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China: Anhui Xuancheng Infrastructure for Industry Relocation Project

Environmental Assessment Executive Summary

Xuancheng Economic and Technological Development Zone Management Committee

Anhui Academy of Environmental Science Research

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1. Project Introduction

This is an executive summary of the social and environmental impact assessment of the proposed Anhui Xuancheng Infrastructure for Industrial Relocation Project (hereinafter referred to as "the Project"). The Project is located in Xuancheng, a municipality in the southeast of Anhui Province in eastern China. Xuancheng is adjacent to two provinces, Zhejiang and Jiangsu, 280 kilometers away from Shanghai, and 160 kilometers from Nanjing. (See Figure 1).

In accordance with the requirements of the China's environmental laws and regulations of environmental impact assessment in China and the World Bank Safeguard Policy OP 4.01, Environmental Assessment, the Project is classified as category A project in view of its potential environmental and social impacts.

Through screening review with respect to the Bank policies, the Project triggered the following World Bank Safeguard Policies: (i) OP/BP4.01, Environmental Assessment, and (ii) OP/BP4.12 Involuntary Resettlement. Therefore, a full environmental impact assessment report, a standalone environmental management plan, and a resettlement action plan have been prepared for the Project, in accordance with the Bank's safeguard policies. This EA Executive Summary is prepared based on the above-mentioned documents with reference to the feasibility studies, the design and other surveys and research.

The environmental impact assessment comprehensively reviewed the proposed development in terms of the environmental impacts, the associated risk assessment and contingency response plans as well as the potential cumulative impacts for the development of XETDZ2 among the potential environmental and social impacts. In the environmental management plan (EMP), adequate mitigation measures were developed to avoid, minimize, mitigate or offset the negative and adverse social and environmental impacts.

The above documents suggest that the preparation of the Project (i) has included alternatives and effective analysis of the engineering measures to maximize the benefits and minimize the potential adverse impacts of the Project; (ii) has minimized the resettlement impacts and will make adequate and reasonable compensation and income restoration available to the affected people; and (iii) has prepared a management plan to address the environmental and social issues during the project construction and operation periods.

Project Description

According to the national strategy of transferring industries from east to hinterland China and the Anhui Provincial strategy to receive the transferred industries, Xuanchen Municipal Government adopted a planning to develop a pilot area in the Xuancheng Economic and Technological Development Zone (XETDZ) in 2010 to receive the transferred industries. The pilot area has an area of 25.6 km2 and is considered as the second phase of development of XETDZ, hence it is named XETDZ2. XETDZ is located in the west of Xuancheng Municipality. It has a jurisdiction area of about 200km^2. The first phase (XETDZ1), with an area of about 17 square kilometers, has been developed in the eastern part of XETDZ. XETDZ2 is located to the west of XETDZ1 with Hefei-Hangzhou Expressway in between. (see Figure 2)

The XETDZ2 development include urban transport, municipal water supply, wastewater treatment, solid waste management, river course rehabilitation, municipal gas supply, and land and environmental improvement under high voltage power corridor. The World Bank loan is intended to support the works of 21 roads and associated water supply, drainage and wastewater networks, and a wastewater treatment plant, which are expected to be completed by 2015-2016.The project owner XEDTZ Management Committee will build another 23km roads with associated subsurface networks etc. using domestic funding. The Project

Environmental Impact Assessment and Environmental Management Plan have covered all the components as shown in Table 1with other parallel non-Bank financed components.

The Environmental Impact Assessment has fully incorporated the existing studies, among other studies, the Strategic environmental assessment (SEA) of XETDZ2. The Project EIA and EMP have incorporated key recommendations of the Strategic EA, especially in terms of cumulative impacts mitigation.

Table 1 Infrastructure Components of XETDZ2

Activity Description	Partly Financed by the Bank Loan	Non-Bank Financed
1. Urban Transport Component		
1.1 Construction of 59.68 km of 21 roads (including associated landscaping, lighting, and other facilities)	Yes	
1.2 Construction of 2 highway interchanges	Yes	
1.3 Construction of 23 km of 24 roads (including associated landscaping, lighting, and other facilities)		Yes
2. Water Supply Component		
2.1 Construction of 85.84 km of subsurface networks for water supply	Yes	
2.2 Construction of 76.71 km of subsurface networks for water supply		Yes
2.3 Construction of a 30,000m^3/d booster station, and 14km of water mains		Yes
3. Wastewater Component		
3.1 Construction of 112.37 km of subsurface networks for drainage	Yes	
3.2 Construction of 76.77 km of subsurface networks for wastewater collection	Yes	
3.3 Construction of a 25,000 m^3/d wastewater treatment plant with 10.71 km sewer mains	Yes	
3.4 Construction of 45.03 km of subsurface networks for wastewater collection		Yes
4. Solid waste component, including building 143 drop-off points, 4 solid transfer stations, 17 public toilets, and 19 refuse trucks		Yes
5. Rehabilitation of 17.25 km of river channel (7.6km upstream reach of Changqiao River, 6km downstream reach of Xijing River and 3.75km of tributary)		Yes
6. Gas supply component		
6.1 Construction of 70.65 km of natural gas networks (DN200-600), a natural gas storage/distribution facility (22,000Nm^3)		Yes
6.2 Construction of a combined natural gas pressure regulation and gasification station (30,000Nm^3/d);		Yes
6.3 Construction of a compressed natural gas filling station		Yes
7. Landscaping of 14.66 km corridor under a power transmission line		Yes

