chapter 7 of *Environmental Management Plan* | Environmental assessment consultant | Linshui Project Management Office (LPMO), Sichuan Environmental Protection Bureau | Environmental Impact Assessment approved by World Bank and Sichuan Environmental Protection Bureau | Before assessment |

## 4.2 Environmental Protection Measures and Suggestions in Construction Period

**Table 4.2-1 Environmental Impact and Mitigation Measures during Construction Stage**

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| Social environment | Transportation issues | 1. Formulate traffic direction, diversion and temporary access plans, setting up sufficient traffic direction signs. Information shall be released through broadcast, television, | Chapter 6 of *Environmental Management Plan* | Contractors | Environmental supervision engineer, | Environmental supervision engineer supervise | Before construction |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| | | newspapers and magazines.<br>2 Enhance management on bridge construction, especially the construction management of buildings. Construction should be coordinated with relevant departments, in aspects of construction time and traffic hours, with obvious warning lights set up at the piers, etc. alerting the passing vehicles.<br>3 Warning lights should be set up along the construction road sections, guiding the access of vehicles. | | | independent environmental consultant | onsite;<br>Specifications followed; | |
| | Preservation of Cultural Relics | According to site survey and consultation with relevant departments along the line, make sure that no surface cultural relics are occupied by construction and operation. If new cultural relics are found during construction, construction unit shall protect the site according to relevant laws, and notify cultural relic administration for salvage and handling, ensuring the safety of cultural relics and smooth construction roads. | Chapter 6 of *Environmental Management Plan* | Contractors | Environmental supervision engineer, independent environmental consultant | Promotion and training already provided;<br>Record of randomly discovered cultural relics | Daily |
| **Ecological environment** | All items | 1. Flowers, grass and trees in the median separator and outer separator shall be transplanted and protected, these shall not be completely destroyed and plant new vegetation, they shall rather be temporarily transplanted and replanted as per design. Be aware to protect trees and green belt in the adjacent areas during construction; Road construction shall be conducted within the right-of-way as possible; earth-pile and stock-pile shall not intrude into the farmland nearby; As for the ruins belt caused by demolition in construction, this shall be handled by carrying out orderly | Chapter 7 of *Environmental Management Plan* | Contractors | Environmental supervision engineer, independent environmental consultant | Environmental supervision engineer supervise onsite;<br>Specifications followed; | Daily |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| | | demolition zone by zone and to avoid messy landscape, and baffer or protective plate (wood, glass, and iron sheet, etc.) may be used as fence to reduce landscape pollution;<br>2 reasonable allocation shall be made for excavation and backfilling construction; excavation and backfilling construction shall not be done in rainy days to prevent water and soil loss by rainwater washing from polluting the water body and blocking drainage pipe;<br>Meeting the construction demand, land occupation shall be minimized as possible and construction schedule shall be rationally arranged. After work finished, clean the construction site in time, withdraw from the occupied land, restore the original road and greening;<br>3 Reasonably arrange the construction period to avoid rainy season construction so as to minimize soil erosion.<br>4 Strengthen construction management and supervision and regulate construction activity to reduce construction land occupation and vegetation loss and reduce damage to wildlife habitat.<br>5 Regulate construction activity and perform construction reasonably and orderly; optimize construction organization by gradually advancing construction in one direction in the same construction section, staggering the construction peak between two adjacent construction sections to avoid large scale concurrent construction in the same area and to reduce disturbance of terrestrial ecological | | | | | |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| | | environment by disordered construction. Strengthen environmental protection publicity and education and wildlife protection knowledge propaganda on the construction staff by multiple means like announcement, leaflets, blackboard newspaper and meetings to improve environmental awareness; forbid constructors from hunting frogs, snakes, wild animals, birds and other wildlife and engaging other activities hazardous to ecological environment protection. | | | | | |
| Acoustic environment | Noise impact during construction period | 1. Reasonable construction site layout<br>Reasonable and scientific construction site layout is a major way in reducing construction noise. Place the fixed noise sources on the construction site collectively to reduce the scope of noise impact.<br>2 Reasonable arrangement of construction time<br>Arrange construction time reasonably in accordance with the provisions of the *Emission Standard of Environment Noise for Boundary of Construction Site* (GB12523-2011). Forbid construction operation with high-noise machinery at night (22: 00~6: 00). Adjust construction time as appropriate or take temporary noise reduction measures like setting up temporary noise barrier (i.e., temporary wood sound barrier) or adopting semi-underground construction and so on when performing construction near residential area. For worksite requiring continuous construction operation, the Contractor shall contact in time the environmental protection department according to specific situation to apply for nighttime construction certificate as per | Chapters 5 and 6 of *Environmental Management Plan* | Contractors | Environmental supervision engineer, independent environmental consultant | Environmental supervision engineer supervise onsite;<br>Specifications followed; | Daily |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| | | regulations and strive for public support as much as possible by issuing announcement.<br>3 Reasonable arrangement of construction transport routes<br>Transport routes and time for construction transportation vehicles, especially large transport vehicles shall be reasonably determined as per provisions of the relevant departments, the transport route shall be far away from residences area. Vehicles for transporting and handling construction materials shall lower their speed to 20km/h at sensitive spot and blaring horns is prohibited.<br>4 Reasonable selection of construction machinery equipment<br>Select construction machinery equipment with low noise as possible and perform regular maintenance for them; select the reasonable construction method, construction site; set up sound insulation board for high noise construction machinery on sides close to sensitive spot during construction to reduce the impact of noise on sensitive spot.<br>5 Strengthen environmental management and accept the supervision of environmental protection department<br>In order to effectively control the impact of construction noise on the urban environment, in addition to the implementation of relevant control measures, environmental management must be strengthened; In accordance with relevant state and local laws, decrees and regulations, the constructor shall voluntarily accept the supervision and inspection of | | | | | |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| | | environmental protection department; in bid inviting of subsequent project, noise attenuating measure shall be explicitly included in the bidding documents; the contractor shall include the construction noise control into the contract content and special person shall be appointed to take charge in this respect during construction and engineering supervision to ensure the smooth implementation of construction noise control measures. Construction operation personnel and constructors on site shall control the working hours as per labor protecting standard and do well their own personal protection, wearing earplugs, helmet, etc., for example.<br>6 The contractor shall use construction site barrier in a standardized way to give full play to its noise reduction effect. At sensitive spots within 50m on both sides of the planned road like centralized dwelling district of Hejiayakou, Liujiawan, and Xinwuzui, the construction barrier height shall be increased or housing demolition shall be carried out in advance. | | | | | |
| Air environment | All items | 1. The Project site management shall strictly refer to the construction site management principle of “Six Musts” and “Six Mustn’ts”. Six Musts include the wet work, the barrier circling on urban road, the road hardening, provision of washing facilities, provision of sufficient cleaning workers, and cleaning the construction site regularly; and Six Mustn’ts include vehicles living without mud, slag vehicle not overloaded, no throwing or littering of construction sediment, no concrete mixing on site, no water left on the | Chapter 6 of *Environmental Management Plan* | Contractors | Environmental supervision engineer, independent environmental consultant | Environmental supervision engineer supervise onsite;<br>Specifications followed; | Daily |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| | | ground, and no waste burning on site, so that the construction site dust pollution can be effectively controlled.<br>2 Provide dust-proof measures like construction barrier at concrete mixing station, or mix concrete inside building to effectively control dust pollution.<br>3 Water in due time the construction site on non-rainy days, including the road section in construction and major transportation road. Watering frequency shall be determined by the site supervision personnel according to the actual situation.<br>4 Powder material like cement, lime shall be packed in tanks or bags, bulk transportation of such material is prohibited, dust scattering in transportation is prohibited; while in storage, they shall be stored in warehouse or covered with tarpaulin.<br>5 Provide dust-proof mat at exits of construction site; clean the body and tires of transport vehicles out of the construction site. Forbid overload of soil, sand, stone; the loading height shall not exceed that of the carriage plate and the loaded material shall be covered with tarpaulin to prevent them from falling along the way.<br>6 In case of a wind velocity above level 4 when it is prone to producing dust, it is suggested that the Contractor should temporarily stop earth-rock excavation and take measures like covering, wetting the stockpile to effectively reduce dust pollution;<br>7 Collect and transport the construction waste in | | | | | |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| | | time, and cover those which cannot be collected and transported temporarily; tightly cover vehicles transporting sand, stone, cement, earth which are apt to produce dust to prevent falling and leaking.<br>8 Provide dust mask for construction personnel to reduce health damage by dust.<br>9 Water the temporary storage yard regularly to reduce the impact of dust on the surrounding environment; set up closed enclosure with height no less than that of the piled up material around; divide the boundaries between the material area and road and clean up the scattered materials in time to keep the road neat and clean the road in time.<br>10. For soil pile of road and pipeline construction over 48 hours, it shall be completely covered to prevent dust.<br>11. Transport vehicles for spoils shall have enclosed bucket; vehicle cleaning platform shall be provided on the inner side at the entrance and exit for transport vehicles and shall be equipped with proper drainage facilities; before leaving the construction site, vehicles shall have their tires and the bodies washed to remove the soil. | | | | | |
| **Surface water environment** | All items | 1. Construction wastewater in the Project is reused after treatment and is not directly discharged into local water bodies, and domestic sewage is discharged after treatment in septic tank or used as agricultural fertilizer, which in general will not impact the water body quality. | Chapter 6 of *Environmental Management Plan* | Contractors | Environmental supervision engineer, independent environme | Environmental supervision engineer supervise onsite;<br>Specifications followed; | Daily |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| | | 2 The Contractor of the Project shall make simple processing to muddy water like filtering and sedimentation, and direct discharge is prohibited; the Owner shall strengthen construction management to perform civilized construction.<br>3 Domestic waste, construction waste, maintenance garbage would produce pollution if directly discharged into the water body, therefore, they shall be recycled, sorted, stored and treated. The usable materials like most paper, wood, metal and glass wastes shall be reused or sold to garbage buyer, and the unusable shall be handed over to environmental health department for harmless treatment, incineration, landfill, stockpiling, etc.<br>4 Residual and waste oils produced in construction shall be collected, recycled and disposed with different vessels; aggregate wash water and concrete batch plant wash water produced in subgrade construction after sedimentation and treatment shall be reused for watering the construction site to reduce dust.<br>5 Leakage and pressure test shall be performed after the connection of pipe network works, and the water pollutants for pressure test is mainly SS, which may be collected as dust suppression water or landscaping water after sedimentation.<br>6 Well-up water produced in the excavation of WWTP structures shall be used in construction after sedimentation. | | | ntal consultant | | |
| **Groundw** | All items | 1. Strengthen sewage and production wastewater | Chapter 6 of | Contractor | Environme | Environmental | Daily |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| **ater environment** | | treatment during construction; the domestic sewage of construction personnel shall be used for agricultural irrigation or recycling after pre-treatment and the production wastewater after sedimentation shall be used for dust suppression in the construction.<br>2 Bulk yard shall be covered to prevent water and soil loss from polluting groundwater.<br>3 The Contractor shall make scientific schedule and carry out reasonable construction to shorten the construction period and further reduce the impact of pumping and discharging of groundwater.<br>4 Organize construction by sections to prevent the additive effect on the falling groundwater level due to the excessive concentration of dewatering wells in some section.<br>5 Increase the number of drain wells as appropriate, choose reasonably the locations of drain wells to minimize the distance from the pipeline in construction so as to reduce the impact scope of falling groundwater level.<br>6 Construction of the foundation of sewage wells shall be arranged in non-flood season to reduce the adverse impact of a lower groundwater depth on construction. | *Environmental Management Plan* | s | ntal supervision engineer, independent environmental consultant | supervision engineer supervise onsite;<br>Specifications followed; | |
| **Solid wastes** | All items | 1. Domestic waste produced in construction shall be classified and collected and shall be collected, transported and disposed collectively by local environmental health department.<br>2 Upon completion of works, dismantle the temporary facilities in the construction area, remove construction waste and all sorts of | Chapter 6 of *Environmental Management Plan* | Contractors | Environmental supervision engineer, independent environme | Environmental supervision engineer supervise onsite;<br>Specifications followed; | Daily |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| | | sundry, clear up and level up the domestic waste, simple toilet, and sump, perform disinfection for these with carbolic acid and caustic lime, and restore the construction site.<br>3 The contractors shall specially designate personnel to take charge of the collection of production waste; the scrap iron, scrap steel, waste wood pieces shall be stacked at the location specified; random piling and stacking is prohibited; wastes shall be collectively reclaimed and subject to centralized treatment.<br>4 In the process of transportation, the domestic waste and building materials shall be enclosed or covered to prevent garbage, sandstone, earth from falling along the way or into the river. | | | ntal consultant | | |
| Water and soil loss | Impact on water and soil conservation within the region | 1. Road and network engineering: conduct prevention and protection measures and stonework and earthwork balance application; optimize construction processes, reducing the waste amount; provide temporary blocking, drainage, sand basin, coverage, and other protective measures; provide vegetation, improving and restoring ecological landscape; set up corresponding flood control and drainage facilities for pipeline and auxiliary engineering areas; protect the temporary stockyard of the pipeline construction area, and drainage of temporary sites, considering the restoration of vegetation.<br>2 Waste water treatment plant shall conduct topsoil stripping, drainage and sand setting in the plant area, and reclamation and greening in later stage; provide temporary stockpile blocking, drainage and protective measures | Chapter 7 of *Environmental Management Plan* | Contractors | Environmental supervision engineer, independent environmental consultant | Environmental supervision engineer supervise onsite;<br>Specifications followed; | Daily |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental management plan/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring frequency |
|---|---|---|---|---|---|---|---|
| | | during construction period.<br>3 Provide temporary drainage and coverage measures along construction roads and construction areas, clearing and leveling the sites, with reclamation or greening. | | | | | |

