Report no. 104242

China: Hubei Xiaogan Logistics Infrastructure Project

ENVIRONMENTAL ASSESSMENT

EXECUTIVE SUMMARY

Hubei Academy Environmental Sciences

SEPTEMBER 2015

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1. INTRODUCTION

The proposed Hubei Xiaogan Logistics Infrastructure Project (herein after “the Project”) is located in the Xiaonan District of Xiaogan City in the Hubei Province of central China (See geographic locations in the Figure 1). The project will provide a holistic solution for efficient and sustainable logistics that serve the rapid urbanization of the Wuhan Metropolitan Region (WMR) and the actual logistics needs. The project consists of a range of tailored infrastructure investments for freight operation and green freight improvements. With the support from the project, the Xiaogan Linkong Logistics Park can meet many value added elements of logistic park infrastructure including proximity to large cities, logistics infrastructure, park located in an economic zone, cheap labour availability, warehousing and custom clearance on site, and a logistic platform.

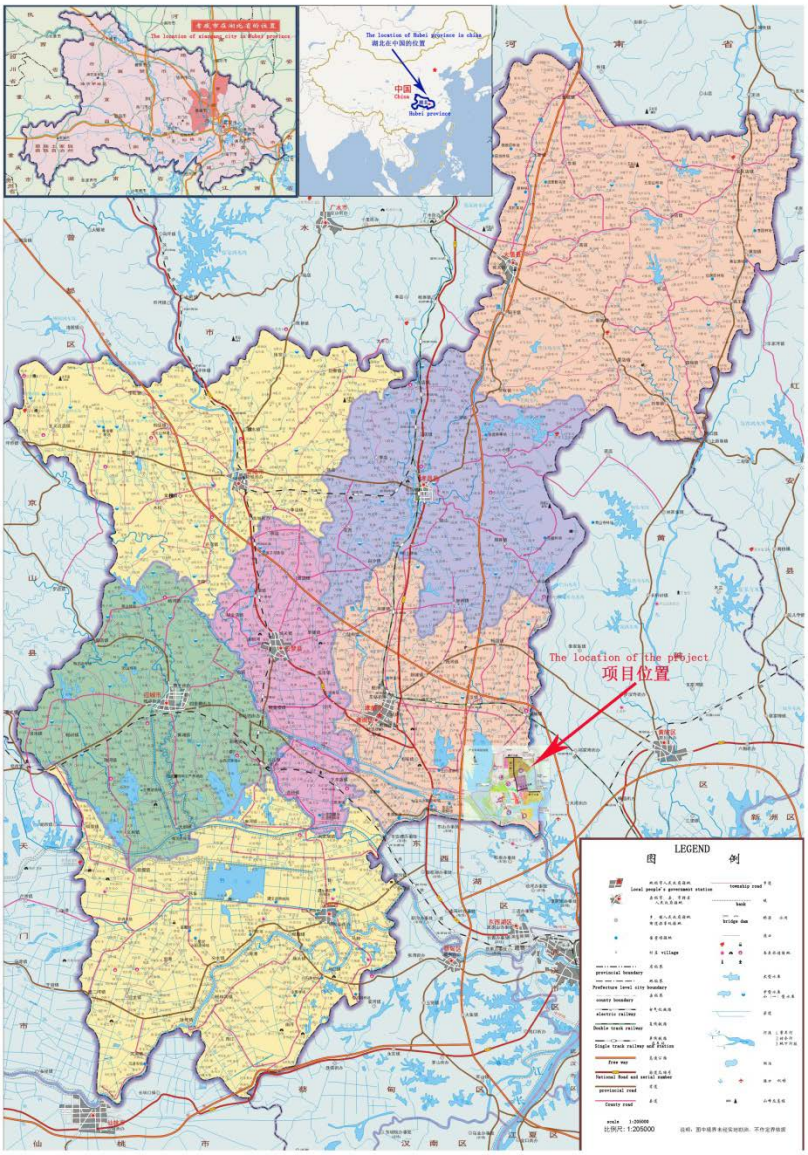

Figure 1 project locations

Considering its potential environmental and social impacts, this project is classified as a Category B as per the World Bank Operational Policy OP4.01-Environmental Assessment. The following World Bank safeguards policies are triggered: (1) OP4.01 Environmental Assessment; (2) OP4.12 Involuntary Resettlement;