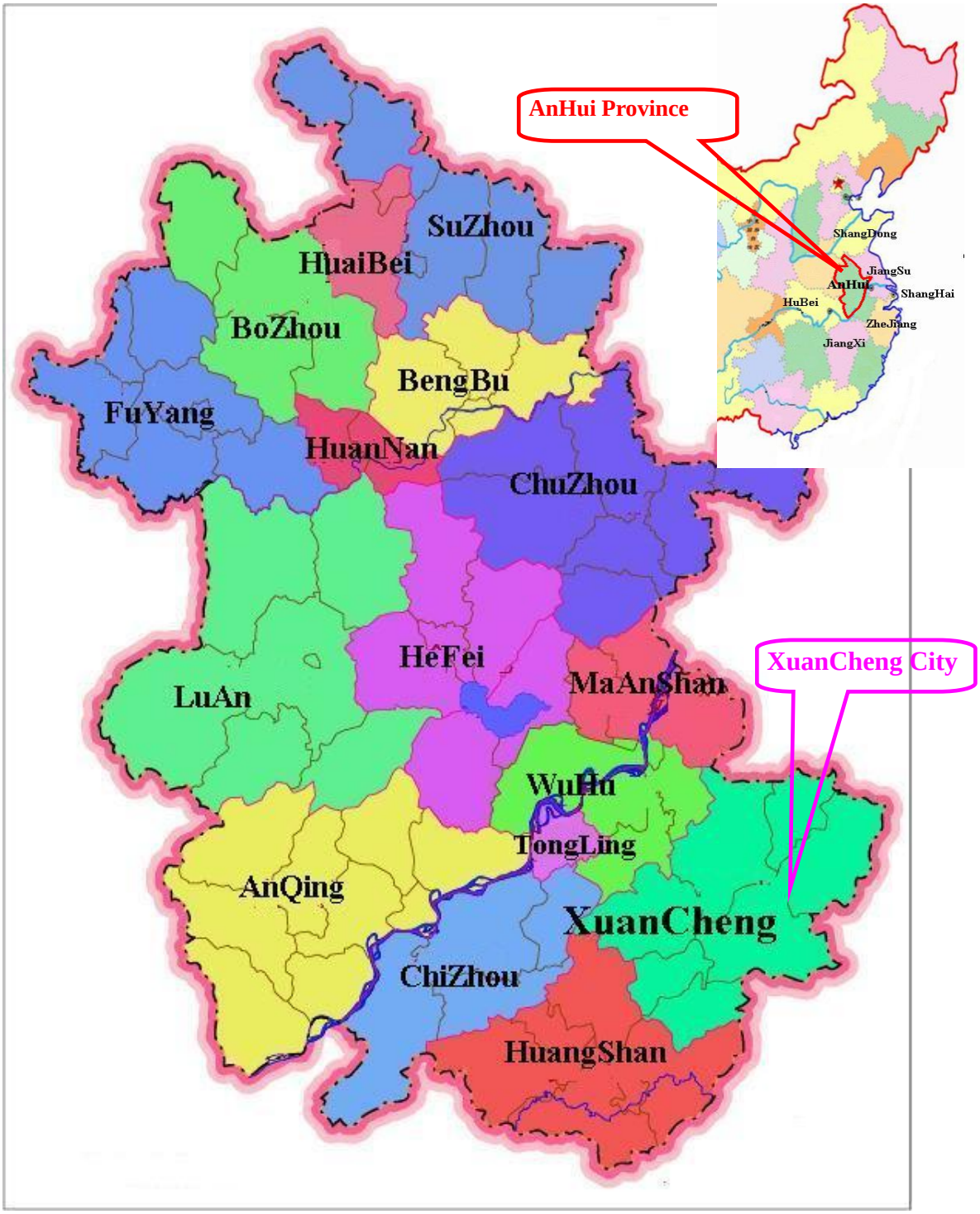

Figure 1 Project Location

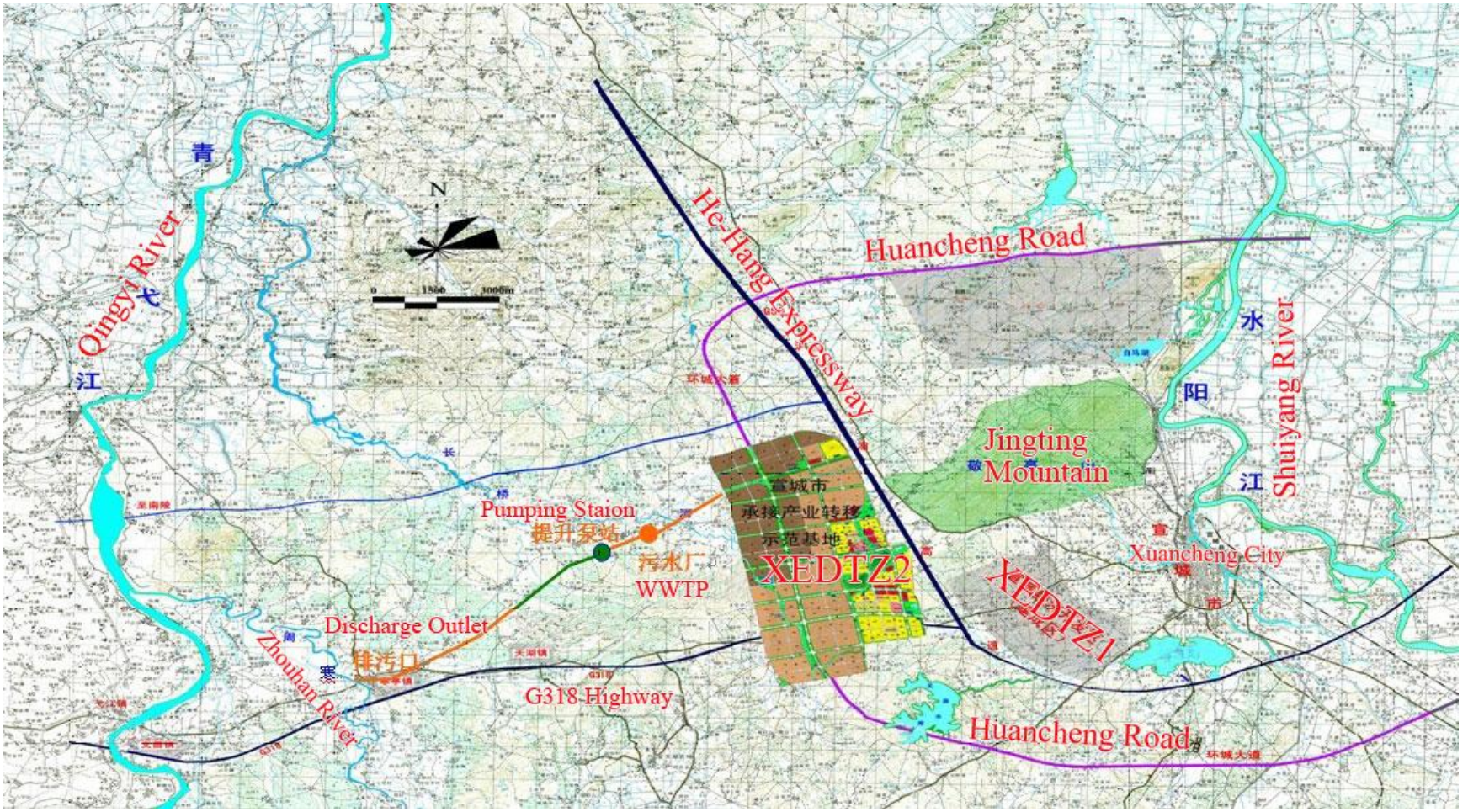

Figure 2 XEDTZ2 Location

2. Legal and Regulation Framework

The Project complies with the environmental assessment laws and regulations in China and the World Bank safeguards policies. Requirements of compliance with the China's laws and regulations and Bank's policies are described in this section.

2.1 The Bank's Safeguard Policies

Among the Bank's 10 Safeguard Policies, two, i.e., the OP/BP4.01, Environmental Assessment, and OP/BP4.12 Involuntary Resettlement are triggered. The Project is in compliance with these two policies. Meanwhile, the Project is in compliance with Bank policies and requirements regarding disclosure of project information. See Table 2 for the compliance with the Bank's safeguard policies.

Table 2 Status of Compliance with Bank's Safeguard Policies

Safeguard Policies	Triggered by the Project	Status of Compliance
OP/BP 4.01 Environmental Assessment	Yes	Category A project. A full EIA and EMP are prepared; two rounds of public consultation have been carried out as part of the EIA procedure.
OP/BP 4.04 Natural Habitats	No	The Project does not involve any natural habitats
OP/BP 4.36 Forestry	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 as defined in the Policy.
OP/BP 4.09 Pest Management	No	The Project would incur neither purchase of any pesticide nor additional pesticide application. No action is required according to the Policy.
OP/BP 4.11 Physical Cultural Resources	No	Not any cultural heritage or other physical cultural resource has been found. Chance-find procedure is included in the EMP.
OP/BP 4.37 Safety of Dams	No	There is no dam in the project area.
OP 4.10 Indigenous Peoples	No	No indigenous people live in the Project area. Nor will the Project impose impact to any indigenous people.
OP/BP 4.12 Involuntary Resettlement	Yes	A Resettlement Action Plan is prepared.
OP/BP 7.50 Projects on International Waterways	No	There is no international waterway involved in the project area.
OP/BP 7.60 Projects on dissentient Region	No	There is no dissentient region involved in the project area.

The World Bank Group Environmental, Health and Safety Guidelines (the EHS Guidelines) are also applicable to the Project. The mitigation measures included in the Project Environmental Management Plan are fully consistent with the requirements of the General EHS Guidelines, especially the provisions on construction management), in that the general requirements in the EHS Guidelines also exist in the China laws, regulations, guidelines, and construction management rules. The measures in the Environmental Management Plan are

also in full compliance with the requirements of the EHS Guidelines with respect to the Project (see Table 3).

Table 3 Compliance with World Bank Group EHS Guidelines

WBG EHS Guideline	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 levels 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.	XETDZ2 is close to the Jingting Mountain Scenic Area. Development and operation of the gas supply utilities in the Zone will make natural gas available to the industries and tend to result in much less emission of air pollutants.
Dust or particulate matter (PM) is the most common pollutants of unorganized emissions. Certain operations (such as transport and open-air storage of solid materials) and bare soil surface (including unpaved road) will release particulate matter.	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 transport of materials on paved or unpaved roads.
Environmental, Health, and Safety Guidelines for Water and Sanitation	**Compliance of EIA/EMP**
No industrial waste water, domestic wastewater, wastewater from operations of public works or stormwater shall be discharged into a public or private wastewater treatment system unless it meets the pretreatment and monitoring requirements of the wastewater treatment system it is to enter.	In XETDZ2, the industrial wastewater is not allowed to enter the wastewater treatment plant unless it is subjected to a pretreatment and meets the Level 3 discharge limits of the Comprehensive Wastewater Discharge Standards (GB8978-1996).
Storm water shall be separated from process wastewater and domestic wastewater in order to reduce the wastewater generation that needs treatment before emission.	Separate storm water drainage and wastewater systems are applied in XETDZ2, and separate storm sewers and wastewater collectors will be developed.
Noise prevention and control measures shall be applied if the projected 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 and power level equipment will be selected. Vibration isolation will be installed for machinery and equipment. Running time of certain equipment or operation will be limited, particularly for those mobile noise sources that will move in a community.
Carry out design, construction, operation and maintenance of a wastewater treatment plant, so that the treated effluent can meet relevant national requirements or internationally accepted standards.	The Changqiao Wastewater Treatment Plant refers to the Level 1-A discharge standards of the Pollutant Discharge Standards of Municipal Wastewater Treatment Plant (GB18918-2002) for compliant effluent discharge.
Odor from the treatment plant will interfere with the WWTP staff and the surrounding community. Measures to prevent reduce and control air emissions and odor are suggested.	Coarse screen, influent pumping station, and sludge thickening tank 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 concentrated and biological treatment. Vegetation consisting of tall trees that are strongly pollution resistant and capable of absorbing harmful gases will be provided around the WWTP boundary to serve as isolation buffer and play absorption function. Health protection distance will be established.

	No residential development, schools or other development of concentrated human activities shall be planned within the 100 m of the WWTP site, especially in areas at its downwind direction.
Sludge treatment and utilization. After stabilization, the sludge may be dewatered for either disposal at the landfill or incineration, or further processing to be conducive for re-use.	Sludge will be dewatered by mechanical belt press and the dewatered sludge will be transferred to the Xuancheng 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 habitat (e.g. old-growth forests, wetlands, and fish spawning habitat) utilizing existing transport corridors whenever possible;	The area where the Project is located is no 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;	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 equipment 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 works as part of a civil works contract of the Project 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 are 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); 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 Project. Roadside buildings shall be installed with sound-proof windows as appropriate. Asphaltic pavement is designed for all the road subcomponents of the Project.
Environmental, Health, and Safety Guidelines for Gas Distribution Systems	**Compliance of EIA/EMP**
To prevent and control impacts to aquatic habitats, distribution pipeline rights-of-way should be sited to avoid critical aquatic habitat such as watercourses, wetlands, and riparian areas, as well as fish spawning habitat, and critical fish over-wintering habitat, whenever possible. Use of guided / directional drilling for	There is no critical aquatic habitat in the Project area. Use of guided / directional drilling for distribution pipeline installation has been considered in the engineering design of the Project.