## 4.3 Environmental Protection Measures and Suggestions in Operation Period

**Table 4.3-1 Environmental Impact and Mitigation Measures during Operation Stage**

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental assessment report/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring Frequency |
|---|---|---|---|---|---|---|---|
| **Ecological environment** | **Landscape impact** | 1. Environmental protection measures for road works during operation period mainly consist of landscape works' maintenance on both sides of road, regular renovation of greening trees in order to ensure the design effect of landscape works.<br>2 Provide greening of the plant area of Waste Water Treatment Plant | Chapter 7 of *Environmental Management Plan* | Owner | Linshui Environmental Protection Bureau | Specifications followed;<br>Environmental monitoring plan compiled | Upon project completion |
| **Acoustic environment** | **Road noise impact** | 1. Make reasonable urban planning, architectural layout and control land use on both road sides.<br>2 Implement traffic control at night, restrict overspeed in sensitive sections at night; strengthen management on blaring horns; strengthen the maintenance and | Chapter 5 of *Environmental Management Plan* | Linshui Project Management Office (LPMO), Owner | Linshui Environmental Protection Bureau | Specifications followed;<br>Environmental monitoring plan compiled | Upon project completion |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental assessment report/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring Frequency |
|---|---|---|---|---|---|---|---|
| | | management of urban road and repair in time the damaged road; restrict the traffic of overspeed, overload vehicles and heavy-duty trucks.<br>3 Since roads in the Project are all located in LETDZ, it is suggested that housing demolition and resettlement should be carried out as soon as possible to reduce the noise impact of the Project. | | | | | |
| | **Noise impact of WWTP** | 1. Provide clear specifications on noise value when ordering high-noise equipment, while exert strict control in equipment installation, increasing installing accuracy.<br>2 Adopt insulating and vibration reduction measures. The operator room shall be equipped with insulating doors and windows. The plant walls shall also use new insulating materials. Operators must wear earplugs, earmuff and other protective gear.<br>3 Plan the land use around the plant and avoid construction of residential buildings near the plant. | Chapter 5 of *Environmental Management Plan* | Owner | Linshui Environmental Protection Bureau | Specifications followed;<br>Environmental monitoring plan compiled | Monthly |
| **Air environment** | **Road impact** | 1. Enforce strictly exhaust emission inspection system and restrict traffic of vehicles with excess emissions; organize transport route scientifically; restrict traffic of ultralimit slag cars; | Chapter 5 of *Environmental Management Plan* | Linshui Project Management Office (LPMO), | Linshui Environmental Protection Bureau | Specifications followed;<br>Environmental monitoring plan compiled | Monthly |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental assessment report/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring Frequency |
|---|---|---|---|---|---|---|---|
| | | strengthen road management and road maintenance and keep road in good operation condition and reduce traffic jam.<br>2 Enforce strictly national vehicle exhaust emission standards; strengthen law enforcement on vehicle management; restrict traffic of vehicles with excess emissions to reduce exhaust emissions.<br>3 Strengthen greening on road sides and plant trees capable of absorbing (or adsorbing) toxic gases like CO, NO2, etc. to reduce road traffic air pollution. | | Owner | | | |
| | **Impact on WWTP** | 1. Rational layout Place structure which is the main source of odor in the middle of the plant to ensure that the surrounding sensitive spots are beyond the protective distance and not affected; provide mechanical ventilation facilities in wastewater lifting pump room, sludge dewatering room to eliminate odor and improve environment.<br>2 Control odor radiation Reasonably arrange the WWTP with the structures of major odor sources in the center of plant to ensure the surrounding environmentally sensitive areas beyond the protection distance will not be affected; provide mechanical | Chapter 5 of *Environmental Management Plan* | Owner | Linshui Environmental Protection Bureau | Specifications followed; Environmental monitoring plan compiled | Monthly |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental assessment report/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring Frequency |
|---|---|---|---|---|---|---|---|
| | | ventilation facilities for the waste lift pump house and the sludge dewatering room of WWTP to eliminate the odor and improve the environment; control the odor emission by covering the pond of treatment facilities giving out odors to confine the odor in not fully open structures; use underground sludge reflux pump above which the landscaping is provided; adopt modified frame filter for pressure filtration and dewatering of sludge which will be transported with special vehicle to the waste disposal plant for landfilling and ensure the sludge is kept for a very short period of time in the plant; collect the sludge on a daily basis to control the production of odor; and specify the health protection distance from the odor boundaries of WWTP. UV efficient purification photolysis method technology is recommended by engineering design for deodorization.<br>3 Health protection distance will be specified. No residence, schools or other projects with relatively high population density shall be planned within the 100m scope surrounding the WWTP site, especially in areas at its downwind direction. | | | | | |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental assessment report/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring Frequency |
|---|---|---|---|---|---|---|---|
| | | 4 Strengthen management. Control fermentation during sludge thickening and collection and transport dewatered sludge in time to reduce sludge stockpiling; during shut down for maintenance of various sewage pools or sumps, the bottom sludge will be exposed and generate odor, measures for clearing sludge deposit shall be taken in time to prevent the effect of odor.<br>5 Enhance greening. Provide greening isolation belt around the sewage station, sludge production area and the coarse grid room of lifting pump station in the WWTP, and plant different series of tree species to form multilayer of protection and isolation belt against odor to reduce the odor pollution as possible. Green area in plant area and pump station shall be no less than 30%. | | | | | |
| **Surface water environment** | **Road impact** | A half-separated drainage system collects the initial dirty rainwater which is discharged to the riverway after sedimentation. | Chapter 5 of *Environmental Management Plan* | Owner | Linshui Environmental Protection Bureau | Specifications followed; Environmental monitoring plan compiled | Monthly |
| | **Impact on WWTP** | 1. Wastewater treatment plant (WWTP) shall formulate operation management procedures for waste water treatment facilities, position responsibility system, incentive and | Chapter 5 of *Environmental Management Plan* | Owner | Linshui Environmental Protection Bureau | Specifications followed; Environmental monitoring plan | Monthly |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental assessment report/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring Frequency |
|---|---|---|---|---|---|---|---|
| | | punitive rules, etc. so as to maximum control over waste water incident caused by mal-operation.<br>2 Maintain the optimal water temperature, dissolved oxygen, and pH value of the biochemical pool.<br>3 Control incoming water quality, with strictly specification in Pb, Cd, As, Hg and other first-class pollutant source, ensuring the normal operation of WWTP.<br>4 Wastewater treatment plant shall be equipped with accident waste water storage pool, where the waste water is temporarily stored in case of accident.<br>5 Install online monitor and automatic control system, enhancing the monitoring over water pollution; introduce advanced control system and install online monitor and automatic control system, to conduct online monitor on the disposal units, so as to know the operation situation of waste water treatment facilities, eliminating potential hazard;<br>6 Sewage of staff, equipment wash water and initial rainwater in plant area shall be treated together by the WWTP;<br>7 Environmental protection department, construction department, | | | | compiled | |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental assessment report/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring Frequency |
|---|---|---|---|---|---|---|---|
| | | environmental hygiene department and administrative department of Linshui County shall fulfill their respective duties while collaborate with each other in daily supervising work. | | | | | |
| **Groundwater environment** | **Impact of WWTP on ground water** | 1. Compressive strength, impermeability, frost resistance of the pool body concrete of WWTP must meet design requirement; and the concrete elevation and slope of the pool floor must meet design requirement; the pool walls shall be vertical and have smooth surface, and concrete of the adjacent wet joints shall be tight and the thickness of concrete cover shall meet the specification; before placing pool wall concrete, the concrete construction joints shall be scabbled and washed clean, and concrete joints shall be free from leak; embedded pipe fittings, water stop and caulk board shall be firmly mounted in right position; full water test shall be performed for each pool to ensure quality.<br>2 Enact partition anti-seepage plan, perform anti-seepage design and take reasonable anti-seepage measures based on different areas; anti-seepage treatment method of HDPE film + impermeable concrete | Chapter 5 of *Environmental Management Plan* | Owner | Linshui Environmental Protection Bureau | Specifications followed; Environmental monitoring plan compiled | Monthly |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental assessment report/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring Frequency |
|---|---|---|---|---|---|---|---|
| | | (seepage coefficient≤1.0×10-10cm/s) shall be conducted for wastewater collection pool, treatment structures, sludge processing unit and dosing room to prevent pollution of underground water environment.<br>3 Develop an emergency plan for the risk accidents of groundwater and identify the closure and intercepting measures that should be taken under the condition of risk accident. | | | | | |
| | **Impact of waste water pipeline on ground water** | 1. Quality control shall be strictly enforced in Project design and construction to prevent underground water pollution from the source; leakage of wastewater inceptor and sewage pipe and so on due to material, pipe fabrication, welding defects and operational errors shall be wiped out; strengthen anti-seepage treatment for pipe network, pool corners, bearings and joints. Strengthen monitoring in Project operation and make record for concealed works; perform regular inspection to effectively prevent wastewater leak.<br>2 Develop an emergency plan for the risk accidents of groundwater and identify the closure and intercepting measures that should be taken under the condition of risk accident. | Chapter 5 of *Environmental Management Plan* | Owner | Linshui Environmental Protection Bureau | Specifications followed; Environmental monitoring plan compiled | Monthly |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental assessment report/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring Frequency |
|---|---|---|---|---|---|---|---|
| **Solid waste** | **Impact of solid waste from WWTP** | 1. Sludge will be dewatered by mechanical pressure filter and transferred to Linshui sanitary landfill for disposal.<br>2 It is suggested to set up special monitoring department or full (part) time personnel to manage the whole process of production, transport, storage, handling and disposal of sludge. Individuals or unit without relevant operation qualification are not allowed for sludge transport; the sludge transport vehicle shall be sealed with waterproof and leakage-proof and spillage-proof measures.<br>3 Conduct inspection on sludge during normal operation of the WWTP with improved technical measures.<br>4 Collect the living waste of workers manually on a regular basis, which is then transported to the landfill through the waste transfer station. | Chapter 6 of *Environmental Management Plan* | Owner | Linshui Environmental Protection Bureau | Visual inspection:<br>Garbage disposal recorded; specification followed. | Monthly |
| | **Road garbage** | **Garbage is connected manually on a regular basis and transported to the landfill through the waste transfer station.** | Chapter 6 of *Environmental Management Plan* | Owner | Linshui Environmental Protection Bureau | Visual inspection:<br>Garbage disposal recorded; specification followed. | Monthly |
| **Risk** | **Risk of WWTP** | 1. Special attention shall be paid to the maintenance and management of pipe network and pump station to prevent the discharge capacity of pipe | Chapter 8 of *Environmental Management Plan* | Owner | Linshui Environmental Protection Bureau | Accident record | Yearly |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental assessment report/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring Frequency |
|---|---|---|---|---|---|---|---|
| | | from being reduced by sediment jam.<br>2. Provide duplicate supply for pump station and WWTP with consideration of alternate equipment in the pump design.<br>3 Technological parameters of treatment unit like Water volume, water quality, residence time, and load intensity, etc. shall be controlled strictly to ensure a stable treatment effect.<br>4 The maintenance and management of Biological deodorization device for odor should be strengthened to prevent the accident of the device.<br>5 Establish safety responsibility system. A set of complete system shall be in place for daily work management which shall specify the responsibility of each person and shall be inspected regularly. Establish emergency measures for risk accident which shall specify the emergent and rescue operation system.<br>6 Strengthen operation management and monitoring on the inflow and effluent quality, sewage untreated and not up to standard is prohibited from being received and discharged. | | | | | |
| | **Risk of waste water pipeline** | 1. Human factors are often the main cause of the accident, therefore, to | Chapter 8 of *Environmental* | Owner | Linshui Environmental | Accident record | Yearly |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental assessment report/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring Frequency |
|---|---|---|---|---|---|---|---|
| | | enforce strict management and managing people well to eliminate accident-causing human factors is the key to prevent accident. These include: strengthen the virtue education on staff to improve the staff's sense of responsibility and initiative; provide systematic post training for operators to make them familiar with work procedures and rules and to strengthen the post responsibility system; for locations prone to accident, apart from in time inspection by worker of the post, safety inspector shall be appointed to perform routine inspection and maintenance, in order to find out and repair problems in time.<br>2 It is suggested that the employer shall perform careful review in Project design stage and check the facilities concerning safety, health and environment in accordance with the relevant specifications and standards, and enforce strict management and inspection on these during the construction period to ensure the construction quality.<br>3 In the event of an accident, it shall be reported to the relevant authorities in time to take effective treatment measures to minimize the harm on the | *Management Plan* | | Protection Bureau | | |