Environmental impact assessment (EIA) report (For Appraisal) has been prepared for the Project by Hubei Provincial Academy of Environmental Sciences (HAES), a prestigious EIA consultant that has provided EIA services for many World Bank financed projects. The preparation of the EIA and an associated EMP followed the relevant laws and regulations of China, World Bank safeguards policies, as well as EHS guidelines, with continuous guidance from the World Bank task team. Besides these environmental safeguards documents, social safeguards documents have also been prepared following the requirement of OP4.12, including a Social Assessment (SA) Report and a Resettlement Plan (RP). The drafts of these documents were submitted to the Bank during the project preparation. They have been locally disclosed in local newspapers, Project Management Offices in Xiaogan Municipality and in local districts, and also have been disclosed in the World Bank Mission workshops.

This document summarizes the potential environmental and social impacts of the proposed Project based on above-mentioned safeguards documents. It highlights the key environmental and social safeguards issues related to the project construction and operation, describes the main findings and conclusion of impact assessment, and summarizes main mitigation measures and implementation management plan/frameworks.

In summary, the proposed project will have significant positive impacts of (1) supporting a green logistics approach to accelerate the transformation of Xiaogan into a trade-oriented economic zone, relying on international green good practices (green freight technologies, dedicated freight lane/corridors); (2) improving fuel efficiency, reducing fuel dependency, improving air quality and minimizing carbon emissions while maintaining competitiveness and economic growth; and (3)supporting more inclusive development through a reduction of spatial and social disparities between rural and urban areas in Hubei Province. It will not significantly degrade the ecological environment; neither will it adversely affect known physical cultural resources. Thorough Environmental and Social Management Plan has been developed that can adequately avoid, minimize, mitigate and compensate the adverse impacts to acceptable level.

2. PROJECT DESCRIPTION

The overall development objectives of this project are to promote efficient logistics in Xiaogan while mitigating environmental and social externalities from increased freight activities. The proposed project has three core components including: (A) Road; (B) Information Platform; and (C) Green logistics facilities.

- **Component A: Connected Logistics.** This component includes the construction of three roads and associated utilities: (i) Secondary Road No. 50 (1.7 km); (ii) extended Horizontal Road No. 8 (1.3 km); and (iii) Vertical Road No. 1 (5.4 km).
- **Component B: Efficient Logistics.** This component includes: (i) a Logistics Management Building that will host offices for the logistics firms and various other services; (ii) a Public Information Platform that will allow more efficient logistics operation through matching of logistics demand with existing capacity.
- **Component C: Green Logistics.** This component includes (i) an Intelligent Transport System (ITS) covering 60 junctions as well as main roads within the Airport Economic Zone (AEZ); (ii) training for the Traffic Police on the operation of the ITS and assistance on drafting the technical specifications for the bidding documents; (iii) road safety activities including the improvement of accident data collection and analysis, road safety audit of new roads pre- and post-opening, Road User Education (RUE) campaigns, activities focused on rural inhabitants, training for truck drivers and vehicle safety inspection programs for trucks; and (iv) Technical Assistance on green logistics policies.

The Component A and B are focusing on physical interventions and the Component C is focusing on non-physical interventions. Each component is composed of several sub-components or sub-projects. The detailed contents of project are listed in **Table 1**. The relevant locations are illustrated in Figure 2.