distribution pipeline installation should be considered where feasible to reduce impacts to both terrestrial and aquatic habitats.	
Identification and location of existing gas and other buried utility infrastructure prior to excavation for installation or repair of gas pipelines. Installation of visual marking of gas lines as part of installation, and updating as necessary on an ongoing basis;	There have been so far no industrial development activities and therefore no gas and other buried utility infrastructure in the Project area. With respect to the gas pipelines, preventive and precaution measures against accidents are recommended in the EIA respectively for the design, construction and operation of the Project.
The presence of gas distribution systems within populated areas may expose the public to hazards from gas leaks and explosions. Gas leakage may result from accidental rupture of pipelines during installation and repair or from contact during excavation unrelated to the gas system. Gas utility operators should inform and advise affected communities, schools, businesses / commercial facilities, and residents about the potential hazards presented by gas infrastructure. Gas distribution system operators should establish an emergency preparedness and response plan and communicate this plan to the public as necessary.	Preventive and precaution measures against accidents are recommended in the EIA respectively for the design, construction and operation of the Project, and emergency plan is developed accordingly.
Environmental, Health, and Safety Guidelines for Waste Management Facilities	**Compliance of EIA/EMP**
Waste Collection and Transport	
Encourage use of containers or bags for waste at the 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;	As part of the Project, 143 waste drop-off points are to be provided, and two 204-L waste bins will be provided at each of the drop-off points to receive respectively refuse that is recyclable and not recyclable. In addition, refuse trucks with hanging bins are included for emptying the waste bins and collecting and transporting the refuse twice per day. For this purpose, four(4) refuse trucks, each with $20m^3$ container, are proposed, and four(4) transfer stations, each with daily handling capacity of 30 tons, are designed to provide a total handling capacity of 120 tons/day. Local sanitation department will be operating the equipment and facilities to collect and transport the refuse to the Xuancheng sanitation landfill.
Establishing frequent waste collection schedules; Instituting a washing program for waste collection vehicles and for company-owned waste collection and transfer containers; Promoting the use of bags to reduce the odors from soiling of waste collection and transport equipment.	
Optimize waste collection routes to minimize distance traveled and overall fuel use and emissions; Implement transfer stations for small vehicles to consolidate waste into large vehicles for transportation to a treatment or disposal facility;	

Domestic Laws and Regulations

Preparation of the EA documents is in full accordance with the above laws, regulations and guidelines. Compliance with key domestic laws and regulations associated with the Project are summarized in Table 4.

Table 4 Compliance with China Laws and Regulations

China's Laws And Regulations	Compliance of the Project
Environmental Impact Assessment Law	• The full EIA report was prepared by a certified EIA consultant and the project implementation unit, and has been approved by the Anhui Provincial Environmental Protection Department. • Two rounds of public consultation have been carried out.
Circulation to Strengthen EIA Management of IFI Financed Development Projects	• The EIA report and Environmental Management Plan are in line with the Bank's safeguard policy.
Land Administration Law	• The land of XETDZ2 is of development land use and the nature is in line with Xuancheng's urban land use master plan (2006-2020).
Water Pollution and Control Law	• XETDZ2 will be developed with such sewer networks as to enable centralized wastewater treatment. • The wastewater treatment plant outfall is not located in a surface water source reserve.
Water Conservation Law	• A soil and water conservation program is prepared, and submitted to the Xuancheng Water Authority for approval. Erosion prevention and control measures will be carried out in accordance with the approved soil and water conservation program. • Building activities in the abandoned sand, stone, soil, etc. stacked in the spoil ground water and soil conservation program, and to take measures to ensure that no new hazards. • The preparation of the soil erosion monitoring program, and will monitor the situation on a regular basis reported Xuancheng City Water Authority.
Cultural Heritage Conservation Law	• During the construction of the Project, in the event of a cultural heritage site being found by any entity or individual, the site shall be protected and the issue shall be immediately reported to the local cultural heritage administrative department.

Industry Relocation and Environmental Management

By nature the project context is the incremental industrial growth and expansion from eastern coastal area to hinterland of China. The project aims to build an infrastructure platform to receive the industrial expansion in Xuancheng which holds an exceptional geographical location to meet the objective. Compared to neighboring Jaingsu and Zhejiang provinces, Xuancheng enjoys relatively abundant and cheaper land and human capital, and good quality environmental resources. Therefore, it is more precise to consider the project an industrial expansion project.

It is possible that a few factories would close its original plants and move to XEDTZ2. The closing, equipment decommissioning and relocation shall comply with national and local

regulations. And the XEDTZ shall put their compliance as screening criteria before receiving the enterprises.

A policy analysis was carried out to study Chinese national regulations in terms of solid waste management, contaminated site clean-up. Such regulations in Zhejiang, Jiangsu, Shanghai and Guangdong have been examined as well. Based on the review, it is clear that a "polluters pay" principle is applied to address the issue. Local governments are responsible for supervision and enforcement in this regard. Therefore, local environmental authorizes take the responsibility of the industrial relocation and legacy issues under its jurisdiction. Original plant owner shall be responsible for remediate environmental impacts such as contaminated soils following relevant regulations and technical standards.

The XEDTZ2 land use pattern has been determined as Category 1 and 2 industrial land use, meaning from legal perspective heavy pollution industries such as refinery, chemical are not allowed to enter XEDTZ2. Overall, when screening new enterprises, XEDTZ will strictly follow land use plan and SEA requirements to carefully select and conduct due diligence of incoming enterprises. Environmental issues, if any, associated with the relocation process will need to be identified and incorporated into the screening criteria.

3. Alternative Analysis

The EIA carried out comprehensive alternative analysis, including the following:

- "Without project" scenario
- Alternatives of roadway interchanges; and
- Alternatives of the wastewater treatment plant.

3.1 Without Project Scenario

Compared with "without project" scenario, the Project can bring a wide range of economic, environmental and social benefits. It will serve as a major engine for regional economic development and create considerable employment opportunities for local people. From a regional point of view, development of XETDZ2 is conducive to reducing the environmental pollution that may otherwise be caused by more disaggregated enterprises. It will enable easy environmental management and sharing of resources and facilities, centralized pollution management, and waste recycling in XETDZ2. It can achieve compact and efficient development and land use, facilitate healthy and sustainable land use for industrial development in XETDZ2 while effectively mitigating the impact of industrial development on the surrounding environment. It is conducive to the sustainable economic development and higher level of recycling economy in the region and therefore, the development of XETDZ2 is recommended.

3.2 Alternatives of Roadway Interchanges

For the grade separation between two proposed road sub-components, the Huanshan Road North and the Tieshan Road and an expressway, the Hehangzhou Expressway, the Huanshan Road North is to go underpass while the Tieshan Road is to go overpass the expressway. In addition, two alternatives were proposed for analysis and comparison in terms of capital investment, difficulty of construction, construction technology and environmental impacts. The selected alternatives will result less earth excavation, soil erosion and disturbance to expressway traffic.

3.3 Analysis of Effluent Standard Alternatives of WWTP

Per the Pollutant Discharge Standards of Municipal Wastewater Treatment Plant (GB 18918-2002), there are two kinds of Level 1 discharge standards, Level 1-A and Level 1-B. Based on the regional water environmental capacity and the consideration to control pollutant emission, Level 1-A discharge requirements are selected for application for the proposed Changqiao Wastewater Treatment Plant. It is currently the most stringent effluent discharge standards being applied to a municipal wastewater treatment plant in China. Comparing to effecting Level 1-B standards, effecting Level 1-A will allow less emissions of pollutants, which will be conducive to the sustainable development of XETDZ2.

3.4 Analysis of Alternative WWTP Effluent Outlet

There were three proposed alternative effluent outfalls, which were analyzed in terms of such factors as natural drainage flows, project investment, construction difficulty, environmental impact, and water environmental capacity. Ultimately, the Zhouhan River alternative is selected because among three alternative considered, the Zhouahn River presents adequate

assimilation capacity; construction scale is relatively small for sewer main, and better cost effectiveness.

3.5 Analysis of Wastewater Treatment Process Alternatives

Two alternative processes, A^2/O oxidation ditch and CASS, were considered and compared in terms of treatment process maturity, easy management, economy in operating costs, capacity against shock load, stable effluent quality. The A^2/O process is recommended per the analysis.

3.6 Analysis of Sludge Disposal Alternatives

Presently in China, there are several main approaches for disposal of sludge from wastewater treatment plant, which are agricultural land application, incineration, disposal at a landfill, and used as raw materials for bricks. Taking into account that the sludge ingredients and composition are undetermined and other factors, the sludge from the WWTP may be disposed at the landfill for the near-term together with the disposal of municipal solid wastes, as recommended by the EIA. The Xuancheng Landfill has been built up and put into operation. The landfill is provided with impervious liner to prevent seepage of leachate. There are also leachate drainage, collection and treatment systems. Therefore, if sludge from the proposed project facility is dewatered and dried to the satisfaction of the landfill, and then accepted by the sanitary landfill for disposal, no significant impact on the regional environment (groundwater and soil) would be incurred.

4. Environmental and Social Baselines

A comprehensive review of the regional environment was reviewed and a special baseline survey was carried out as part of the EIA preparation process. A due diligence of XEDTZ1 development was carried out as well. Overall, there are good natural conditions, including water resources, electricity, natural gas, and environmental quality in the region of XETDZ2. Due to long-term and intensive human activities, there is no rare animal or vegetation existing in the region of XETDZ2, which is less sensitive in terms of biodiversity.

4.1 General Regional Environment

Xuancheng is located in southeast Anhui, where the remaining mountains of the South Anhui meet with the alluvial plain of the middle and lower reaches of the Yangtze River, at borders of three provinces, Zhejiang, Anhui and Jiangsu. XETDZ2 is located in the northwest rural area of Xuancheng Municipality. There are slightly undulating terrains in the project area, with both small hills and valleys and the elevations largely ranging 25-50 meters.

The Xuancheng Urban Master Plan (2007-2020) identified a spatial structure of the metropolitan area consisting of "a city and three towns", which are respectively the main city (i.e., downtown Xuancheng), the North Town, the West Town and the East Town. The City is separated from the three Towns by green spaces. It also stated that **the planning area of the West Town is on both sides of the Xuannan Road and to the west of the Xuancheng-Hangzhou (i.e. Hefei-Hangzhou) Expressway, which is orientated to be an expansion of the Xuancheng Economic and Technical Development Zone, and to be a comprehensive urban area featured by advanced manufacturing industry and livable communities.**

The XETDZ2 is located in the West Town of the metropolitan area as determined in the Xuancheng Urban Master Plan (2006-2020) and its future development is in line with the requirements of urban land use expansion, orientation and function as per the Xuancheng Urban Master Plan (see Figure 3).