| Link and elements | Potential impact/issue | Mitigation measures | Reference of environmental assessment report/Resettlement Action Plan | Implementation responsibilities | Monitoring responsibilities | Monitoring indicators | Monitoring Frequency |
|---|---|---|---|---|---|---|---|
| | | surrounding environment and people's lives and properties. | | | | | |
| **Social environment** | **Effectiveness of complaining system** | Establish the complaining system, providing hotline number at all the main entrances and exits of the construction area. Each complaint shall be recorded with written reply and solutions provided within 3 weeks. | Chapter 10 of *Environmental Management Plan* | Linshui Project Management Office (LPMO) | Linshui Environmental Protection Bureau | / | / |
| **Cumulative environmental impact** | **Impact of development in Linshui County on surface water, ground water, air, acoustic and ecological environment** | Solutions for cumulative environmental impact are already listed in the environmental assessment report of the Economic Technical Development Zone;<br>Best Management Practice (BMP) is adopted in the urban expansion of Linshui County.<br>Establish dialogue mechanism with stakeholders, so as to monitor the development and ecological condition of Linshui County. | Chapter 9 of *Environmental Management Plan* | Linshui Project Management Office (LPMO) | Sichuan Environmental Protection Bureau, Development Zone Environmental Protection Branch | Environmental assessment report planned by the Economic Technical Development Zone approved;<br>Organizing various meetings | Yearly |

# 5. Environmental Supervision and Monitoring Plan

## 5.1 Objectives, scope and stages

Environmental supervision is an important means to guarantee the effective implementation of EMP. The objective of environmental supervision is to perform the relevant obligations and to provide independent, fair, scientific and efficient services for the Project; to implement the environmental monitoring, to ensure that the Project conforms to national laws, regulations and policies, WB technical standards and specifications, approved design documents, bid documents and supervision and construction contract, the requirements for environmental protection and management in terms of design, construction and operation.

Based on the contract, each engineering supervision company shall entrust a professional ESE, who is responsible for the supervision on environmental protection performed by contractors by stages.

The scope of environmental supervision includes the construction area and densely populated areas of the Project. Environmental supervision is performed during the whole process, including: Construction preparation, construction and completion stages.

## 5.2 Environmental management contents

### 1 Environmental supervision before construction

ESE shall ensure the following tasks to be done before construction:

To assess pollution prevention control mechanism: Review treatment and disposal measures on discharged wastewater, wastes and solid wastes during construction, including the selection and feasibility of technology.

To review the contractor's construction land plan and ensure that the following measures are included:

a) To ensure smooth traffic;

b) To minimize interference and other damages.

To review environmental protection clauses involved in the construction contract: The contractor shall meet all requirements for environmental protection as specified in the contract. During the construction period, the contractor is responsible for supervision, inspection and test work to minimize pollution.

### 2 Environmental supervision during the construction period

ESE shall perform the onsite inspection at different stages, for instance, check whether the construction conforms to environmental protection clauses, or the clauses are changed without any permission. The monitoring is adopted to make sure whether the operation meets the requirements for environmental protection during the construction period and the works meets the environmental protection standards. In addition, effective implementation of these measures is ensured. Main contents include:

Monitoring transportation of surplus materials, transportation management, the construction plan on the access roads to communities or commercial stores, pedestrian safety measures, etc.

Performing the supervision on soil conservation measures; in addition, minimize water pollution during the construction period. The measures include:

a) Soil conservation;

b) Spoil disposal;

c) Implementation of temporary and long term erosion control measures;

d) Implementation of sediment reduction measures (sedimentation tank and sediment fence);

e) Ensuring that the designed runoff control measures are taken properly;

f) Normal operation of all wastewater treatment facilities.

Supervising production and domestic sewage: to check treatment and disposal schedule for production and domestic sewage source and wastewater, treatment procedures and final treatment plant; to examine and supervise whether treatment measures meet the allowable discharge standards.

Environmental supervision on air pollution: air pollution in the project area is mainly the waste gas from all vehicles and fugitive dust produced during the construction period. The strict implementation of fugitive dust control measures by the contractor is ensured.

Environmental supervision on noise: noise attenuating measures shall be taken in accordance with design parameters and allowable noise level.

Environmental supervision on solid waste treatment: Solid waste treatment shall satisfy local requirements; effective cleaning measures are taken to maintain a clean and tide construction site. ESE will monitor the spoil transportation, which is responsible by building garbage transportation authorities.

Environmental supervision on greening plan: vegetation protection measures, in particular, the implementation of measures on tree protection and transplantation and the greening plan.

Environmental supervision on safety and health: to ensure that adequate safety and health measures shall meet relevant rules and regulations.

**3 Supervision at the completion stage**

ESE shall perform monitoring and management on environmental restoration and all pollution prevention control equipment, including:

Perform the supervision on prepared completion documents;

Organize initial inspection;

Assist World Bank (Guang'an) PMO in organizing the completion acceptance of the works;

Prepare final report of environmental supervision of the project.

**4 Environmental Management during Operation**

Organization and implementation of environmental monitoring during operation

## 5.3 Environment monitoring plan

### 5.3.1 Objective

The objectives of environmental monitoring plan include: To monitor surrounding environmental quality and pollution emission amount, and implementation of inspection measures, and to provide a basis for mitigation and corrective measures on environment.

### 5.3.2 Responsibilities of implementation

The project owner shall entrust the qualified environmental monitoring institution (for example, local environmental monitoring station) to perform environmental monitoring during the construction and operation period.

### 5.3.3 Environment monitoring plan

Based on characteristics of works and construction in each stage, the monitoring plan during the construction and operation stages is listed in Table 5.3.3-1.