Figure 2 Location of project components

Table 1 Project Composition and engineering content

Component	Sub-Component/Project	Content
A. Connected Logistics	Vertical Road No.1	New construction of Secondary trunk road 5372 m long and 42 m wide. From Chentian Avenue to Horizontal Road No.8.
	Secondary Road No.50	New construction of Branch Road 1692 m long and 20 m wide. From Xiaohan Avenue to Vertical Road No.1
	Horizontal Road No.8	New construction of Secondary trunk road 1340 m long and 32 m wide. From Vertical Road No.1to Baishuihu Avenue.
B. Efficient Logistics	Logistic Management Building	Total land area 62780 m^2. Base area 4553 m^2; GFA 31396 m^2.
	Public Information Platform	A Public Information Platform that will allow more efficient logistics operation through matching of logistics demand with existing capacity.
C. Green Logistics	Intelligent Transport System	An Intelligent Transport System (ITS) covering 60 junctions as well as main roads within the AEZ
	Technical Assistance (ITS, Road safety, green logistics policies)	(i) training for the Traffic Police on the operation of the ITS and assistance on drafting the technical specifications for the bidding documents; (ii) road safety activities including the improvement of accident data collection and analysis, road safety audit of new roads pre- and post-opening, Road User Education (RUE) campaigns, activities focused on rural inhabitants, training for truck drivers and vehicle safety inspection programs for trucks; and (iii) Technical Assistance on green logistics policies.

3. REGULATORY AND LEGAL FRAMEWORK

The Environmental Impact Assessment (EIA) was conducted in accordance with Chinese EIA laws/regulations and the World Bank safeguards policies.

Chinese Laws and Regulations

The EIA is prepared fully in compliance with relevant China national laws, regulations, technical guidelines and standards. Compliance with a selective list of key Chinese regulations and EIA technical guidelines are summarized in **Table2**.

Table 2 Compliance with Key China Domestic Laws and Regulations

China Laws and Regulations	Project Compliance
Environmental Impact Assessment Law	• EIA prepared by licensed EIA consultant, reviewed and approved by local environmental protection agency.
Classified Directory for Environmental Management of Construction Project	• Individual EIAs have been prepared according to proper classification
Interim Measures for the Public Participation in Environmental Impact Assessment	• Two rounds of public participation conducted in surrounding communities, and info disclosure through website of Xiaogan Municipal Government.
Series of EIA Technical Guidelines on Atmospheric Environment, Surface Water Environment, Noise Impact Assessment, Ecological Environment.	• Impact assessment follows the technical requirements of these guidelines
Series of National and local Regulations on Ambient Air, Soil Conservation, Hazardous Waste, etc.	• Impact assessment follows the technical requirements of these guidelines

World Bank Safeguard Policy Requirements

Of the ten safeguards policies, the following are triggered: 1) OP4.01 Environmental Assessment; 2) OP4.04Natural Habitat; and 3) OP4.12Involuntary Resettlement. Relevant assessment and safeguards documents have been developed accordingly. In addition, the WB/IFC Environmental, Health and Safety General Guidelines is referred for the development of mitigation measures in the EMP.

Table 3 Compliance with World Bank Safeguards Policies

World Bank Policies	Project Compliance
Environmental Assessment (OP 4.01)	• Category B project. • An EIA and EMP have been prepared. • Consultation conducted as part of EIA process.
Involuntary Resettlement (OP4.12)	• Resettlement Action Plan has been developed.

World Bank Policies	Project Compliance
Environmental, Health and Safety General Guidelines	• Mitigation measures for waste management, community health and safety and construction management equivalent to EHS guidelines requirements are developed in the EMPs.

4. ENVIRONMENTAL AND SOCIAL BASELINES

The description of the prior-project environment (biophysical, ecological and socio-economic) establishes (i) the environmental setting within which the project will be implemented, and therefore needs to be designed to suit, and (ii) the environmental values which will be changed (either negatively or positively) by the project.

4.1 Natural Environment

Landform: The project area is located in the Airport Economic Zone (AEZ) in the Xiaogan Municipality. The AEZ is 5 km to the west of Wuhan Tianhe Airport and 13 km to the north of the Wuhan Railway Cargo Station. The municipality is between the Dabieshan Mountain and the Yangtze River with hilly areas in the north and plain area in the south. The AEZ is in the plain with planed area of 85.2 km2 including 28.4 km2 of water area.

The elevations in AEZ are between 17 m (low-lying ground in the southeast) and 47 m (hills in the north). The slope is below 6^{o}. The area has good geotechnical condition that fits for construction use.