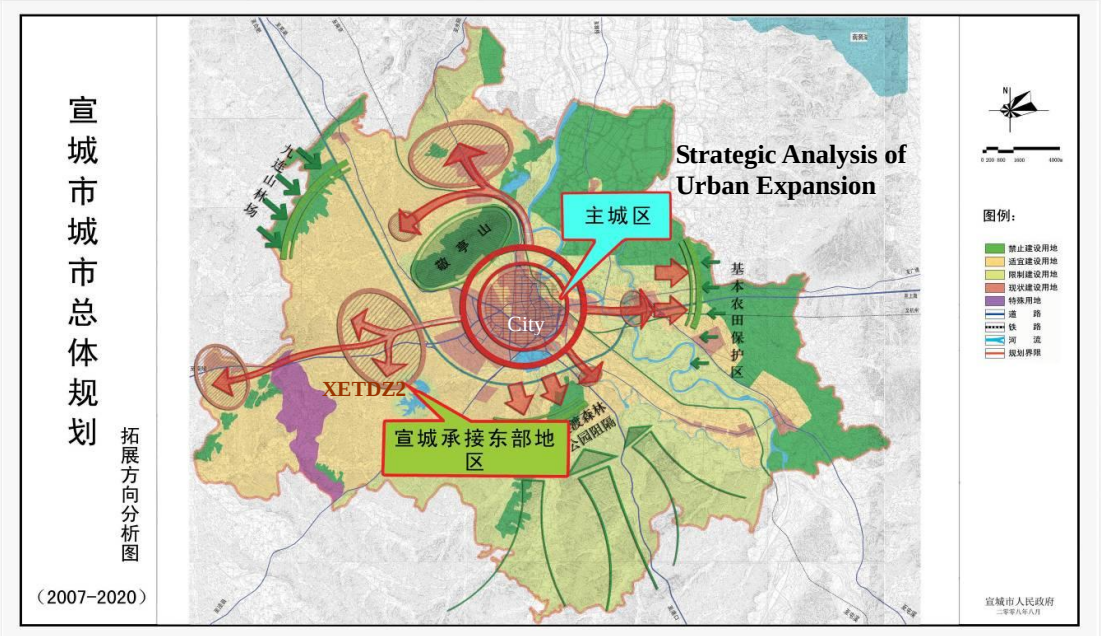

Figure 3 Location of XETDZ2 in the Xuancheng Urban Master Plan

In terms of Natural Reserves, the reserve that is closest to the Project aite is the Jingting Mountain Scenic Area of 2,009 hectares, including 1,402 hectares of forest land. There are 1,148 hectares of woodland and 216 hectares of shrub land, with forest coverage of 67.9%, and 97.3% of the forestry land covered by vegetation. The vegetation is of subtropical evergreen, deciduous and broadleaf forest and is all of artificially created fir, pine, camphor forest. In addition, there are some cash-tree-species such as tea, pear, peach, plum and chestnut. No rare or endangered species is ever found.

XETDZ2 is further away from the core area of the Jingting Mountain Scenic Area, and is not in its exterior environmental buffer zone. It is away from the Scenic Area's buffer zone by about 400m at the closest location, thus meeting the protection requirements of the Scenic Area.

According to the Xuancheng Urban Land Use Master Plan (2006-2020), land use of XETDZ2 is entirely of planned urban development land use (see Figure 4), which is in line with the Urban Land Use Master Plan.

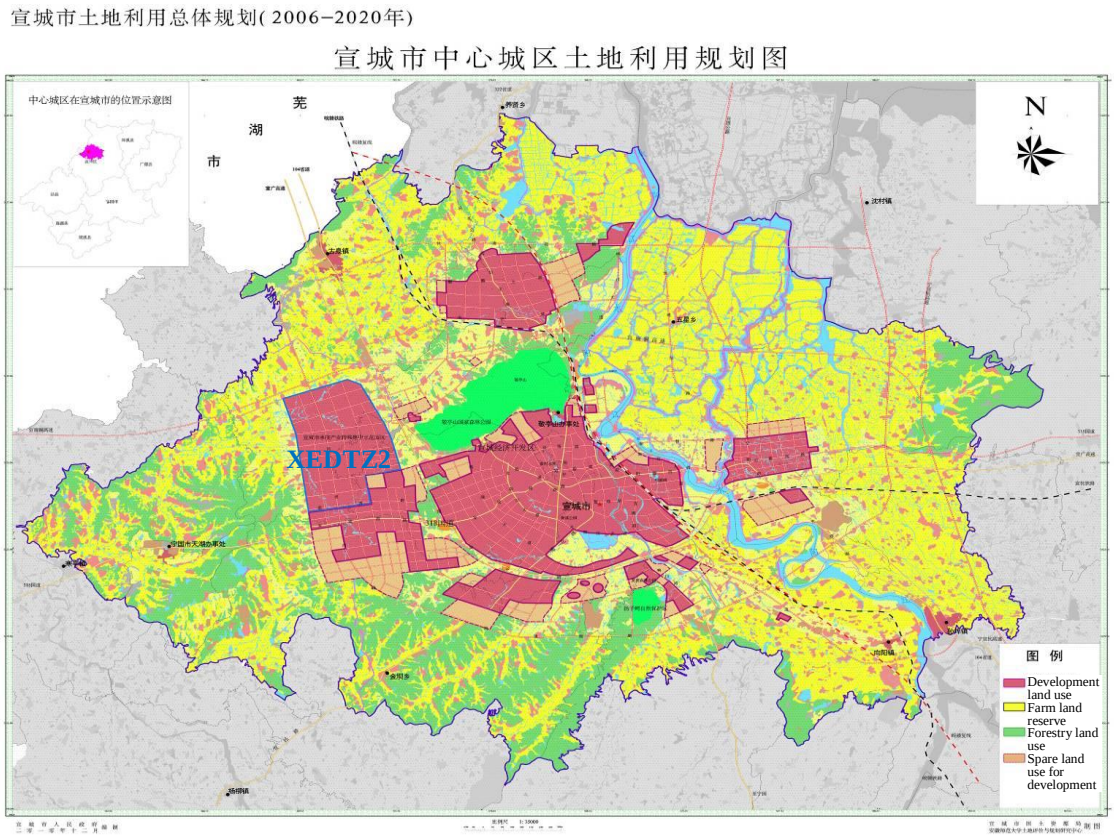

Figure 4 Land Use Plan of Xuancheng Metropolitan Area

4.2 Natural Environment

Overview

Xuancheng is located in the Anhui Province in central eastern China, where three provinces, Zhejiang, Anhui and Jiangsu, border. The terrain is slightly undulating, with woven small hills and valleys and most of the elevations ranging 25-40 meters.

Climate

The climate is of the subtropical at the northern margin of the climate region. There are four distinct seasons, mild climate, highly variable annual temperatures, moderate rainfalls, abundant sunshine, long frost-free period, and dominating easterly winds. The average annual temperature of the municipality is 15.9°C. There are favorable light, temperature, water and climate conditions.

Water Resources

There are two guest rivers, the Shuiyang River and the Qingyi River, running across the jurisdiction of Xuancheng, and eight large tributaries. With Shuiyang and Qingyi Rivers being the main water sources, the city is available with plenty of water and is the most resourceful of surface waters in the province. Within the scope of XETDZ2, there is no major surface water system except for the agricultural-irrigation purposed Changqiao River and the North Trunk Channel.

The emission receiving water body of the XETDZ2 as to be developed is the Zhouhan River, a class one tributary of the Qingyi River. Being a local river of Xuancheng, besides being exposed to non-point source pollution, Zhouhan River is nearly free of industrial source of pollution, and the water quality is good.

Current Land Use

According to field investigation, current land use in the area of XETDZ2 is shown in Table 5.

Table 5 Existing Land Use in Area of XETDZ2

Land Type		Area (ha)	Representation (%)
Residential land use		255.2	10.06%
Development land use to be developed	General arable land	1074.5	42.37%
	Forest land	430	16.96%
	Tea plantation	301.3	11.88%
	Others	475	18.73%
	Total	2563	100%

Farmland in the region consists of mainly rice fields and dry land. Agricultural production is dominated by the simple and traditional mode, growing mainly grain, cotton and rapeseeds that are of small-scales and low profits. The forest is mainly planted woodland dominated by such varieties as pine and fir. The tea plantations mainly belong to the Jingtingshan Tea Farm.

Ecology and Environment

The local vegetation in Xuancheng is the subtropical evergreen broad-leaved forest and vegetation. Based on field surveys and reference analysis, all the woods and vegetation in the region were planted, where there is no forest of natural status, no rare or endangered species. According to on-site surveys and relevant information, there is no flora distribution of key nationally-protected species and no distribution of nationally-protected rare species, ancient trees or valuable trees in the area of the ecological surveys. Except for such animals as birds, small rodents and reptiles, there is no other large-scale and protected wild animal spotted in the region.

A lot of writing reviews as well as regional-level reviews were carried out for the ecological survey findings. No endangered or protected species or other important habitat was found in the region of XETDZ2. As was mentioned above, the closest sensitive area is the Jingting Mountain Scenic Area.

4.3 Environmental Quality

During the EIA preparation period, surface water, groundwater, river sediments, air, noise and soil of the areas for XETDZ2 were sampled and tested. The results show good quality and that the environment is not contaminated and is in compliance with relevant quality standards of China. That the region is with good environmental quality is mainly because it is in a rural area and under-developed. There are few industries with little industrial pollution. There is less farm land and more idle land, and less application of fertilizers and pesticides. There is no evident industrial point source pollution or agricultural non-point source pollution.