**Table 5.3.3-1 Implementation of Environmental Monitoring Schedule during Construction Period and Operation Period**

| Category | Item | Monitoring Plan at each Stage | |
|---|---|---|---|
| | | Construction Period | Operation Period |
| Acoustic environment | Monitoring location | The operation site with a large amount of operating equipment, especially in the area near the main sensitive area | Dongguawan, Xubwuzui, Wangjiawan, Xinfangzi, Group 6, Poshi Village, Meijiawan, Shiba Village, Liujiawan, Hejiaya, etc. |
| | Factors to be monitored | Equivalent continuous sound level ($L_{Aeq}$) | Equivalent continuous sound level ($L_{Aeq}$) |
| | Monitoring frequency | Once/month | Once/quarter |
| Water environment | Monitoring location | Construction camp and construction site | The outlet of WWTP and its downstream |
| | Factors to be monitored | $COD_{Cr}$, $BOD_5$, SS and petroleum | pH,$COD_{Cr}$,$BOD_5$,$NH_3$-N,TP |
| | Monitoring frequency | Once/quarter | To conduct online monitoring at the outlet, and conduct a monitoring once a month at the downstream by the environmental protection department. |
| Air quality | Monitoring location | The operation site with a large amount of operating equipment, the sensitive area or on unpaved roads or empty grounds near the sensitive environment | WWTP boundary and three monitoring locations in the downwind direction at the boundary |
| | Factors to be monitored | PM10 | $H_2S$,$NH_3$ and odor intensity |
| | Monitoring frequency | To perform random sampling during the peak construction period | One day/quarter |

**Table 5.3.3.-2 Monitoring Plan for Water and Soil Conservation during Construction Period**

| Monitoring Period | Monitoring Area | Monitoring Point | Monitoring Content | Monitoring Frequency |
|---|---|---|---|---|
| Construction preparati | Road works area | Subgrade excavation side slope | Disturbance area and degree; damage quantity and degree on original water conservation | Disturbance surface area monitored once per month; |

| Monitoring Period | Monitoring Area | Monitoring Point | Monitoring Content | Monitoring Frequency |
|---|---|---|---|---|
| on period and construction period | | | facilities | retaining effects of water & soil conservation measures once every three months, progress of main works and water & soil loss impact factors monitored once every three months; additional monitoring made in time in case of rainstorm and strong wind, etc. |
| | | Subgrade filling side slope | Disturbance area and degree; damage quantity and degree on original water conservation facilities | |
| | | Temporary soil storage yard | Soil storage area, harm of water and soil loss on the surrounding environment | |
| | Wastewater interceptor works area | Pipe area | Impact of water & soil loss on main works and the surrounding environment | |
| | Linshui No.3 WWTP area | Plant area | Impacts of water & soil loss on main works and the surrounding environment, disturbance area and degree; damage quantity and degree on original water conservation facilities | |
| | Surface soil storage area | K40+900 | Soil storage area, implementation conditions of preventive measures, harm of water and soil loss on the surrounding environment | |
| Natural recovery period | Road works area | Subgrade excavation side slope | Quality, completeness, stability of the side slope and drainage ditch, etc. and dammed slag sedimentation effects | Growth of water and soil conservation vegetation measures monitored once every three months during the recovery period of forest and grass; additional monitoring made in time in case of rainstorm and strong wind. |
| | | Subgrade filling side slope | Quality, completeness, stability of the side slope and drainage ditch, etc. and dammed slag sedimentation effects | |
| | | Temporary soil storage yard | Quantities implemented of preventive measures, treating area, survival rate, reserving rate, coverage rate and area of the forest and grass | |
| | Wastewater interceptor works area | Pipe area | Quantities implemented of preventive measures, treating area, survival rate, reserving rate, coverage rate and area of the forest and grass | |
| | Linshui No.3 WWTP area | Plant area | Site cleaning and leveling conditions | |

### 5.3.4 Environmental monitoring report

1 Environment monitoring report during the construction period

The construction lasts about 48 months as performed according to the works contents at different stages. According to environmental management regulations

of PRC and requirements of World Bank for business policy, the Owner shall prepare *Environmental Monitoring Report* and submit it to World Bank and Environmental Protection Bureau of Guang'an. The objective of the report is to assure environmental protection authorities that all environmental protection measures are implemented as required by the approved environmental monitoring plan in order to eliminate the adverse environmental impacts of the project plan.

Environmental monitoring report includes:

a) Brief introductions to works progress;

b) The establishment and responsibilities of environmental management institution

c) Main construction contents and methods, environmental impacts caused and mitigation measures and the relevant implementation;

d) Environmental monitoring report;

e) Public complaints and resettling

According to construction management provisions, the contractor and ESE shall submit the periodic environmental report to the Owner during the construction period.

2 Environmental monitoring report during the operation period

After the operation of the proposed project, the qualified environmental monitoring station is entrusted by World Bank (Guang'an) PMO to undertake the environmental monitoring in accordance with the monitoring plan. . In addition, annual environmental monitoring report is prepared, and its contents include: The establishment of the environmental management institution, operation status of the works, the implementation of environmental prevention measures as required by the environmental protection bureau, environmental monitoring (date, frequency, locations, methods, applicable standards, etc.), statistical analysis results of monitoring data and necessary follow-ups. The prepared environmental monitoring report shall be submitted to Environmental Protection Bureau of Guang'an and World Bank

# 6. Contractor's Environmental Specification

The *Contractor's Environmental Specification* shall cover a series of guidelines, processes and regulations to ensure the ecological environment is free from the impacts of the Contractor's activities. The Contractor shall follow the guidelines determined in the Documents. General environmental problems related to the Contractor's activities include:

- Site management;
- Storage and treatment of fuel and material;
- Dust and noise hazard control;
- Wastewater management; and
- Waste Management

Refer to the chapters after-mentioned for the environmental problems (like water & soil conservation plan and emergency plan, etc.) related to the project activities.

## 6.1 Contractor's Environmental Protection Plan

The Contractor shall hold the copy of *Environmental Management Plan*, which shall be included in the bidding documents. Before construction, the Contactor shall submit an *Environmental Protection Plan* for the construction site to the ESE, external environmental management consultant (EEMC) and the Owner for review. The Plan shall include the general mitigation measures for environmental impacts and the specific mitigation measures for response to emergency accidents, and the general measures shall include the followings, but not be limited to the followings:

- General Construction Plan, indicating operation area, fuel storage area, fuel supply area, parking area, equipment maintenance area, material storage area and campsite;
- Waste Management Plan;
- Dust Control Plan; and
- Noise Control Plan.

## 6.2 Site Facility

The construction campsite with a distance to the surrounding industries shall be ensured. The ESE shall be responsible for preparation and check of the construction activity plan.

### 6.2.1 Labor employment

- If appropriate, local labor shall be the priority choice.
- The Contractor shall publish the operation position to all villages and towns in Linshui County.
- The construction workers and other personnel shall be employed legally.
- The Contractor shall provide training for the construction workers on environmental protection and occupational health and safety.

### 6.2.2 Requirements for construction campsite

- The Contractor shall provide proper accommodation for the construction workers.
- Independent and sound bath facilities (toilet and bathroom) shall be equipped in the construction campsite for male and female workers. The toilets shall have sufficient water and be equipped with soap and toilet paper, etc. All facilities shall be clean and available. The toilet shall be marked with “Male” and “Female”.
- The kitchen in the construction campsite shall be supplied with clean water, and in favorable sanitary condition.
- Domestic sewage at the campsite shall not be directly discharged to any water area, and shall be discharged at least after treatment in the septic tank.
- Emergency medical facility shall be available at the construction campsite. The emergency equipment shall be available at the campsite, and shall be managed by special personnel dispatched. The emergency rescue personnel shall receive complete emergency rescue training and get relevant qualification, and be capable of properly transferring the injured or patients to local hospital in time. The medical treatment and public health facilities shall be supplemented in time after use.

## 6.3 Code of Conduct

The *Code of Conduct* shall be established for the construction workers and emphasize appropriate conduct, strict prohibition of drug and alcohol and conformance to relevant laws and regulations to reduce the social impacts. All workers shall be familiar with the

*Code of Conduct*. The local community shall also know the *Code of Conduct* for construction workers. The workers who fail to follow the *Code of Conduct* shall be punished. The *Code of Conduct* shall include, but not be limited to the following measures:

- All workers shall abide by national laws and regulations;
- Dangerous goods and weapon are strictly forbidden at the construction site.
- Obscene goods and gambling are strictly forbidden at the construction site;
- Fighting is strictly forbidden at the construction site;
- Life and production of the surrounding area and the local people shall not be interfered.
- Local traditional culture, customs and traditional activities shall be respected.
- Smoking is only allowed in designated area.
- Dressing and personnel hygiene shall be appropriate.
- Sanitary conditions of accommodation shall be proper.
- The *Code of Conduct* shall be followed during visit in the surrounding regions and interview with the local people.

The followings are strictly forbidden at the construction site and the surrounding area:

- Injuring the surrounding wild animal and livestock;
- Catching protected animal or picking the protected plant;
- Purchasing and eating protected animal;
- Impacting or damaging the structure with historical or architectural value;
- Outdoor burning;
- Drinking during working time;
- Mechanical maintenance (engine oil and lubricant addition) made out of the designated area;
- Waste discarded out of designated area;
- Dangerous driving in local highway;
- Safety dressing (safety shoes and helmet) failure during construction;
- Bring impact to the surrounding people;
- Pollutant leakage, like oil; and
- Waste burning.

All Contractors, office workers or other personnel who violate the above regulations shall be subject to the punishment of verbal reprimands to termination of labor contract according to the severity.

## 6.4 Health and Safety

- The Contractor shall ensure the project conforms to all national and local safety regulations and other damage avoidance measures.
- Before construction, the Contractor shall execute safety training for the workers;

- Sufficient sunlight and night lighting shall be provided;
- Enclosure shall be established round the construction site, and shall be inspected and maintained during construction;
- The unauthorized persons shall not enter the construction campsite without the approval of the Contractor's personnel;
- Fire-fighting equipment, like fire extinguisher, shall be equipped at the construction campsite;
- The Contractor shall provide sufficient personnel safety protection safety device (like goggles, protective gloves, face shield, dust cover, helmet, ear protector and steel helmet, etc.) for the construction workers, and use in site shall be ensured;
- Safety regulations, contingency plans and emergency contact information shall be indicated in the bulletin board at the construction site;
- Warning sign shall be set in the area possibly subject to danger;
- Safety protection distance shall be determined as per relevant regulations;
- The Contractor shall take all rational measures to prevent risks and ensure that fire-fighting equipment are provided at the construction site and all campsites;
- Open fire required by the works is only allowed in the area approved by the ESE, and made under his supervision; Meanwhile, relevant fire-fighting equipment shall be set in the required position;
- The Contractor shall provide physical examination for the construction worker annually;
- The Contractor shall also provide training on personal basic hygiene and epidemic prevention, including respiratory disease and communicable disease;
- The Contractor shall implement education activity on disease prevention and treatment (especially AIDS and VD prevention), including publicity at the construction site and the surrounding areas in the form of bulletin and training course;
- The Contractor shall provide basic emergency rescue service and emergency measures for the construction worker; and
- The Contractor shall set necessary warnings and reduction gears for the construction roads (if any) near the local community to ensure traffic safety of the residents.