Climate: The Xiaogan Municipality has a subtropical monsoon climate that has distinct four seasons. The yearly average temperature varies in the range from 15.4^{o}C to 16.1^{o}C, with extreme temperatures of -13.7 ^{o}C (Low) and 43.1^{o}C (High). The average annual precipitation is 1093.1 mm. The dominant wind directions are NE (winter) and SE (Summer) with average wind speed of 2.5 m/s.

River system: The Xiaogan Municipality has many river and lakes. In the AEZ, there are two major rivers, namely the Fuhe River and the Jiehe River. The Fuhe River is a secondary tributary river for the Yangtze River. The Jiehe River is the border between the Xiaogan Municipality and the Wuhan Municipality. Other than these major rivers, there is a small stream flow across the AEZ in north to south direction until it enters the Fenghuanggang Wetland.

There are two major lakes in AEZ, namely the Yezhuhu Lake and the Tongjiahu Lake. The Yezhuhu Lake has a water area of 24 km2 in the municipality. The Tongjiahu Lake lies across the Xiaogan Municipality and the Wuhan Municipality.

Other than the major rivers and lakes, there are many wetlands including the Zhangxihu-Yangxihu Wetland, the Fenghuanggang Wetland, and the Yujiazui Wetland, and many named or unnamed ponds.

Ecological environment: Within or near the project area, the ecological environment features mostly farm land ecology with some developed lands for housing buildings and small enterprises as illustrated in Figure 3.

Figure 3-A A village in project area

Figure 3-B Farm land in project area

4.2 Socio-economic Context

The Xiaogan Municipality is located in the center of Hubei Province, with an area of 8910km2 and a population of 5.27million (2012). The Xiaogan Municipality recorded a GDP of 123billion CNY in 2013, a 10.5 % increase from the previous year. Under the municipality's jurisdiction, there are 3 county level cities (Hanchuan, Yingcheng, and Anlu), 3 counties (Yunmeng, Dawu and Xiaochang), and 1 district (Xiaonan). The proposed project is located in the Minji Township of the Xiaonan District, which was converted into the AEZ in 2011. The basic socio-economic indicators in the AEZ are summarized in the Table below.

Table 4Basic Socio-economic Indicators in AEZ

Indicator	2013	2012
Administrative area, ha	9710	9710
No. of village committees	28	28
Household	7237	7237
Population	26310	27165
Farm land, ha	1813	1813
No. of population below poverty line	1483	1459
Per capita income	8508	7028

4.3 Special Environmental and Social Sensitive Sites/Areas

The proposed projects are all within the AEZ. In the project affected areas, there is no identified natural reserve, scenery areas, forest parks, cultural protection sites, or basic farm lands.

Communities

There are 14 sensitive receptors during construction stage and 1 sensitive receptor during operation stage. The affected communities are summarized in the table below. Among them, the villages (except for the Minji Community) will be phased out due to regional development while the Minji Community will remain to accommodate the local residents. Thus during operation phase, only the Minji Community will be affected.

Table 6Sensitive receptors in the Project Area

Subprojects	Name	No. of Households
Horizontal Road No.8	Pengxing Village	30
	Chengjia Yard	10
	Qiaojianwan Village	20
Vertical Road No.1	Anjingmiao Village	30
	Yangjiatian Village	34
	Tangjiawan Village	26
	Minji Town	80
	Yufantaowan Village	10
	Gaomiao village	30
	Gaomiaoyiwan Village	7
	Wangtufu Village	4
	Chengjia Village	15
Secondary Road No.50	Yaoxi Village	44
	Yangxingwan village	38
Vertical Road No.1 (in operation stage)	Minji Community	1500

Water Bodies

The project does not involve surface water bodies. The only one sensitive receptor is the groundwater at the Minji Water Plant Intake (ground water), which is closely by the road (approximately 25 meters from the red line of the proposed Vertical Road No.1 at K1 +740), as illustrated in the Figure 4