4.4 Socio-Economic Overview

Socio-economy

As of late 2011, Xuancheng has a population of 2.794 million. In 2011, the Municipality achieved a GDP of RMB67.14 billion, increasing by 14.1% over the previous year based on comparable prices, with added value of RMB10.21 billion achieved for the first sector industries, increasing by 4.7%; RMB34.99 billion for the second sector industries, increasing by 19.7%; and RMB21.94 billion for the third sector industries, increasing by 10.7%. Calculated based on the resident population, the per capita GDP is RMB26,360. The proportions among the three sectors of industries are 15.2:52.1:32.7, with the weight of the second and tertiary industries increased by 1.6 percentage points over the previous year. The industrialization index increased from 38.4% in the previous year to 43.9%.

The per capita disposable income of the urban population is RMB17,994.6, increasing by 18.8% over the previous year. The Engel coefficient is 40.3% for the urban residents, 0.1 of a percent more over the previous year; and 35% for the rural residents, down by 5 percent over the previous year.

The Xuancheng Economic and Technical Development Zone is the main region of future economic growth in Xuancheng. Since its inception, it has focused on the development of a number of new industries, and industries that are focused on and developed in recent years are industries in auto and auto parts, sanitary ware, optoelectronics, and new building materials. In 2011, XZETDZ achieved industrial added value of RMB926 million, fiscal revenue of RMB540 million, and exports US$59.32 million.

According to the resettlement surveys, operations in the area of XETDZ2 are dominated by agricultural production, and there are very few industries, and the for the few that exist, they are of small-scales. In the area, the contracted farm land ownership is 8.94 mu per household and 2.2 me per capita. For individual villages, people are quite well-off in terms of per capita arable land ownership. The annual income is RMB8,749.55 per capita, including 15.25% coming from agricultural production. A lion portion of the gross social product comes from non-agricultural production and business operation.

Agricultural Production

Agricultural production in the area of XETDZ2 is of simple and traditional mode, mainly producing grain, cotton and rapeseeds, of small-scales and low profits. Tea plantations there are mostly belonging to the Jingtingshan Tea Farm. During the course of the field socio-economic investigation, quite much land was seen to have been abandoned likely due to lower profits of agricultural production compared with other operations. With the development of XETDZ2, it is expected that local people will gradually shift to XETDZ2's industrial-related sector and services to make a living.

Livelihoods

Per the Resettlement Action Plan, livelihood survey was carried out, which covered some of the communities that may be affected by the Project, including the Fushan and Muma Villages. There were in average four people per surveyed family, of which 2 were labor force, 1.35 working outside the area. In 2011, the main sources of income for the affected population are from livelihood operations outside the project area (mainly by working as migrant workers and the associated income accounted for 48% of the total income). Meanwhile income from agricultural activities accounted for only about 15% of the total income. According to the survey, income of agricultural production is no longer the main source of income for local people. For local residents, they do not depend on agricultural production for their livelihood. Average residential area is 39 m2 per person, which is generally in line with the 40 m2 of compensation area as specified in the Xuancheng resettlement policy in terms of collective land taken.

Minority

According to 2010 census of population, Xuancheng has a permanent population of 2.53 million, of which there were some 8000 minority people. They are scattered across the city. There was no minority community found in XEDTZ2 either. No impacts to minorities are anticipated.

Physical Cultural Resources.

A survey of physical cultural resources was conducted through field visit and consultation with cultural relics authorities during EA preparation. There were no cultural relics or other valuable physical cultural resources found in the XEDTZ2. The project construction will not involve tombs relocation either.

5. Impact Assessment and Mitigation Measures

This Project is a coordinated regional development project, and is expected to significantly improve the environmental management in the Project area. The Project will impose direct, indirect and cumulative impacts on the social and natural environment. The analysis covered such main impacts as those on the air environment, the water environment, and the ecology during the construction period, and those on the water environment and acoustic environment during the operation period. Mitigation measures proposed in the Project Environmental Management Plan and Resettlement Action Plan will avoid, reduce or mitigate the expected adverse impacts.

The EIA report covered a due diligence on the environmental and social management aspects of the earlier development of the XETDZ1. It was confirmed that the earlier project development was in line with the China's environmental laws and regulations. No significant environmental or social issue was identified. The EA also covers due diligence of the water treatment plant and landfill that were in operation and will serve the project area. The result shows the facilities comply with relevant environmental laws and regulations and are properly managed. Their capacity is adequate to meet the planned XEDTZ2 development. The Resettlement Action Plan included a due diligence report on the resettlement activities that were carried out for the works built up or under construction in 2010-2011 when the Development Zone was expanded to the west. It confirmed the resettlement efforts of all the works were in line with relevant laws, regulations and policies of China, Anhui Province and Xuancheng Municipality, and were consistent with the safeguard policies of the World Bank.

5.1 Impacts during Construction Period

5.1.1 Impacts on Ambient Air Quality during Construction

Major sources of atmospheric pollution during the course of construction include, (i) dust due to excavation and operation of transport vehicles; (ii) rise and fall of construction building materials (cement, lime, sand and aggregates) during handling, transportation, piling up process, and rise and fall of excavated materials during handling and transporation process; and (iii) exhaust emissions of various types of construction machinery and transport vehicles during construction operation. The main cause of impact to ambient air is dust during construction period. By taking such measures as covering the materials that are dusty, and water sprinkling to suppress dust, the impacts may be mitigated.

5.1.2 Noise Impact on the Environment during Construction

There will mainly be noise from construction machinery and construction vehicles in operation. Noise impacts will be mitigated by such measures as carefully arranging the construction time periods and working sites, keeping noisy operation area away from sound sensitive points, and setting up temporary noise barriers.

5.1.3 Impacts of Wastewater during Construction

Wastewater during construction period will be from the construction process wastewater and domestic sewage from construction teams, which may be pretreated by a sedimentation tank or a septic tank before being discharged into nearby water bodies or applied for agricultural purpose. Direct discharge without treatment shall be prohibited. Since the construction period will be short and temporary, the wastewater generation and discharge will be small, the impact on the surface water environment will be no significant.

5.1.4 Impacts of Solid Waste during Construction

During the construction period, large amount of spoil, sediments dredged from the rivers, wasted construction materials and other solid wastes will be generated on site.

Spoils and sediments will be totally reused to fill low lying land in XEDTZ2 to achieve material balance. According to water and sediments monitoring results, the water quality and sediments are not contaminated due to minor industrial or insignificant agricultural non-point source discharge. The dredged sediments will be placed in temporary storage yard which is provided with embankment and sedimentation tank. After natural drying, the sediments will be used for refilling. There will be in total 13 spoil disposal sites. Disposal sites are selected taken into account social and environmental considerations and are far away from sensitive receptors such as residential area. A comprehensive soil erosion control plan has been developed to mitigate the potential impacts resulted from excavation and disposal operations. The disposal sites will be rehabilitated in a timely manner and appropriate mitigation measures are designed.

Construction wastes include domestic wastes from worker camps and packaging materials, oil tanks etc. An environmental specification have been developed and included in the EMP to specify requirements for proper handling of the construction wastes.

5.1.5 Ecological impacts during Construction

Ecological impacts include the impacts on soil, vegetation, and wildlife, and soil erosion. Such impacts may be incurred by the construction of roads and utility pipelines, wastewater treatment plant and river rehabilitation. The project area is primarily agricultural ecological system with significant idle land. There were no natural habitats, rare or endangered species, or old trees identified in the project area. The project will not result in significant negative impacts to the regional biodiversity.

Mitigation measures and a special soil erosion control plan have included in the EMP to mitigate ecological impacts during construction, including: strict management measures will be carried out during the construction period to control the construction behaviors.

The scope of the construction site shall be clearly identified. No construction workers and vehicles shall access non-construction areas. After the construction is finished, temporary construction facilities and working camp shall be removed, and the associated areas and stockyard shall be leveled and ecological rehabilitation measures shall be carried out in a timely manner. Manuals and education materials shall be distributed to the construction workers and nearby communities and sign boards will be erected to enhance people's ecological and environmental protection awareness. Environmental protection, monitoring and management shall be strengthened during construction. The soil and water conservation program shall be implemented at the entire project component sites.

5.1.6 Impacts to Environmentally Sensitivity Areas

Among nature reserves, the one closest to the Project is the Jingting Mountain Scenic Area, XETDZ2 is further away from the core area of the Jingting Mountain Scenic Area, and is not in its exterior environmental buffer zone. It is away from the Scenic Area's buffer zone by about 400m at the closest location, thus meeting the protection requirements of the Scenic Area. There is no impact on the biodiversity of the Jingting Mountain Scenic Area during construction period of the Project.

5.1.7 Social Impacts during Construction

Land Acquisition and Resettlement. According to OP4.12, inventory surveys were carried out on the potential land acquisition and population to be affected by resettlement. Consultation with the affected was carried out and a Resettlement Action Plan was prepared, which was

shared with the affected population. The Project will affect housing of 161 households and properties of five businesses. For the affected households, there are two available options, (i) cash compensation, and (ii) resettlement housing in an apartment building with property ownership in exchange of the affected housing, which is to be developed with other apartment buildings for resettlement. For the affected industries, they will be resettled locally.

The Project will acquire a total permanent land use of 2,558.1 mu, which are of either collective land or state-owned agricultural land. The plan is to include a grievance appeal process from the village committee level to the provincial government level as a part of the RAP. Institutional arrangements and capacity building of resettlement agencies, monitoring and reporting procedures are also included in the Resettlement Action Plan. Field surveys showed that for local people, their the main sources of income are non-agricultural production and operation, and the Project will create more non-agricultural employment opportunities for their benefits, therefore, land acquisition of the Project will have limited negative impacts to the income level of the affected population.