## 6.5 Storage of Fuel, Oil/Grease, and Other Hazardous or Toxic Matter

- All fuel shall be stored in a yard with rail at the construction site, and the storage yard shall be 110% the fuel storage container. Fuel storage sites shall not to be located near any source waters (i.e., within 100m from the source water).
- Dangerous goods shall be stored in a designated storage device. Temporary storage regulations shall be prepared for fuel, oil and paint, etc.
- Only authorized personnel are allowed to enter the storage area.
- The storage area shall be free from vehicle damage, and shall be subject to periodic inspection for leakage, damage and pollution condition.

- Equipment maintenance can only be made at the Contractor's campsite. The operation surface (concrete floor within the rail area) must be properly designed to ensure collection of oil and fuel in the appropriate container. In case of oil/fuel leakage, the soil polluted must be removed to the approved area for treatment.
- Relevant preventive measures must be taken to prevent the grease, oil, fuel, solvent and chemicals from polluting or eroding the water and soil.

## 6.6 Waste Management

- During construction, the Contractor must take proper measure to timely remove the waste at the construction site to the approved waste treatment equipment. Construction material accumulation shall be reduced by any possibility.
- Household garbage produced during the Contractor's activities at the campsite must be placed in the can (210L steel or plastic buckets) or garbage truck. The Contractor must ensure to empty the garbage container weekly or as required.
- All garbage must be immediately put into the garbage can or truck. The garbage shall not be thrown about in operation area or Contractor's campsite.
- The construction waste must be stored at the Contractor's campsite, and the Contractor is responsible for treatment. The construction material polluted must be treated separately.
- It is strictly forbidden for incineration of waste at the construction site.

## 6.7 Wastewater and Rainwater Management

- Wastewater from the construction site and the campsite shall not be directly discharged to the surface waters.
- Domestic sewage must be discharged after proper treatment (septic tank).
- Rainwater must be discharged to rivers after energy dissipation and measurement.
- Storm runoff discharged from the construction site (temporary drainage facility) shall be equally distributed by any possibility; and

Flow rate of the runoff shall be reduced through the gabion box, stepped bed or bottomland.

## 6.8 Noise Control

- Construction time in the day time shall be confined;
- Construction near the local community on the weekend shall be noise-free;
- Personnel, visitor and construction worker at the site must wear proper hearing protection device to avoid hearing injury by noise.
- The ESE must check the site periodically to ensure the site comply with *Occupation Health and Safety*.

## 6.9 Information Communication with the Public during Construction

Public consultation and complaint recording:

- During construction, the Contractor shall keep open communication with local government and people from relevant community;

- Before construction, the Contractor shall publish the project information to the affected parties (local government, enterprises and residents) in the form of community meeting;
- Relevant project information shall be indicated at each construction site, and include, but not be limited to:
  a Project Overview;
  b Construction plan;
  c Main construction activities;
  d Main environmental problems and mitigation measures; and
  e Name and tel., etc. of the Project Manager, the Engineer and environmental protection personnel;
- The Contractor shall regularly communicate with the ESE on the main sensitive subjects to mitigate the unfavorable impacts on them by any possibility;
- All Contractors shall provide training on neighboring relationship maintaining, communication, local custom and code of conduct for the workers;
- Relevant information on complaining channel must be issued on the entrance of the construction site;
- Complaint recording shall be equipped in the office of main campsite at the construction site; All complaints, problems and other matters shall be included in the feedback report which shall be submitted to the ESE or Administrative Committee of LETDZ for review;
- Complaints requiring corrective measures must be delivered to relevant parties to make the grievant satisfactory.

### 6.10 Physical Cultural Resources

- Aiming at providing education on historic relics and training on discovery and protection of historic relics;
- In case of discovery,
  a The Contractor shall immediately stop construction and protect the site;
  b A report shall be given to the ESE, the Owner and local cultural resource bureau;
  c During the survey made by local bureau, the Contractor shall take proper measures to protect the site with historic relics and take weather protection measure;

  The construction can only be continued after approval by relevant bureau.

## 7. Water and Soil Conservation Plan

In order to ensure successful implementation of water and soil conservation measures and execution of the requirement of “simultaneous design, simultaneous construction and simultaneous operation of water and soil conservation project and main works”, management measures and technical measures, etc. shall be taken for water and soil conservation to ensure implementation of the project through administrative and legal measures.

Assurance measures for implementation of the scheme include establishment of relevant organizations and agencies, management according to project entity system,

engineering bidding system and project supervision system during project construction, assurance of capital source and strengthening of monitoring and management.

After the Water and Soil Conservation Plan is approved by competent water administrative department, the approved prevention and control measures and investment estimation shall be included in the preliminary design and construction drawing design of the main works, and prepared into single copy or special chapter. In case of major change in design, it shall be approved by the original approval department who shall participate in the preliminary design review in order to ensure the smooth implementation of water and soil conservation measures as per detailed design requirements.

## 7.1 Tendering and Bidding

Tendering and bidding system will be implemented for water and soil conservation works. The construction unit undertaking construction of main works and water & soil conservation works must possess technical personnel familiar with water and soil conservation business and technical requirements of water and soil conservation measures, strengthen the training on water and soil conservation for construction team, enhance the water and soil conservation consciousness of construction workers, improve the technical level and environmental protection consciousness of the construction workers, and put the water and soil loss prevention in the first place. Construction shall be carried out strictly in accordance with the water and soil conservation scheme, *Technical Code on Soil and Water Conservation of Development and Construction Projects*, relevant technical standards and specifications on comprehensive treatment of water and soil loss.

## 7.2 Construction Supervision of Water and Soil Conservation Works

Water and soil conservation supervision, as an importance measures proposed in the Scheme for water and soil conservation works, favors providing technical support and guarantee of effective prevention and control of water and soil loss for construction unit ensuring achievement the prevention and control objective of water and soil loss proposed in the water and soil conservation scheme and meeting the special acceptance requirements of water and soil conservation. According to the specific conditions of the Project, water and soil conservation supervision are included in consideration of supervision of the main works to strengthen construction management, and during acceptance of water and soil conservation facilities, the supervision unit of the main works shall provide relevant supervision data on water and soil conservation for the Project, including video data.

## 7.3 Water and Soil Conservation Monitoring

Water and soil conservation monitoring on the dynamic change in water and soil loss amount and effect of water and soil conservation measures, etc. during construction shall be strengthened during service period of the Scheme to monitor and guide implementation of water and soil conservation scheme and formulate relevant supplementary treatment scheme for water and soil conservation measures. The Owner shall entrust the water and soil conservation monitoring unit with relevant qualification who shall make a report to the Owner in time according to the monitoring content, methods, time and effects specified in the Scheme, and the annual monitoring report shall be provide guidance for construction in the next year. In design level year, the monitoring unit shall provide water and soil conservation monitoring report on the implementation and effect of water and soil conservation measures and analysis over fulfillment of water and soil conservation objectives, and the report shall meet the water and soil conservation completion and acceptance requirements.

## 7.4 Construction Management

The water administrative department shall conduct supervision and administration on the implementation of water and soil conservation plan according to law. During the plan implementation, the Owner shall strengthen cooperation with local water administrative department and consciously be subject to the supervision and management of local water administrative department. The Owner shall record and timely deal with the problems discovered by local water administrative department during supervision and inspection. In the process of taking engineering measures, real time inspection of construction quality shall be conducted. For works failing to meet design requirements or quality standards, reconstruction is required until they meet the requirements or standards. In the process of taking vegetation measures, attention shall be pay to the subsequent tending and management of vegetation and weeds clearing, in order to ensure the survival rate of vegetation and to ensure the water and soil conservation benefits of vegetation measures.

## 7.5 Completion Inspection and Acceptance for Water and Soil Conservation Works

According to the requirement of “three simultaneousnesses”, before acceptance of main works, the water and soil conservation facilities must be accepted firstly; only upon passing acceptance inspection of water and soil conservation facilities, could the main works be put into operation; otherwise, the main works cannot be put into operation.

The inspection report shall be submitted during acceptance, providing summary evaluation on the quantity and quality of the water and soil conservation measures implemented, and summarizing the successful experiences and insufficient part during the implementation of water and soil conservation work. For sections not fully completed or for defective works, it is suggested that the Owner shall redesign and make supplements until the water and soil conservation measures reach Class 1 control goal according to the prevention and control standard for water and soil conservation.

## 7.6 Funding and Use Management

According to the principle of “He who develops shall be responsible for environmental protection; he who causes water and soil loss shall be responsible for its prevention and control” and Article 32 of *Law of the People's Republic of China on Water and Soil Conservation*, water and soil loss due to production construction projects or other production construction activities shall be treated. The water administrative department is responsible for organization and implementation of prevention and treatment of special water and soil loss. Administrative measures of collection and use of water and soil conservation compensation fee are formulated by the Ministry of Finance, competent charging department, and water administrative department of the State Council. Water and soil conservation fee produced during construction and operation shall be handled as per uniform national financing system.

# 8. Emergency Plan

After being put into operation, pipelines of the Project have no harmful effect on the environment in normal condition, however, in case of abnormal conditions (namely, accidental state) of the wastewater treatment plant (WWTP), wastewater interceptors and wastewater pipe network, they may produce harmful effect impact on the external environment, especially water and air environment.

## 8.1 WWTP Accident Prevention Measures and Countermeasures

1 Pipe network maintenance measures

Pipe network maintenance is important for the normal operation of WWTP. Special attention shall be paid to the maintenance and management of pipe network and pump station to prevent the discharge capacity of pipe from being reduced by sediment jam. Pipe connection shall be prevented from leakage in polluting groundwater and emptying the foundation. Silting up of pipe shall be cleaned in time to ensure unblocked flowing in the pipe, in order to collect domestic sewage and industrial wastewater in full capacity. Design of main sewer and branch sewer shall select a proper fullness and minimum flow rate to prevent sludge deposit.

Special person shall be appoint to take charge of the incoming pump station of WWTP, who, at ordinary times, shall strengthen the maintenance of machinery and equipment and, in the event of accident, shall repair them in time to prevent sewage from flowing into the nearby rivers.

Strict maintenance system shall be enacted for the sewage pipe network. Users shall strictly execute relevant national and local emission standards, management on the inflow water quality of industrial wastewater collected shall be specially strengthened to ensure the inflow water quality of WWTP.

2 Precautions for pollution accident

WWTP accident stems from equipment failure and maintenance, or from poor treatment effect due to changes of technology parameters. Precautions are:

1) Provide duplicate supply for WWTP. Provide standby for water pump, blower and so on. Use mechanical equipment with reliable quality and performance, imported product is preferred.

2) In case of a shut down accident of WWTP, the big discharging client shall restrain production to reduce discharge, and the WWTP shall start accident emergency pool which shall allow for 4 hours of servicing time which is 667$m^3$ in volume in the Project.

3) In order to make the WWTP recover normal operation rapidly in the event of accident, corresponding buffer capacity shall be reserved in the volume of main hydraulic structures and corresponding equipment (such as reflux pump, reflux pipe, valve and instrument, etc.) shall be provided.