Table 6 Water Bodies in the Project Area

No.	Name	Location	Function
1	Minji WTP Intake	Vertical Road No.1	Groundwater

Figure 4 Minji Water Treatment Plant

5. IMPACTS ASSESSMENT AND MITIGATION MEASURES

The proposed project aims at assisting Xiaogan Municipality in facilitating the development of the logistics park by supporting the road infrastructures and the green logistics industry development. It can bring in multi-folder positive benefits. The positive benefits include (1) supporting a green logistics approach to accelerate the transformation of Xiaogan into a trade-oriented economic zone, relying on international green good practices (green freight technologies, dedicated freight lane/corridors); (2) improving fuel efficiency, reducing fuel dependency, improving air quality and minimizing carbon emissions while maintaining competitiveness and economic growth; (3)supporting more inclusive development through a reduction of spatial and social disparities between rural and urban areas in Hubei Province; and (4) eventually improving the local economic development and the income level.

Meanwhile, there are also potential adverse environmental and social impacts envisaged during the project construction and operation stages. These potential impacts are mostly temporary impacts related to construction activities. Based on the environmental impacts assessment reports and social safeguards documents, the manageable adverse impacts are primarily related to:(i) impacts on ecological environment; (ii) impacts on groundwater resource;(iii) community impacts such as resettlement in urban and rural areas, noise, dust, odour, solid waste, community disturbance and safety etc, and (iv) social impacts.

These impacts are carefully assessed in EIA and SA, and measures have been developed in EMP and RAP. In summary, the project will not have significant adverse environmental or social impacts; will not result in significant degradation or conversion of ecological environment. The mitigation measures in the EMP would effectively avoid, minimize, mitigate and/or compensate the impacts to acceptable levels. The key findings of potential impacts and mitigation measures are summarized as follows:

5.1 Impacts on Ecological Environment

Vegetation. The project is located mostly in rural areas that have been disturbed by intensive human activities. According to the field investigation conducted by the EIA consultant, the project affected areas are mostly farm land with minor shrubs, water and construction lands. The project will permanently acquire 38.85 ha (collectively owned lands). These lands are currently fish ponds (11.33 ha), dry farm land (11.79 ha), irrigated farm land (7.42 ha), barren land (3.64 ha) and construction land (4.67 ha). The occupation of these lands will cause permanent vegetation loss. However the field investigation also confirmed that the vegetation in these areas is mainly farmland crops, not primeval vegetation, and the project will not cause extinction of the species in the vegetation in the region. Therefore the project will cause some adverse impacts on the vegetation; however, compared with the whole area, vegetation loss is not significant, especially as there will be post-construction landscaping to offset some potential vegetation loss. Necessary protection measures have been identified and included in the EMP to mitigate the potential adverse impacts.

5.2 Impacts of wastewater

The wastewaters during construction are mainly construction wastewater, domestic wastewater and sediment filtrate. The construction wastewater is mainly from the cleansing water of vehicles and equipments that contains high SS and oil content. The domestic wastewater is mainly from the construction worker and has high content of COD, BOD and SS. There is no river or lake

within the area of influence of the project. To address these impacts, adequate mitigation measures have been developed in the EIA and in the EMP, such as collecting and treating the construction wastewater through oil-separation and sedimentation, and recycling the wastewater after treatment; maximizing the use the local facility to reduce domestic wastewater; and proper management of material storage and construction site drainage.

During operation the wastewaters are mainly the domestic wastewater from the logistics facilities. The wastewater will be pre-treated using septic tank or oil-separation and then conveyed to the Xiaogan City Wastewater Treatment Plant for treatment. Therefore it will not impact the natural water system in the town. In addition, mitigation measures have been developed to mitigate accidents-induced impacts by enforcing speed limit when crossing sensitive water bodies. All these measures have been included in the EIA and EMP.

5.3 Physical Cultural Resource

There are no identified physical cultural resources in the project affected area. However chance-find relics are possible during project implementation. The reporting and protection procedures have also been developed and included in the EIA and EMP.