Gender. As part of the social assessment of the Project, in-depth analysis of gender issues was carried out from such angles as educational and vocational opportunities, participation of decision-making and entitlements for women. Further specific protective measures are provided ensure equal participation of women and livelihood restoration process for women

Social Disturbance. The impacts will mainly be disturbance to urban transport operation and local people's lives, which will be addressed by the traffic management department through such interventions as using adjacent road network for traffic organization and diversion to ensure normal lives of the local people are not disturbed.

5.2 Impacts during Operation Period

Adverse impacts during the operation period of the developed facilities include traffic noise of the roadways in operation, impacts to the water bodies due to the effluent from the wastewater treatment plant, and impacts of the sludge from the WWTP.

5.2.1 Traffic Noise Impacts

Through projection and analysis, traffic noise along the roadways will affect the buildings along the roadways. Such noise may be mitigated by taking the following measures, (i) according to traffic and noise forecast, it may be necessary to install ventilation and soundproof windows for the first row of the Jinda resettlement buildings facing the roads in 2021; (ii) to mandate a minimum of 80m clearance from the right-of-way for new apartment buildings or other sensitive development along the primary roads; and (iii) to apply land use and functional constraints along the primary roads, better maximize layout of such land use as warehouse, factory, and vegetation for areas within 80m on both sides of the highways, to design carefully building orientation by roadside and optimize the acoustic design, and to installed soundproof windows facing the roads.

5.2.2 Impacts of WWTP Effluent

Through projection and analysis, when the effluent from the Changqiao WWTP meets designed Class 1-A standards (most stringent standard) as specified in the Pollutant Discharge Standards of Municipal Wastewater Treatment Plant, the impact to the receiving water bodies, the Zhouhan River and Qingyi Qing River, will be small, and the downstream water environment function will not be compromised. By such careful operation management as anticorrosion and anti-seepage of the sewage treatment facilities and day-to-day management, nor will the groundwater environment be adversely affected. Meanwhile, for incidents of

accidental sewage discharge, contingency plans were developed, and accident strategies and contingency response action plans were prepared as detailed in the EMP.

5.2.3 Impacts of Odorous Pollutants from WWTP

Air emissions generated during the operation of the wastewater treatment plant are mainly of odorous pollutants. The WWTP is located in rural area and is far away from villages. By developing associated biological deodorization system, the emission source intensity may be reduced. By setting a 100-meter buffer of health protection distance, and providing vegetation barriers at the plant boundary, the smelly impact can be effectively mitigated.

5.2.4 Impact of Solid Wastes

Solid wastes from the wastewater treatment plant in operation are mainly sludge, screenings and removed grits. The sludge is to be taken to the sanitary landfill for disposal as recommended for the near-term. The sludge from the WWTP will be sent to the Xuancheng Municipal Solid Waste Landfill for disposal with municipal solid wastes. The landfill is provided with impermeable liner to prevent leakage of leachate. There are also leachate drainage, collection and treatment systems. Sludge generated from the proposed project facilities will be dewatered and the dewatered sludge will have moisture content below the limits (less than 60%) to the satisfaction of the sanitary landfill. It is feasible to incorporate the WWTP sludge into the landfill for disposal. With functioning of the environmental facilities of the landfill, its impact on the environment will be limited.

5.2.5 Risk Analysis and Emergency Response

Risks are associated with the following conditions: 1) broken of natural gas pipelines that may result in fire or explosion, and 2) broken of wastewater pipelines may result in pollution of surface or groundwater. Emergency response plan has been incorporated into EIA and EMP, including day-to-day survey and maintenance of pipelines. In the wastewater treatment plan, accidental container will be built and redundant equipment will be in place to address the risks.

5.2.6 Cumulative Impacts

The cumulative impacts are the accumulation of impacts incurred or to be incurred by a combination of behaviors in the past, at present and in the future. Assessment of the cumulative impacts is to define them and the findings are aimed at coordinating the Project with other regional developments and resource conservation efforts in order to achieve a best scenario both to the benefit of the ecosystem and to the realization of economic functions.

In the past five years, the Xuancheng Development Zone has developed rapidly. The number of industries settling down in the XETDZ increased from 58 to 154 from 2007 to 2011, with the average annual growth rates in terms of industries, GDP, industrial added value and the population all exceed 20%. The employed population also grows at an annual average rate of more than 18.6%. Historical data show a healthy economic development of the Xuancheng Economic and Technical Development Zone, which has played an important role in the local economy.

Based on a comprehensive environmental quality monitoring (surface waters, air, noise and soil) of the built-up area of XETDZ1, it can be seen that the development of the phase 1 of the XETDZ does not impose significant impact on the environment in that the overall environmental quality of the region is quite stable and is in line with the requirements of the quality standards. It implies that the concepts of focusing both development and environmental sustainability have been adopted during the development process, as evidenced by the following. (i) Strict admission review of industrial applicants. Industries admitted in phase 1 are largely of light pollution, labor-intensive and technology-driven enterprises. (ii) Proactive utilization of clean energy, which has reduced the emission of atmospheric

pollutants from the origins. (iii) Completion of such environmental infrastructures as a wastewater treatment plant and a landfill, which provide good supports for the development of XETDZ1. Therefore, each environmental element continues and maintains the current planning target and the impact on nearby sensitive receptors is small.

As per the projection, during the 2011-2016 planning period, sources of the cumulative impacts include major economic and population growth, urbanization and industrial development. Analysis of the cumulative impacts focused on the atmospheric environment, the acoustic environment, surface waters, groundwater, and the ecology due to potential developments in accordance with the plan of XETDZ2.

According to the XETDZ2 development planning, the project will support infrastructure construction to serve the industrial and urban development in the area. The land use pattern in XETDZ2 will turn from current agricultural land into industrial and urban development land use.

Land use in XETDZ2 is to be dominated by residential, public, and industrial category 1 and 2. It is noted that the industrial category 1 is subject to those industries that will not result in pollution to residential or public facilities. While industrial category 2 land use is subject to industries with minor pollution. The land use requirements by nature eliminate the introduction or heavy pollution industries such as chemical, refinery, pulping, etc. The land use requirement is also consistent with the leading industries of the Zone, i.e., auto parts, semiconductor lighting (LED), new building materials, and sanitary ware. By selecting the leading industries and the land use layout, heavily polluting industries are restricted and cannot be admitted. Through analysis of available resources and the environmental carrying capacity, conditions in terms of water resources, electricity, natural gas, and land use are available and can support the implementation of the plan of XETDZ2. At the same time, the atmospheric capacity and water environmental capacity of the region will be able to meet the development as well.

For impacts on the atmospheric environment, the most unfavorable scenario, i.e., that coal-based energy were applied for all the industries, is taken for projecting the likely impacts on the air quality. The emissions of SO_2, NO_2 and other air pollutants were estimated assuming compliant emission. The concentrations were then added on top of the background concentrations to derive the average concentrations for assessment. The hourly and daily average concentrations, and the long-term maximum ground concentrations of each individual environmentally sensitive area of the region as estimated all met the requirements of Class-I and II standards per the Ambient Air Quality Standards (GB3095-1996). Thereby, implementation of the planning of XETDZ2 would not have significant impacts on the regional atmospheric environment, and would not trigger a change of the functional level of the regional atmospheric environment.

The Jingting Mountain Scenic Area is classified as a Category-1 functional area in terms of air quality, which will be the constraint to potential air emissions from XETDZ2. In practice, the environmental authorities have required all incoming industries to use natural gas as energy source. With the natural gas utilities being developed in XETDZ2 and natural gas supply being available and adequate, it is expected that the future emissions of air pollutants from XETDZ2 would be significantly fewer than the predicted scenario.

It is estimated that wastewater generation of XETDZ2 at the end of the planning period will be approximately 46,000m^3/d. The Changqiao Wastewater Treatment Plant is planned with capacity of 50,000m^3/d, based on which, a facility of 25,000m^3/d is designed and will be implemented for the first phase. Should the actual growth of wastewater generation warrant, it is possible to expand and develop a second group of 25,000 m^3/d. Both industrial and municipal wastewater will enter the Changqiao WWTP for treatment. Industrial wastewater is not allowed to discharge into the municipal sewerage system unless it is pretreated by the industries and the pretreated effluent meets the discharge requirements of Level-3 discharge

standards as specified by the GB8978-1996, the Comprehensive Wastewater Discharge Standards. For the Changqiao WWTP, the Level 1-A standards as specified in the Pollutant Discharge Standards of Municipal Wastewater Treatment Plants (GB18918-2002) are applied and its treated effluent shall meet the requirements therein.

Three alternative outfall designs were reviewed and compared from economic terms and environmental capacity, and the Zhouhan River was selected as the receiving water body. As projected, in case the wastewater treatment plant in operation is in compliance in effluent discharge, the estimated COD and NH_3-N concentrations of each section downstream of the outfall would meet the water quality requirements of Class-III waters per the GB3838-2002, the Environmental Quality Standard of Surface Waters. The discharge would not change water environment function at the downstream of the WWTP and would have low impact on the water intake at the downstream of the WWTP.

In order to alleviate the cumulative environmental effects due to the development of region for the XETDZ2 as planned, the strategic EA proposed a range of mitigation measures covering surface waters, groundwater, atmosphere, noise impacts, and solid waste impacts. It also included suggestions on how to control industries to be developed in the EDZ, which has been carefully defined in the Environmental Impact Assessment and the Environmental Management Plan of the Project. Therefore, the cumulative impacts of development have been well accounted for in the development of XETDZ2 to ensure environmental sustainability and economic development of the region.

5.3 Summary of Mitigation Measures

On the basis of the impact assessment, the Environmental Management Plan developed a series of mitigation measures to avoid, minimize, and mitigate any adverse environmental and social impacts, and make remedies in the event of an adverse impact. These mitigation measures were designed in accordance with relevant national laws, regulations, rules and codes as well as the World Bank safeguard policies (including the General EHS Guidelines) to address the impacts during the design, construction and operation periods.