4) Choose high quality equipment. For mechanical and electrical equipment, instrument, etc. of WWTP, products of good quality, low accident rate, and easy to maintenance shall be used. Key equipment shall have one in use and one for standby; spare parts shall be provided for damageable parts in order to replace in time in case of accident.

5 Technological parameters of treatment unit like Water volume, water quality, residence time, and load intensity, etc. shall be controlled strictly to ensure a stable treatment effect. Flowmeter and water quality automatic monitoring instruments and the like shall be provided for regular sampling monitoring. Operator shall make adjustment in time to make the equipment in the best working condition. In case of abnormal phenomenon, precautionary measures shall be taken immediately.

6) Establish safety operation procedures which are to be strictly followed at ordinary times. Perform regularly theoretical knowledge and skills trainings and examinations for WWTP staff.

7) Strengthen operation management and monitoring on the inflow and effluent quality, sewage untreated and not up to standard is prohibited from being discharged.

8) Toxic gas monitor shall be provided in sewage pump plant and necessary ventilation device shall be provided.

9) Establish safety responsibility system. A set of complete system shall be in place for daily work management which shall specify the responsibility of each person and shall be inspected regularly.

10) Establish emergency measures for risk accident which shall specify the emergent and rescue operation system.

## 8.2 Accident Prevention Measures and Countermeasures of Wastewater Interceptors and Wastewater Pipe Network

(1) Human factors are often the main cause of the accident, therefore, to enforce strict management and managing people well to eliminate accident-causing human factors is the key to prevent accident. These include: strengthen the virtue education on staff to improve the staff's sense of responsibility and initiative; provide systematic post training for operators to make them familiar with work procedures and rules and to strengthen the post responsibility system; for locations prone to accident, apart from in time inspection by worker of the post, safety inspector shall be appointed to perform routine inspection and maintenance, in order to find out and repair problems in time.

(2) It is suggested that the employer shall perform careful review in Project design stage and check the facilities concerning safety, health and environment in accordance with the relevant specifications and standards, and enforce strict management and inspection on these during the construction period to ensure the construction quality.

(3) In the event of an accident, it shall be reported to the relevant authorities in time to take effective treatment measures to minimize the harm on the surrounding environment and people's lives and properties.

## 8.3 Accident measures and emergency plan

In the event of sudden accident of WWTP in the process of sewage collection, transportation and treatment, it shall be handled emergently as per plan draw up in advance. Emergency plan includes the following:

(1) Profile of risk source

Describe in detail the type, intensity and location of the risk source.

(2) Emergent protection zone

Including the water quality control area downstream the water body nears the Project.

(3) Emergency organization

Accident emergency team shall take overall command of the accident site, and professional rescue team shall take charge of the urgent repair or rule out of the accident or malfunction.

(4) Emergency facilities, equipment and materials

Provide relevant standby equipment, tools and materials.

(5) Emergency communication, notifications, and transportation

Stipulate contact communication methods in emergency, notify relevant parties, control the accident site, and make sure rescue teams arrive in time.

(6) Emergency environmental monitoring and post-accident assessment

For major accident, monitor the water environment nearby and assess the nature, parameters and the consequences of the accident to provide basic data for decision making by relevant department.

(7) First-aid measures

Control the accident to prevent it from expanding and chain reaction; close relevant gate to reduce harm.

(8) Emergency situation termination and recovery measures

Stipulate emergency termination procedures, make care-taking arrangement, and recover the normal operation of WWTP rapidly.

(9) Staff training and drilling

After the development of emergency plan, arrange training and drilling for relevant staff in peacetime.

(10) Recording and report

Make special accident record, establish accident records and reporting system, appoint full-time or part-time personnel to take charge of management.

# 9. Mitigation and TOR of Cumulative Environment Impact

The infrastructure construction in the Project promotes the process of urbanization and industrialization and the EIA results show that the degree and scope of direction impact from project activities are limited while the induced and cumulative environmental impacts are the main challenge of the Project. Without reasonable planning and implementation, fast urbanization and industrialization, the surrounding environment quality will be adversely affected and local communities will suffer long term influence therefrom. In general, the induced and cumulative impacts are beyond the scope of direct impact of a project. The Project will indirectly facilitate the urban expansion and industrial development, which is one of the reasons to study said induced and cumulative impacts in this assessment. However, different from the past, current development activities may be superimposed with possible development activities in the future, producing cumulative environmental impact.

## 9.1 Mitigation Measures for Cumulative Environmental Impact

1. Ecological impact mitigation measures

(1) During the implementation of road works, landscape works is performed for the roads to create a linear landscape belt; during the implementation of factory construction, the landscape works is designated as a necessary part for the factory construction. Urban landscaping is possible in making up for the loss of biomass and area caused by construction.

(2) The greenbelt system planning shall be taken into consideration during the planning. It is stated in the general planning of LETDZ that one comprehensive park is positioned against the natural mountain in the west of planned area; the belt-shape green lands of parks are arranged in combination with natural waters while the riparian park at the relatively open area; the belt-shape green lands are positioned along the street according to the layout of urban truck roads. The construction of greenbelt system may also compensate to some degree the reduction in vegetation

area and quantity caused by the construction of Park, so it is very necessary.

(3) The numerous natural mountains in the middle of the planned area of LETDZ are planned as the ecological greenbelts. The area is mainly applied for afforestation, with suitable trees distributed, thus creating the background of greening of ETDZ.

(4) Design slow traffic system on the both sides of road, which include pedestrian traffic and non-motorized traffic. The slow traffic system is environmental-friendly and beneficial to personal safety, producing no environmental pollution and conductive to physical activity. Moreover, the slow traffic is integrated with the concepts of fairness and harmony, people foremost and sustainable development. It cannot be replaced by motorized traffic for its roles in improving the short-distance travel efficiency, filling a gap in the bus service, promoting the sustainable traffic development and guaranteeing the travel convenience of vulnerable groups. It competes and cooperates with private motorized traffic and public traffic to constitute the urban passenger transport system.

2. Mitigation measures for air environment impact

(1) Reasonably arrange the enterprises to be settled in the Park strictly according to the planned leading industries and the layout of industrial land.

(2) Strengthen the control over industrial waste gas pollution in the five aspects: ① promoting cleaner production; ② optimizing the structure of energy utilization by using natural gas in preference; ③ making sure the effective control of waste gas from enterprises´ technology; ④ improving the environmental management and surveillance; and ⑤ perfecting the emergency response mechanism in case of accident discharge.

(3) Regularly monitor the enterprises that may produce air pollutants in the park area to ensure the normal implementation of enterprises´ waste gas treatment and the emission of up-to-standard waste gas.

(4) Strengthen atmospheric environmental management; strictly review and restrict high energy consumption and high pollution industrial project, constantly reduce energy consumption per unit output value and pollution emission standard, and encourage the development and utilization of clean energy.

(5) Shut down small enterprises with atmospheric pollution emission exceeding the standard value and the projects listed in catalogue of outdated production capacity, technologies and products to be phased out. Energetically promote cleaner production, and boost ISO14000 environmental management system certification in order to change resources utilization from extensive form to intensive form.

(6) Strengthen civilized construction management; use commercial concrete for urban construction and take such dust control measures as closed

operation, clean car operating on the road, watering for dust fall so as to control construction fugitive dust.

3 Mitigation measures for surface water environment impact

(1) Apply the system of diverting wastewater from clean water and storm water from wastewater by enterprises in the ETDZ;

(2) Popularize cleaner production processes by enterprises in the ETDZ;

(3) Implement fully the emission declaration and permit system;

(4) Make sure that wastewater from enterprises in the park area must be discharged to WWTP for further treatment after the wastewater is treated up to class 3 standard in *Integrated Wastewater Discharge Standard* so as to realized discharge of up-to-standard wastewater.

(5) Strengthen the water environment protection of rivers and canals in the park area;

(6) Develop proper emergency response plan in case of WWTP accident discharge;

(7) The long-term WWTP treatment capacity may be adjusted according to the actual settlement of enterprises in the Park to make sure the WWTP is capable of receiving the production and domestic wastewater in the Park and avoid pollution of nearby water bodies like rivers.

(8) Complete the construction of existing supporting wastewater interceptor works of WWTP; accelerate the construction of wastewater treatment and supporting facilities, renovate urban wastewater treatment system, apply the system of diverting wastewater from rain water so as to improve municipal wastewater collection rate; establish WWTP, regional wastewater collection, treatment and discharge system in different areas.

4 Mitigation measures for groundwater environment impact

(1) Enterprises in Economic and Industrial Development Zone apply proper ground anti-seepage measures according to possible pollutants form production in the overall principle of higher anti-seepage level and lower infiltration coefficient for regions with more severe pollution and higher probability of accident.

(2) Wastewater from enterprises shall be first treated in respective wastewater treatment facilities until the wastewater satisfies the requirements of being received by the WWTP and then enter into the WWTP where it shall be treated up to standard before discharge. It is forbidden to discharge wastewater arbitrarily. The wastewater under accidental condition and fire-fighting wastewater shall be discharged into the accident pool, guided in batches into respective wastewater treatment facilities until the wastewater satisfy the requirements of being received by the WWTP then enter into the WWTP where it shall be treated up to standard before discharge.

(3) Strengthen the maintenance and management of WWTP to ensure the long-term stable discharge of up-to-standard wastewater after

centralized treatment and prevent the accidental discharge of wastewater from severely affecting the surface water and groundwater;

(4) Perform strict quality inspection during the construction of the planned area and strengthen the anti-seepage treatment of pipeline and structures in the design and construction to make sure the engineering and pipeline construction are in line with design requirements and guarantee both the quality and quantity.

(5) During the park construction, factors such as the infiltrating green land and the pervious ground are considered.

Infiltrating green land: during the urban construction, the green land near the factory and road will be lower than the road and factory levels, through which the storm water runoff from surrounding hardened ground flows naturally into the green land to supplement the groundwater.

Pervious ground: pervious asphalt pavement is considered for the road in the implementation of road works; measures such as pervious colored pavement brick are taken for the pedestrian path; impervious pavement in catchment area are improved by using porous materials instead of completely hardened ground to increase the amount of infiltration and supplement the groundwater.

5 Noise control measures

(1) Measures for industrial noise control, arrange reasonably to the noise level at boundary is up to standard;.

(2) Measures for construction noise control, arrange the construction time reasonably;

(3) Measures for traffic noise control, buildings sensitive to noise, including residential and school buildings should not be planned or constructed on both sides within 30m from the main roads and main traffic artery of planned area; besides green belt of 20-50 wide shall be established to mitigate the impact of traffic noise by means of range attenuation and noise reduction by afforestation.

(4) Measures for controlling noise of social activities.

6 Solid waste management and disposal measures

(1) Strengthen the management of general industrial solid waste, realize reclamation of waste and used materials, explore approaches of comprehensive utilization, strengthen the disposal and exchange management of industrial solid waste, establish the information system for industrial solid waste production, direction of flow, storage, disposal and exchange and encourage the waste recycling among production enterprises in the Park;

(2) Implement the system of hazardous waste production, declaration and registration, and the permit system for the business of hazardous waste storage, collection, disposal and facility utilization. The whole process management shall be provided in the collection, transport, storage, utilization, treatment, disposal of hazardous waste.