5.4 Community and social Impacts

(1) Land Acquisition and Resettlement

The project will permanently acquire 38.876 ha (collectively owned lands). These lands are currently fish ponds (11.335 ha), dry farm land (11.801 ha), irrigated farm land (7.427 ha), and 8.309 ha other lands (barren lands or lands of construction use). The project will also demolish 45 private houses, affecting 242 people and 9,767 m^2 buildings. There will also be a brick plant (2100 m^2 GFA) and small amount of power poles to be relocated. The total GFA to be demolished is 10,867 m^2.

Table 7 Summary of Land Acquisition, ha

Component	Irrigated land	Dry farm land	Barren land	Water pond	Construction land	Subtotal
Horizontal No.8 Road	3.83	1.55	1	0.41	1.1	7.89
Vertical No.1 Road	3.6	10.25	1.87	4.38	3.57	23.67
Borrow pit/Spoil Ground	0	0	0.77	6.54	0	7.31
Total	7.43	11.8	3.64	11.33	4.67	38.88

To address the community impacts of land acquisition and resettlement, a Resettlement Action Plan (RAP) has been prepared in line with relevant Chinese laws and regulations, and World Bank OP 4.12. The RAP has adequately addressed the impact, compensation standards, institutional arrangement, public participation with consideration of gender issues, budget arrangement and grievance redress mechanism.

(2) Noise and Dust

There are a total of 13 villages/communities or 358 households as sensitive receptors subject to noise and dust impacts during construction and noise impact during operation. The noise sources

during construction mainly come from construction machines/equipment and material hauling vehicles. Along with noise, earth excavation, backfilling and pavement can cause secondary dust impacts on nearby communities. Such noise and dust impact is of temporary nature, but can be a major nuisance to the local communities.

To address such nuisance, adequate mitigation measures have been developed in the EIA and in the EMP, e.g. ban of night-time construction near communities; proper arrangement of construction schedule to avoid impacts on schools; enforcement of speed and horning control; utilization of low noise techniques and maintenance of machinery/vehicles; application of frequent water-spraying to quench dust; enforcement of truck cover for material transportation; enforcement of proper management of material storage; timely removal of spoil waste etc. With effective implementation of the mitigation measures, the nuisance of noise and dust from construction can be adequately mitigated.

During operation stage there will be one community or approximately 1500 households as sensitive receptors subject to noise or dust impact. The traffic on the project roads will have potential impacts of vehicle noise on the community. Traffic noise mitigation measures for those communities subject to noise exceeding applicable standard have been developed and budgeted in the EMP, including vehicle control and speed limit/no-horning signage.

During operation stage, the operation of the project facilities, i.e. venting and air conditioning system will also have potential impacts of equipment noise on the nearby communities. Mitigation measures such as adoption of low-noise equipments and sound attenuation walls are proposed in the EIA and included in the EMP.

(3) Exhaust gas

There are a total of 13 villages/communities or 358 households as sensitive receptors subject to exhaust gas impacts during construction and 1 community or 1500 households as sensitive receptors subject to exhaust gas and odour impact during operation. The exhaust gas sources during construction mainly come from construction machines/equipment and material hauling vehicles. Such impact is of temporary nature, and will not be a major nuisance to the local communities.

During operation the exhaust gas sources mainly come from vehicles on the project roads. With effective implementation mitigation measures, the nuisance of exhaust gas and odour can be adequately mitigated. These measures are also included in the EMP, such as timely cleanup and transfer of garbage, routinely spray of odour quenching materials, etc.

(4) Solid waste

There are a total of 13 villages/communities or 358 households as sensitive receptors subject to solid waste impacts during construction and operation. The solid wastes during construction are mainly the construction waste, the demolishing waste and the domestic waste from construction workers. Mitigating measures have been developed according to the national regulation, i.e. the Standards for Construction Site Environmental Management, and included in the EMP, such as reusing the spoil for filling and landscaping, enhance construction site management, and timely collect and transport offsite, etc.

3 sites have been selected as the spoil grounds for the construction. These sites are currently fish ponds and planned to be used as construction land according to the master plans. Therefore the spoil can be beneficially used as filling material in the fish pond for site preparation which can facilitate future development.

The solid wastes during operation are mainly the domestic garbage. Mitigating measures have been developed and included in the EMP, such as enhanced garbage management by timely collecting and cleanup, etc.