A summary of the key mitigation measures and their implementation and monitoring arrangements are shown in Table 6, 7 and 8.

Table 6 Environmental Protection Measures during the Design Stage

Activity	Potential Impact/Issue	Mitigation Measure	Ref of EMP/RAP	Prepared by	Supervised by	Indicator of Compliance	Time of Monitoring
Land acquisition and resettlement	Impacts on the affected people	To prepare a resettlement action plan in accordance with the national policies and the Bank's policies.	Resettlement Action Plan	Wuhan University	Xuancheng Economic and Technical Development Zone and the Bank	Resettlement Action Plan approved by the Bank	By appraisal
Project design	Impacts on environmental and social aspects	Alternative analysis: wastewater site selection, discharge location, sludge disposal, etc Environmental design: noise and air safety distance, greening, wastewater odor and leaking-proof, etc	EIA Chapter 4, 6 and 8	EA Consultant	Xuancheng Economic and Technical Development Zone and the Bank	EA approved by the Bank	By appraisal
Construction activities	Poor environmental management practices may result in significant negative environmental impacts	The Environmental Management Plan has provisions of contractors' obligations, which will be written into the bidding documents and the contracts of works.	Chapter 6 of the EMP	EA Consultant	Xuancheng Economic and Technical Development Zone and the Bank	The EIA is approved by the Bank. The provisions are included in the technical specifications of the bidding documents.	By appraisal Before the award.
Soil and water conservation program (soil erosion control plan)	Erosion impacts	To do the soil and water conservation program well. The general layout shall take full account of the types, manners and extend of impact of construction caused erosions, and the overall planning of operation management during operation.	Chapter 8 of the EMP	EA Consultant	Xuancheng Economic and Technical Development Zone and the Bank	The Soil and Water Conservation Program is approved by the Xuancheng Water Authority.	By appraisal

Table 7 Environmental Protection Measures during the Construction Period

Activity	Potential Impact/Issue	Mitigation Measure	Ref of EMP/RAP	Implemented by	Monitored by	Indicator of Compliance	Time of Monitoring

Activity	Potential Impact/Issue	Mitigation Measure	Ref of EMP/RAP	Implemented by	Monitored by	Indicator of Compliance	Time of Monitoring
Construction activity	Potential disturbance on project area as well as environmental impacts due to construction activities	A site layout of construction activities, construction EMP implementation plan, mitigation measures shall be prepared and submitted to the environmental supervision engineer for approval. Implementing of EMP implementation plan and mitigation measures.	Chapter 6 of the EMP	The contractors	Environmental supervision engineer, Independent environmental consultant, Environmental quality monitoring consultant	Field supervision by ESE EMP compliance	Before the construction day-to-day.
Contractors' management	wastewater, solid wastes, disturbance of communities, and safety concerns	• Living facilities, cleaning detergent, chemical deodorant, drinking water, first-aid kits, etc. must be provided for the working staff; • To effect a workers' code of conduct; • Safety storage of fuel and hazardous materials; • Appropriate treatment of wastewater, and collection and disposal of solid wastes; • To maintain ongoing consultation with the communities, to disclose the project information, and to provide a complaint logbook at the camp's office.	Chapter 6 of the EMP	The contractors	Environmental supervision engineer Independent Environmental Consultant	Various facilities are provided. Training is carried out. Materials and solid wastes are properly managed. A disclosure committee is established.	Day-to-day
Soil and Water Conservation Program	Impacts to regional soil and water conservation	• Roads and utility works. Provide preventive and protection measures and arrange earthwork haulage to achieve balance. Optimize the construction process to minimize the amount of spoil. For road	Chapter 8 of the EMP	Contractors	Environmental supervision engineer, and independent environmental consultant	Environmental supervision engineer conducts field supervision. The codes and technical	Day-to-day

Activity	Potential Impact/Issue	Mitigation Measure	Ref of EMP/RAP	Implemented by	Monitored by	Indicator of Compliance	Time of Monitoring
		construction, provide temporary support, drainage, sedimentation, covering and other protection measures. Pay attention to vegetation. Improve and restore the ecology and landscape. Provide flood control and drainage facilities to utilities and auxiliary works. Provide protection at temporary storage yards of utilities construction sites, and drainage on site. Consider the recovery of vegetation. • River rehabilitation. Handle the excavated materials properly by enclosed storage before disposal. Consider slope protection, embankment, retaining wall and other protective measures for the river with steep slope. Consider providing vegetation at the river sides. Provide cofferdam, supports and other protective measures during the construction period. • WWPT. Perform such measures as topsoil stripping, drainage and sedimentation on site, excavation supports, drainage and protection during the construction period, and topsoil recovery and re-vegetation toward the end of construction. • Disposal areas. Interception and				specifications are followed.	

Activity	Potential Impact/Issue	Mitigation Measure	Ref of EMP/RAP	Implemented by	Monitored by	Indicator of Compliance	Time of Monitoring
		drainage systems shall be provided. Temporary storage yards shall be provided with retaining and protection measures. The area of spoil shall be enclosed before disposal operation. Land remediation and restoration of vegetation shall be carried out toward the end of construction according to land use plan. • Construction access and working sites. Carry out temporary drainage and covering measures. Carry out site clearing and leveling, land reclamation or vegetation at the end of the construction. • Environmental rehabilitation along the HV power corridor. Carry out land remediation and provide drainage, and then carry out ecological vegetation to form a complete green-space ecosystem.					
PCR protection	PCR accidentally encountered may be compromised	Chance-find procedures: whenever any likely cultural heritage is accidentally discovered, construction shall immediately be suspended and relevant cultural heritage department be notified. Construction shall not be resumed until approval is received from the relevant authorities.	Chapter 6 of the EMP.	Contractors	Environmental supervision engineer, and independent environmental consultant	The accidental discovery of the cultural heritage is recorded.	Day-to-day

Table 8 Environmental Protection Measures during the Operation Period

Activity	Potential Impact/Issue	Mitigation Measure	Ref of EMP/RAP	Implemented by	Monitored by	Indicator of Compliance	Time of Monitoring
Site recovery	Wastes may be left at the camps and working sites. The sites were not leveled or restored after erosion. Site appearance and landscape were damaged.	At the end of the construction, all rubbles, debris and other wastes, construction equipment no longer in use, contaminated soil, and any other items shall be cleared and removed from the sites.	Chapter 7 of the EMP	Contractors	Environmental supervision engineer, independent environmental consultant, Xuancheng Economic and Technical Development Zone	The Site is cleaned up and recovered.	Upon the completion of the Project
Wastewater Treatment Plant	Contamination of surface water bodies	• To enact operation management procedures, duty accountability system, and award/penalty incentive regulations and other rules and regulations for effective management; • Accident storage tanks shall be provided to receive and store wastewater temporarily in the event of accident discharge; • Provide effectively monitoring and control of the effluent by installation of electromagnetic flow-meter, online monitoring instruments, and providing available sampling and monitoring location, and placing the environmental protection logo.	Chapter 5 of the EMP	Project Owner	Environmental Protection Bureau (EPB) of XETDZ	The codes and technical specifications are followed. An environmental monitoring program is prepared.	Every month

Activity	Potential Impact/Issue	Mitigation Measure	Ref of EMP/RAP	Implemented by	Monitored by	Indicator of Compliance	Time of Monitoring
	Air pollution	• Vegetation at WWTP boundary for separation from communities and reducing impacts of exhausts. • Cover and/or seal odorous sources (facilities) wherever possible to reduce odor emission. • Strengthen sludge management for timely transfer and disposal. Cover the sludge trucks and take up provisions to prevent spill of materials and secondary pollution during transportation. • Establish minimum health clearance away from communities. Do not grant development permit to housing, school and other people-concentrated properties and facilities within 100m from the WWTP site, especially at the downwind direction. • Enhance the O&M of biological deodorization system to ensure maximum collection and effective treatment of the odor.	Chapter 5 of the EMP	Project Owner	Environmental Protection Bureau (EPB) of XETDZ	The codes and technical specifications are followed. An environmental monitoring program is prepared.	Every month
Operation of solid waste transfer station	Impacts on ambient air, acoustic environment and water quality	Storage time shall be limited to acceptable level; ventilation facilities installed; deordorizer sprayed Leakage collected and stored in anti-seepage well.	EMP chapter 5	Project Owner	Environmental Protection Bureau (EPB) of XETDZ	EMP compliance Monitoring plan implemented	Every season

Activity	Potential Impact/Issue	Mitigation Measure	Ref of EMP/RAP	Implemented by	Monitored by	Indicator of Compliance	Time of Monitoring
		Leakage moved to landfill leakage treatment facility by enclosed vehicle daily.					
Gas pipeline operation	Fire or explosion risks	Daily survey, maintenance, alarming system installed	EMP Chapter 5	Project owner	Environmental Protection Bureau (EPB) of XETDZ	EMP compliance	Every season
Cumulative environmental impacts	Impacts on surface waters, groundwater, air, acoustic environment and the ecology with the development of XETDZ2	Solutions to address cumulative effects of the development of XETDZ2 has been included in the Strategic EIA of XETDZ2; Establish a mechanism for dialogue with the stakeholders to monitoring the development process and the ecological status of the region.	Chapter 10 of the EMP	Xuancheng Economic and Technical Development Zone	Anhui Provincial Environmental Protection Department	The Strategic EIA of XETDZ2 is approved. All kinds of meetings are organized.	Every year

6. Public Consultation and Information Disclosure

In accordance with the environmental impact assessment regulations and requirements of public participation in China and the Bank's OP4.01, two rounds of public consultation have been carried out during the preparation of the Project EIA, when and where questionnaire surveys, interviews and public meetings were conducted with the affected people, institutions, businesses and other stakeholders. Issues raised by the people during the consultation process have been reflected in the project design, the environmental management plan, or the resettlement action plan. Disclosure of information required for the preparation of the EA has been carried out through local newspapers and the internet websites. The complete draft EIA documents were posted on the website of the Xuancheng Economic and Technological Development Zone on November 29, 2012, which is available for people to access. Full RAP was disclosed on November 12, 2012 on the website of Xuancheng Economic and Technological Development Zone as well. EA and RAP are submitted to World Bank InfoShop on January 18, 2013.