(3) Establish the waste collection system, waste storage system, waste transport system and waste treatment system and realize harmless disposal of domestic waste.

## 9.2 Addressing Cumulative Environmental Impacts

1. Environmental Management

Controlling the environmental impact of regional development is an important step to control from the source, for example, strictly review and restrict high energy consumption and high pollution industrial project, shut down small enterprises with atmospheric pollution emission exceeding the standard value and the projects listed in catalogue of outdated production capacity, technologies and products to be phased out, pretreat wastewater of enterprises in the Park up to standard before discharge, strengthen civilized construction management, etc. All these need the support of local environmental protection department.

A total of 50 persons work in Linshui Environmental Protection Bureau, including environmental monitoring stations and environmental monitoring corps. Construction of Environmental Monitoring Stations is up to national standard class 3, and that of Environmental Monitoring Corps is up to national standard class 3 and is to be accepted as per national standard class 2.

Linshui County covers a large area, the staffing of the county environmental protection bureau currently can meet requirement. However, with the expansion of Linshui County, in order to better meet the requirement of environmental protection, to constantly increase the environmental supervision capacity and to boost the healthy development of environmental protection work in Linshui County, it is suggested to set up Environmental Monitoring Stations by zoning within the county territory.

2. Implementation of Environmental Protection Measures

In the process of urban development, in order to control environmental impact, it is also necessary to implement and manage specific environmental protection measures in all aspects.

(1) When the urban planning is carried out or adjusted by the planning department, the percentage of urban greenbelts in the total planned area shall be fully taken into consideration. During the process of planning land, it is avoided to incorporate high yield farmland into the planned area; in the construction and development of Linshui County, Linshui Housing Urban-Rural Development Bureau shall implement the construction of greenbelts works according to the planned greenbelts by the planning department.

(2) According to the enterprise settlement in Linshui County, Linshui Water Affairs Bureau shall promptly adjust the treatment capacity of WWTP for effective wastewater collection and treatment in the park.

(3) Linshui Housing Urban-Rural Development Bureau shall pay attention to the construction of the pipeline works in Linshui County, such as wastewater pipe network, rainwater pipe network and water supply pipe network, to effectively collect wastewater from different areas of Linshui County to be transmitted to WWTP for further effective treatment; the repetition period of rainfall in Linshui County shall be taken into account, so as to ensure adequate drainage capacity provided by the rainwater pipe network to reduce the impact of rain storm to the city;

(4) During the implementation of road works by Linshui Housing Urban-Rural Development Bureau, the utilization of new materials, such as infiltrating greenbelts, pervious asphalt pavement, pervious colored pavement brick,

is required for the construction of the road works to reduce the impacts of pavement hardening on natural drainage.

(5) Linshui Bureau for Environmental Health establishes the waste collection system, waste storage system, waste transport system and waste treatment system, and focus on the capacity of the refuse landfill at any time to ensure hazard-free treatment for general industrial waste and domestic garbage.The source of capital mainly includes self-raised funds and loans.

## 9.3 Detailed cumulative environmental impact assessment – A strategic environmental and social assessment

During preparation of EIA of the Project, induced and cumulative environmental impact assessment is conducted based on the available data. However, given the insufficient of data available, and various urban and industrial development planning is under preparation and perfection, the current induced and cumulative environmental impact assessment is only a preliminary one. On the other hand, the pressure and impact of rapid urbanization and industrialization on the environment, resources and society have to be coped with seriously. Therefore, in the technical assistance part of the Project a second-stage induced and cumulative environmental impact assessment is included. This assessment shall, based on preliminary assessment, further collect data, conduct research and consultation, and carry out detailed cumulative environmental impact assessment. This assessment will closely coordinate with ongoing various planning processes of Linshui and will cover both environmental and social aspects, thus is considered a Strategic Environmental and Social Assessment. The TOR(term of reference) shall include the following.

**Preparation guidelines of terms of reference for the stragegic environmental and social assessment**

The rapid assessment method is proposed for this assessment and the assessment shall be performed in combination with other factors of technical assistance project, in particular the preparation of strategic urban plan. The assessment procedures include:

**1.** Components introduction and background:

Describe the proposed project component, its background and other components and activities that may have any cumulative effect; use the environmental assessment report and other documents such as master urban planning of LInshui, Linshui ETDZ master and/or regulatory planning, relevant environmental function zoing, resource utilization, heritage protection planning, etc. In the induced and cumulative impact assessment (CIA), determine the sequence of component planning and construction, the sequence of affiliated and local infrastructure construction and the possible industrial type and development status. Identify the potential impact on important environmental factors and put forward geological information (including the administrative boundary or watershed) and time limit by the consultant for cumulative impact assessment.

Component introduction includes:

(1) Known components

Components that have been implemented inside the assessment

area for World Bank loan and other regions, for which the description covers the scale, overview and scheduled implementation time of current stage; the World Bank loan funded components in the same area and the overview of proposed construction area in current period; the urban infrastructure related to the known components including the proposed roads, power transmission lines and gas transmission lines; and for which the environmentally sensitive area, main stakeholders and affected residents in the region shall be identified.

(2) Past, present and future possible components

After the determination of assessment scope and environmental impacts, the past, present and future possible components and activities in particular time and space frames shall be analyzed. The assessment of other components and activities shall consider:

- Assessing all components proposed or planned to be implemented in the assessed area;
- Determining the time period of past, present , proposed and planned future components;
- Assessing the approved components, components to be approved and components proposed or being designed in the area for cumulative impact assessment;
- Assessing the potential industrial development pattern and tis potential pollution load in the area for cumulative impact assessment;
- Assessing the environmental factors of reasonably foreseeable social and environmental cumulative impacts, in particular components exerting direct impact on the water resource, land resource and biodiversity and drawing basic maps for the future development of existing and future components and expansion area.

(3) Identification of important environmental and social issues

Identify the cumulative impacts of urban expansion in assessment scope to important resource, such as on the groundwater, the biodiversity and the life of local people, all of which are usually known as valued ecosystem components (VECs) and determined through consultation with potential affected groups, local government authorities, non-governmental organizations and experts and scholars to make sure that they could be measured with relevant indicators. The potential VECs and indicators may include:

Damage of urban green areas, green areas and natural habitats caused by urban expansion;

Automobile exhaust due to urban road construction and increased number of vehicles and noise from running vehicles; impact of factory construction in LETDZ to the quality of ambient air and acoustic

environment;

Natural soil with good permeability used for the ground in the region prior to the development and construction; but the ground will be hardened in the urban construction. The hardened ground reduces the permeability of natural soil layer and the concrete has poor permeability, which may, to some extent, hinder the direct supplementation of aquifer by atmospheric precipitation.

The farmland owners will lose their land due to the urban expansion, which may impact the income source and sustenance of farmers to some extent.

Impact of urban expansion and infrastructure construction on physical cultural resources.

(4) Baseline map

Use geographic information system or other tools to mark the selected VECs. Develop the plan on the required indicators for status, environmental carrying capacity, urban development trend and urban expansion for each VEC within the time frame.

**2. Impact Assessment**

The degree of induced and cumulative impacts shall be assessed. For this, the method used is similar to the environmental assessment, but the components within given time and space frames are assessed in the induced and cumulative impact assessment as well as other components and activities.

The assessment includes the impacts during the construction and the planning and development stages. The assessment of each environmental factor and cumulative impact considers the typical parts of environmental assessment, i.e., the degree, frequency, duration, order of magnitude, uncertainty and possibility. The assessment method is subject to the qualitative analysis and the analysis on available quantitative data obtained via data collection or analogy; the assessment may consider the map overlay method to analyze the future industrial development and additional load of environmental system, such as the WWTP.

**3. Determination impact degree or scope**

The degree and scope of cumulative impact is determined. The impact degree shall be determined according to the preset threshold limits, laws, rules or policies, or the professional judgment and consultation based qualitative assessment and the degree or scope of cumulative impact must stand up to scrutiny.

The assessment consultant shall define the impact degree and scope, following them in the past, present and planned components. The impact degree or scope of each VEC in any past, present and future components is subject to assessment, as well as the cumulative impact of induced development.

**4. Development of impact mitigation measures**

**Preparation guidelines of terms of reference for the stragegic environmental and social assessment**

Reasonable and feasible methods are analyzed to mitigate or avoid significant induced and cumulative impacts. Corresponding action plans (including the time, organization and duties and budget) are developed according to the analysis conclusions to clarify the mitigation measures and incorporate such measures in to the environmental management plan. For example, the available environmental impact mitigation measures for the urban region development or the development and construction of industrial park include:

- Full consideration of landscaping area in factories during the construction and green area creating surrounding the industrial park;
- Riparian parks for main rivers of Linshui County, such as Shiba River and moat; full consideration of green area and green area in the center of street in the design of urban streets to form green corridors in Linshui County and bring benefits to the urban ecological environment and landscaping;
- Emphasis on protection or bypassing of high yield farmland during the planning and expansion of city and LETDZ;
- Full consideration of phased WWTP construction and adjustment of WWTP capacity according to the population increase and enterprise settlement in Linshui County to satisfy the urban expansion requirements;
- Full consideration of new materials in road construction (i.e., pervious asphalt pavement), full consideration of infiltrating green area (lower than the factory and road level) in road and factory construction and use of porous materials in catchment area instead of completely hardened pavement to reduce the possible impact on groundwater supplementation by atmospheric precipitation;
- Development of more complete, normative and stringent requirements on water and air pollutant emission by local environmental department for factories inside the LETDZ;
- Strengthened surveillance by local environmental department on water drainage and gas emission from enterprises inside the LETDZ and development of environmental detection plan for better understanding of pollutant discharge in park area;
- Development of other traffic systems, such as slow traffic, and consideration of bicycle path and pedestrian path;

It is suggested that the adaptive management method for impact be included since the high uncertainty of impact or the lack of information may result in incomprehensive assessment.

## 9.4 Dialogue Mechanism with Stakeholders

Obtain a full understanding of the requirement put forward by the public and suggestions from the environmental protection department, and establish the dialogue mechanism with stakeholder during the operation period of the Project. The dialogue mechanism

provides a forum to monitor and assess the regional development activities, changes in ecological environment and the process of social environment of Linshui County, so as to ensure that all relevant authorities and the residents have a basic understanding of the latest news concerning regional development and accumulative environmental and social impacts.LETDZ Administrative Committee Office is responsible for organizing the stakeholders to participate in the periodic dialogue; the stakeholders to be invited shall include the main representatives from Environment protection department of Sichuan Province, Environmental Protection Bureau of Guang´an, Linshui Environmental Protection Bureau, Development and Reform Bureau of Guang'an, Development and Reform Bureau of Linshui County and ETDZ and the representatives of local villagers.