(5) Traffic Disturbance and Safety

Construction activities will inevitably cause disturbance on traffic, including blocking or narrowing existing road surface, traffic congestion, increase of material hauling vehicles through communities etc. These will adversely impact the daily life of nearby communities and villages, and cause potential increase of traffic accidents. To address these impacts, mitigation measures have been developed in the Social Management Plan (EMP), e.g. safety fences and signs; traffic diversion plan and staff; information disclosure and prior notice; community safety education; community participatory monitoring; ongoing public consultation plan during construction etc.

5.5 Soil Erosion

The road construction will disturb the soil surface and cause increased soil erosion. The EA estimated the project will induce additional soil erosion of 5535 tons. A series of temporary and/or permanent mitigation measures have been proposed for the design, construction and operation to minimize or mitigate the soil erosion. These measures have been included in the soil erosion control plan and been included in the EIA and EMP.

Minority ethnic group. There are no minority ethnic group identified to be affected by the project.

5.6 Induced and Cumulative Impacts

The Xiaogan AEZ Management Committee has retained the Xiaogan Environment Science Institute to conduct the Strategic Environmental Assessment for the Xiaogan AEZ Development Plan (refered to as Strategic EA) in 2014. As a part of the development activities in the Xiaogan AEZ Development Plan, the Project will also contribute to the induced and cumulative impacts of the plan. The findings of the Strategic EA are summarized as below.

Land use. As the development plan is implemented, the nature of land use will significantly change. According to the Strategic EA, 3559 ha of farm land will be converted into construction land for residential, public management, commercial, industrial, transportation, and public use, etc. The Strategic EA also recommended reclaiming the same amount of farm land to offset the farm land loss through the land compensation policy implementation. The land compensation policy applies to the land acquisition of farm land. The Municipal Land Resource Bureau will lead the implementation of the policy. Each year the bureau will summarize the farm land acquired for non-agricultural use and establish a quota for each county and city to reclaim the same amount of farm land. By adopting this approach the municipality can mitigate the land use impact and maintain the same amount of total farm lands available.

Ecological Environment. The development will occupy farm land and lead to reduction of agriculture productivity. According to the Plan EIA, the implementation of the development plan

will lead to reduction of grain by 21,000 tons/year, oil seed 7000 tons/year, and peanut 9000 tons/year. In addition, the conversion of farm land to developed land will convert the agricultural ecological system to urban ecological system, and lead to permanent and irreversible change of the structure and function of the ecological system.

On the other hand, the development of AEZ will improve the wastewater management by improving sewer collection and wastewater treatment, though the wastewater production will increase. After proper treatment, the effluent will comply with the Class I B discharge standard. Therefore the impact on aquatic ecological environment is insignificant.

Land resource carrying capacity. Currently the per capita land resource in Xiaogan Municipality is 0.068 ha, much higher than the minimum requirement of 0.047 ha. Therefore the land resource carrying capacity is sufficient to support the AEZ development.

Water resource carrying capacity. Xiaogan Municipality is rich in water resources as there are many rivers and lakes in the region. Currently there are 3 water treatment plants (WTPs) in the municipality, with short term water supply capacity of 220,000 m^3/day and long term capacity of 420,000 m^3/day. The current water consumption is 160,000 m^3/day and it is expected to increase to 240,000 m^3/day in long term. Therefore the municipality has abundant water supply capacity of 60,000 m^3/day in near term and 180,000 m^3/day in long term. According to the local government's plan, the AEZ will need water supply 50,000 m3/day in near term and 155,000 m^3/day in long term. The development of AEZ will not deplete the water resource or cause extra burden for water treatment.