In order to reduce the project impacts, communication with the affected population will be continued throughout the Project process by requiring the contractors to disclose such information as the description of the works, the main environmental issues and mitigation measures, how grievance appeal will be addressed and the contact information on the construction site. During the course of development of XETDZ2, a minimum of annual meeting with the affected groups shall be carried out for consultation. Moreover, grievance appeal mechanism is also included in the Resettlement Action Plan to address people's concerns about land acquisition, livelihood and compensation issues.

During the operation of the Project, a stakeholder dialogue mechanism will be established, which will provide a platform for the monitoring and evaluation of the environment and social development situations of XETDZ2. Its main purpose is to inform the parties and the people on the regional development and cumulative environmental and social impacts.

The Xuancheng Economic Development Zone will take the responsibility and organize the stakeholder dialogue meeting once every year. The stakeholders include, but not limited to, the Environmental Protection Department of Anhui Province, the Xuancheng Environmental Protection Bureau, local development and reform department, the municipal government, representatives of major industries in XETDZ2, local communities and farmers' representatives.

During the Project operation period, environmental monitoring data will be shared with the stakeholders, and main conclusions and recommendations of the meetings will be officially copied to the relevant government departments to take necessary measures to maintain the sustainable development of XETDZ2 for coordinating the socio-economic development and environmental protection.

7. Environmental Management Plan

A detailed environmental management plan has reflected all the issues identified in the EIA report as follows, (i) a combination of measures to mitigate the environmental impacts of the Project during the construction and operation periods; and (ii) institutional organization, procedures, responsibilities of the implementation agencies, and the budget and funding sources of each of the activities. The Environmental Management Plan also includes capacity building for environmental supervision and local environmental protection bureaus.

7.1 Roles and Responsibilities

The main roles and responsibilities during the construction period are shown in Figure 5. A project management office of the proposed World Bank financed Project (PMO) has been established in the Xuancheng Economic and Technological Development Zone Management Committee, with four full-time staff officers. The PMO takes overall responsibility for the implementation of the project management and coordination through its subordinated investment construction company (CIC, PIU), including the environment and social safeguards.

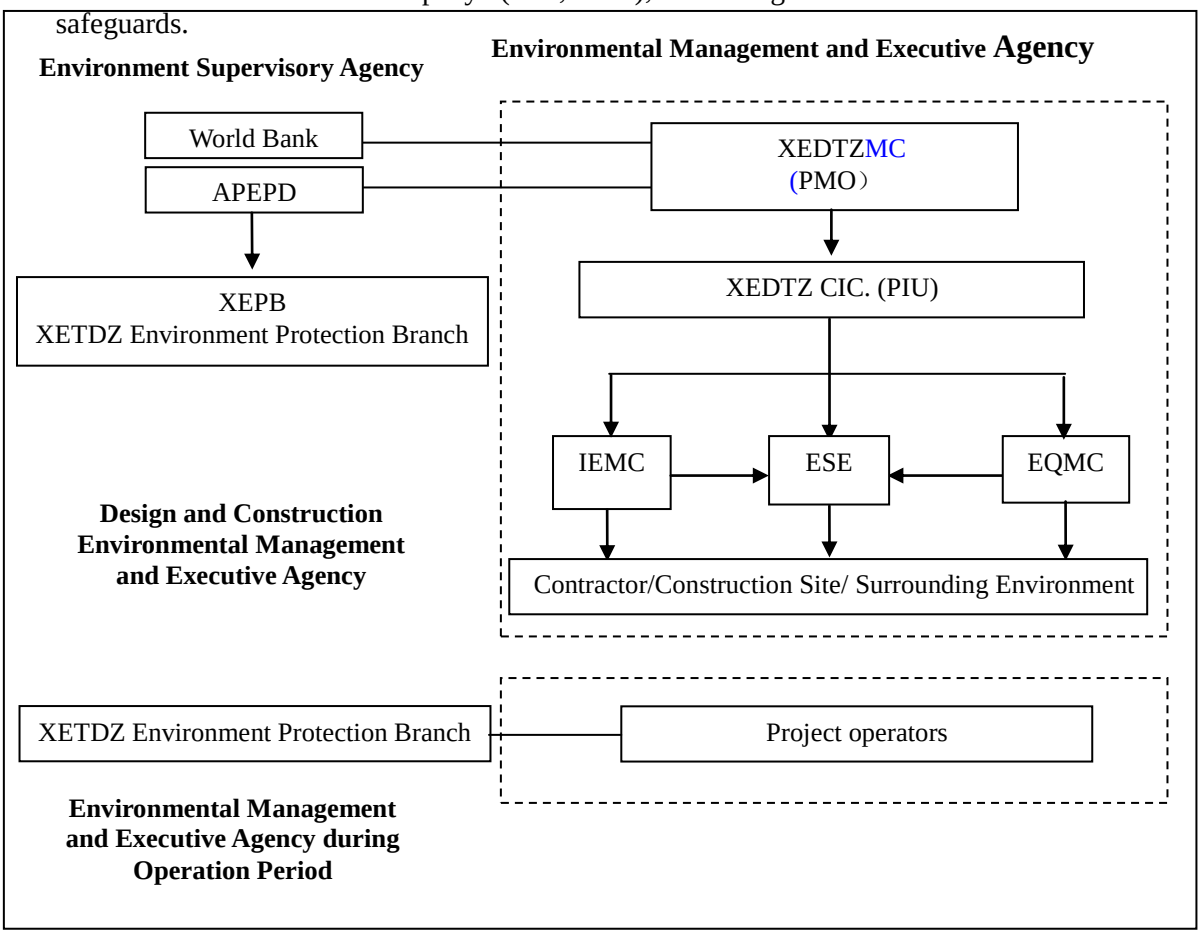

Figure 5 Environmental Management Institutional Structure

The CIC will be responsible for day-to-day management of safeguards implementation, including supervision and reporting. The Management Committee and CIC will coordinate other relevant government authorities to facilitate the project management.

An independent environmental management consultant (IEMC) will be hired by the PMO to carry out independent supervision to the contractors and environmental supervision engineers. The

IEMC will provide EMP training, supervision, and assist the Management Committee in preparing semi-annual environmental monitoring report for the project owner and World Bank.
The EMP shall be incorporated into project bidding documents and civil works contracts. Environmental supervision responsibilities shall be included in the supervision contracts as well.

7.2 Capacity Building Plan for XEDTZ Environmental Protection Bureau

The XEDTZ EPB is responsible for the environmental administration. The fast development of infrastructure and industries pose challenges to the EPB. Therefore it is necessary to build its capacity. The capacity building program addresses team development, equipment development, business housing and staff training in accordance with the capacity building standards and requirements of the Ministry of Environmental Protection per the development of the XETDZ2. An environmental management capacity training plan was also prepared, including 1) increasing staff numbers from currently 6 to 15-20 by end of 2016; 2) building supervision and enforcement capacity, equipments and tools, monitoring facilities, communication and office equipments; 3) development of management information system, including discharge/emission charge, enforcement, online monitoring and hotlines; and 4) office area. Annual training plan include 1) laws and regulations; 2) project review and approval; 3) environmental supervision and enforcement' 4) cleaner production; 5) hazardous waste management; 6) environmental management and 7) emergency response capacity building.

8. Budget for Environmental Management Plan

Cost estimates of all environmental mitigation measures, including those of supervision and monitoring activities, have been prepared and included in the total project cost. The total cost estimate for environmental management of the Project is RMB40.33 million, accounting for 1.6% of the total Project cost. Detail estimates of the environmental management costs are shown in Table 10.

Table 9 Cost Estimate of Environmental Management of the Project

Period	Item Description		Cost Estimate (RMB million)	Notes
Construction period	Social environment	Media and public posters	10	
		Information boards on the working sites	12	
	Soil and water conservation	Maintenance of borrow pits and disposal areas	2726.6	To be implemented according to the Soil and Water Conservation Program
		Restoration of broken vegetation		
		Flexible coverage of piled materials		
		Monitor	44.8	
	Atmosphere	Sprinkling	20	Provide sprinklers, etc.
		Monitoring	10	
	Noise	Temporary noise barriers and noise reduction facilities	5	-
		Monitoring	5	
	Wastewater	Treatment of construction wastewater	20	Provide sedimentation tanks and other facilities.
		Monitoring	5	
	Solid Waste	Disposal of spoil of works	120	Transported and disposed at designated disposal areas.
		Disposal of MSW	5	Specialized
	Environmental M&E during construction period		260	
	Independent Environmental Management Consultant		150	
	Contingency		170	
	Total		3753.4	

Period	Item Description		Cost Estimate (RMB million)	Notes
Operation period	Ecological compensation	Vegetation	260	Vegetation area coverage of 25%
	Atmosphere	Prevention and control measures	50	Deodorization facilities of the WWTP, the transfer stations, and the public toilets.
		Monitoring in the 1st year of operation	10	
	Noise	Noise control	30	Noise control facilities of the WWTP, the transfer stations, and the pumping stations.
		Monitoring in the 1st year of operation	5	
	Wastewater	Wastewater treatment	20	Collection facilities of leachate at the landfill.
		Monitoring in the 1st year of operation	5	
	Contingency		19	
	Total		399	
		Training	50	
		Grand Total	4033.4	
		Representation in Total Project Cost (%)	1.56	