During the operation period of the Project, environmental and ecological monitoring data about ETDZ is totally shared for the stakeholders. Main findings and suggestions put forward on the meeting shall be officially delivered to the relevant government, so as to take necessary follow-up actions to ensure sustainable development of the base, thus achieving the integration and harmony of social and economic development and maintenance of ecological function.

# 10. Information Disclosure and Public Consultation

## 10.1 Public Consultation

Public consultation has been widely implemented during preparation of *Environmental Impact Assessment* (EIA) and *Resettlement Action Plan* (RAP) to show public worry in EIA/RAP.

To minimize the impact, communication with the affected population will last the whole Project period. The communication aims at providing a bidirectional information channel, by which implementation of the Project and *Environmental Management Plan* is expanded to the affected population whose feedback on the impact of the project under construction will be timely delivered to the Contractor and administrative committee.

The Contractor shall disclose relevant content of the Project, main environmental problems and mitigation measures, etc., in the manner issued at the construction site by the receiver.

Complaining system is established in RAP to deal with public worry on land acquisition and compensation.

## 10.2 Complaint and Grievance Mechanism

Complaint and grievance mechanism functions a bidirectional communication between the Owner and the public, an important mechanism for reducing risk and social impact of the Project, and an important manner for information disclosure and public consultation. The PMO shall establish a high-transparency, simple and easy complaint collection and handling procedure to objectively, fairly and efficiently handle the public's complaint and ensure smooth implementation of social management plan.

The complaint and grievance subjects are the population subject to resettlement and land acquisition impact in the project area, other pollution, as well as the construction workers, etc.

Complaint and grievance content must be directly or indirectly associated with the Project.

Complaint and grievance objects show diversification, and mainly mean local grass-roots government organizations, higher level government organizations, PMO and judicial offices, etc.

Complaint and grievance manners are oral or written. Oral complaint and grievance refers to that the grievant reflects the problems or difficulties to the PMO, village community, other government department or relevant staff in verbal manner. Written complaint and grievance refers to that the grievant exhibits written application to relevant competent organization or department, indicating basic information of the grievant, matters, reasons, expected solutions or other opinions and recommendations, etc.

### 10.2.1 Collection manner

(1) Report from the village committee or township/neighborhood office, including complaints, progress, measures and existed problems;

(2) The construction unit must periodically report the construction conditions, problems found, mainly the impact of construction on the public to the Owner.

(3) The construction unit shall paste the bulletin at the construction site and campsite, indicating project overview, construction period, requirements of civilized construction, tel. of contact person for environmental protection complaint, etc. for the resident to appeal.

(4) Coordination information on environmental protection complaint found during patrol at the construction site by the Owner;

(5) Information fed back by the external monitoring organizations;

(6) Letter and visit of the affected person;

(7) Information fed back by the workstation dispatched by the Owner;

(8) Special problems fed back by the environmental protection department during inspection;

(9) Special internal monitoring investigation.

### 10.2.2 Procedures

- Stage 1

  The grievant proposes verbal or written grievance to the Village Committee or township & sub-district resettlement office. In case of verbal complaint, the Village Committee or sub-district resettlement office must make a written record and give a clear reply within two weeks. In case of major problems, instruction shall be obtained from the resettlement office at the higher level, and the resettlement management department at the higher level must try to give a reply within two weeks.

- Stage 2

  If the grievant does not satisfy the reply of Stage 1, he can complain to the PMO within one month after receiving the reply, and the PMO shall make a decision within three weeks.

- Stage 3

  If the grievant still does not satisfy the reply of Stage 3, he can apply for a suit to the People's Court within 15 days after receiving the reply from PMO.

### 10.2.3 Handling principles

The handling is made according to the principle of listening to the public's appeal on environmental protection during construction and operation of the Project, asking for their opinion and repeated negotiation with patience, and the handling opinions are to

be given objectively and fairly according to national regulations, principles and standard in the EIA report. The grievance subject to handling incompetence must be reported to the resettlement department at the higher level, and the assistance shall be provided for investigation.

In the event that the organization fails to give a reply at the previous stage, the grievant is entitled to appeal.

#### 10.2.4 Replay content and manner

1 Content

- Description
- Investigation results
- Relevant national regulations, RAP principle and standard
- Handling opinion and basis
- The grievant has the right to complain to the resettlement department at the higher level and sue in civil court, and the legal costs are to be paid by the Owner.

2 Manner

- The reply for the grievance on individual phenomenon is directly send to the grievant in written.
- The reply for the grievance reflected by more persons is to be informed to the community through Villager Meeting or issuance of document.

No matter what manner is used, the data on the reply must be sent to the resettlement department of the grievant.

#### 10.2.5 Recording, tracking and feedback

The competent grass-roots organization shall record and manage the data on complaining and handling results, and report to the PMO monthly in written. The PMO shall periodically check the registration.

# 11. Environmental Protection Training

## 11.1 Environmental protection technology and skill training

1 In-service training for environmental management personnel

The objective of organizing in-service training for environmental management personnel is to strength environmental management during the construction and operation period, and to ensure the quality of environmental monitoring and effective environmental management, thus improving the quality of the whole works. After participating in position training, environmental management personnel can tell apart main environmental issues during the construction period, and have a better understanding of existing problems and deficiencies on environmental management, and report to the engineering environmental protection office (department) in time in order to facilitate to take necessary prevention and control measures as soon as possible. During the construction period, project management institution shall invite environmental protection experts or environmental management personnel with similar management experience to make the onsite explanation on environmental problems and relevant solutions.

2 Construction responsible personnel and training for construction workers

Before the construction, for the bid winner, the systematic environmental professional knowledge training shall be organized for the responsible personnel and construction workers responsible for construction in order to avoid environmental damages due to misoperation during construction. For contract responsible personnel, the objective of training is to define the environmental protection responsibilities of the contractor; for construction workers, the objective is to ensure the proper construction operation during the construction period in order to avoid some construction behaviors, which have adverse impacts on the environment. The training is helpful for the project responsible personnel to understand their obligations in environmental protection needed to be assumed and possible consequences of the environmental damage; construction workers have a better understanding of the protection level and methods for environmental sensitive areas. Based on the actual situation of the Project, the training for construction workers only lasts one week.

3 During the operation period, project management institution shall provide the personnel with the periodic trainings on environmental protection knowledge so as to identify possible environmental issues at respective posts and take necessary measures. Each personnel shall hold the idea of environmental protection.

## 11.2 Training methods and expenses

**Table 11.2-1 Environmental Protection Training Plan**

| SON | Training Objects | Training Contents | Organizer | Training number | Training Time | Location | Budget (CNY10,000) |
|---|---|---|---|---|---|---|---|
| 1 | Personnel from PMO and engineering environmental protection office (department) | Knowledge in environmental protection management | The Owner | 2 persons | 15 days | Guang'an | 0.6 |
| 2 | Personnel from PMO and engineering environmental protection office (department) | Visit similar domestic project site so as to learn the mature environmental management experience. | The Owner | 2 persons | 5 days | / | 0.2 |
| 3 | Personnel from PMO and engineering environmental protection office (department) | Acquire all-round knowledge in environmental protection and management and understand the contents of environmental impact report of the works. | The Owner | 2 persons | 15 days | Guang'an | 0.3 |
| 4 | Site responsible personnel from supervision unit and engineering environmental supervisor | Knowledge in environmental supervision, the contents of environmental impact report of the | The Owner and Supervision Unit | 1 persons | 15 days | Guang'an | 0.3 |

| SON | Training Objects | Training Contents | Organizer | Training number | Training Time | Location | Budget (CNY10,000) |
|---|---|---|---|---|---|---|---|
| | | works and environmental protection design documents related to the works | | | | | |
| 6 | Main technical leaders and construction responsible personnel of the Contractor | Knowledge in environmental protection and management | The Owner and the Contractor | 3 persons | 15 days | Guang'an | 0.9 |
| 7 | Construction workers | Knowledge in environmental protection of the works | The Owner and the Contractor | 150 persons | 5 days | Guang'an | 7.5 |
| Total | | | | / | / | / | 9.8 |

# 12. Environmental Protection Investment

A budget has been made for Environmental Management Plan during construction and operation, refer to Table 12-1 for details. Total budget of environmental investment includes environmental mitigation measures, environmental protection monitoring and management and main works, as well as mitigation and elimination of negative impacts on environment. Notes that many mitigation measures are management practices, and the budge are included in the whole contract and not indicated specifically.

The total investment for environmental protection of the Project reaches CNY 91.6245 million, of which total project investment is CNY 854.4574 million. The environmental protection investment accounts for 10.7% of the total project investment. See the table below for environmental protection works and investment estimate of the Project:

Table 12-1 List of Environment Protection Works Investment

| Item | Content | | Project investment (CNY 10,000) | | |
|---|---|---|---|---|---|
| | | | Already Included in the Main Works | Newly Added | Total |
| Ecological environment and water and soil conservation | Shrub planting, seed broadcasting, drainage ditch, desilting culvert, land reclamation, shrub planting, seed broadcasting and temporary soil drainage ditch | | 6117.31 | 857.39 | 6974.7 |
| | Landscaping | | 1260.65 | / | 1260.65 |
| Acoustic environment | Construction period | Temporary sound insulation enclosure, etc. | / | 10 | 10 |
| | Operation Period | Measures like sound proof window reserved | / | 92 | 92 |
| Air environment | Construction period | Dust-proof measures like watering | / | 20 | 20 |
| | Operation Period | Deodorization device | 35 | / | 35 |
| | | Canteen fume purifier | / | 1 | 1 |

| Item | Content | | Project investment (CNY 10,000) | | |
|---|---|---|---|---|---|
| | | | Already Included in the Main Works | Newly Added | Total |
| | | Plant greening | Already listed in landscaping | / | / |
| | | Resettlement fee | / | 10 | |
| Surface water environment | Construction period | 5 sets of sedimentation tanks and privies established in the construction camp | / | 50 | 50 |
| | Operation Period | Installation of on-line monitoring device | / | 100 | 100 |
| | | Installation of central control system | 262.7 | / | 262.7 |
| Groundwater environment | Construction period | Combined with the measures for surface water during construction and collect construction wastewater and domestic sewage in a unified manner | / | / | / |
| | Operation Period | Anti-seepage measures for wastewater collection and treatment structure, sludge treatment unit and dosing room | 301.4 | / | 301.4 |
| Solid wastes | Construction period | Collect domestic waste and construction waste for centralized treatment | / | 5 | 5 |
| | Operation Period | Mud cake cabinet and temporary storage site for general waste | / | 5 | 5 |
| | | Domestic waste and street refuse collection and treatment | / | 20 | 20 |
| Environmental risks | Operation Period | One accident emergency pool for collecting wastewater | / | 15 | 15 |
| Total | / | / | 7977.06 | 1185.39 | 9162.45 |

Note: the investment is only the environmental assessment estimate, and the actual investment depends on project estimation.