Water environment carrying capacity. Based on the local government's plan, it is estimated that the AEZ will produce 31,700 m^3/day wastewater in near term and 95,200 m3/day wastewater in long term. After normal treatment to Class I B effluent standard, the AEZ will bring additional pollutant discharge of 695 t/a COD, 93 t/a ammonia in near term and 2085 t/a COD and 278 t/a ammonia in long term. However, the water quality in the receiving water body (Fuhe River) is currently Class IV, suggesting that the pollutants load have already exceeded its carrying capacity. Therefore additional pollutant reduction measures in the watershed of the Fuhe River are necessary to ensure the sustainability of the project. A series of mitigation measure have been proposed in the EIA, including developing more wastewater interception, collection and treatment facilities and industrial restructuring. It is expected that there will be reduction of total discharge of COD 4802 tons/year and ammonia 985 tons/year in the Fuhe River basin to leave room for the development of the AEZ.

For the above cumulative impacts, the Strategic EA has proposed a serious of measures to monitor future potential cumulative impacts.

The Strategic EIA also identified some induced impacts, such as increased wastewater, solid waste due to increased economic activities from AEZ development. To mitigate the pollution risks from increased runoff, the AEZ will enforce better waste management to reduce the pollutants from the initial flush during storm events. To mitigate the impacts, a wastewater treatment plant has been planed and currently in mid-2016. In addition, the existing landfill in Xiaogan Municipality with sufficient treatment capability will be used to handle the increased solid waste from the AEZ.

6. ANALYSIS OF ALTERNATIVES

6.1 With/Without Project

The EIA included a comparison between "With Project" and "Without Project" options. The "Without Project" option will use the old Road 38 and the village-to-village highways to address the transportation needs, instead of building the proposed roads under the Project. These two options were compared in terms of their impacts on sound environment, water environment, ecological environment and social environment. It was found that the "With Project" option is a better option in all aspects except in terms of short term impacts on ecological environment. The EIA therefore recommended the "With Project" option from the environmental impact aspect.

6.2 Spoil disposal

The EIA included a comparison between "roadside disposal" and "spoil ground disposal" options. Roadside disposal is an existing practice in the area. However it can lead to significant soil erosion. These FS design selected three sites to serve as spoil ground. Currently they are all fish ponds and are planned to be used as construction land. The EIA found that the spoil ground disposal can not only reduce the soil erosion, but can also beneficially use the spoil as filling materials, so that the site can be prepared for future development use. Therefore the "spoil ground disposal" option prevailed both in both environmental protection aspects and economic benefits aspects.

7. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

Public consultation and information disclosure have been conducted following the national laws and regulations, as well as World Bank *OP4.01 Environmental Assessment*. The first round of public disclosure was on October 11, 2014 by publicizing the EIA outline on the official website of HAES and at project sites. The second round of public disclosure was conducted on January 30, 2015 by publicizing the full EIA report on the official website of HAES and project sites. In addition, the EIA report was also published on March 7, 2015 on the local press.

Table 8Summary of Information Disclosure

	Date	Methods	Content
1st round	October 11, 2014	Poster at project sites; HAES website: http://www.hbepb.gov.cn/wsbs/gsgg/hpgs/hpdwhp/201410/t20141011_72964.html	Project title and construction content; the employer's contact; appointed EIA agent and EIA agent's contact; main tasks of EIA; method for submitting public opinion
2nd round	January 30, 2015	Poster at project sites; HAES website: http://www.hbepb.gov.cn/wsbs/gsgg/hpgs/hpdwhp/201501/t20150130_75131.html	Project title and construction content; summary of potential environmental impact with construction project; key points of EIA put forth in environmental impact assessment report; particular method for consulting public opinion
Additional	March 7, 2015	Local press:Xiaogan Daily	Revised draft of Project EIA report and environmental & social management plan

The first round of consultation was carried out during November 2014 through a combination of public meetings, field interview, and questionnaire survey in project affected communities. In total over 53 project affected people and the local authorities were consulted in project areas. The project received a broad support from the public consulted who expressed strong wishes to speed

up the project implementation. The key environmental and social concerns from the public are mainly related to dust and noise impact, and traffic disturbance during operation stage. In addition, the local EPA advised that the Yezhuhu Lake and Baishuihu Lake had recently been enlisted in the "Fine Lake Plan" by the State Council. Therefore they stressed that the construction of the bridge should be well managed to reduce the disturbance to the water quality in the lakes. After the feedbacks are collected and summarized, the PMO decided to remove the bridge subproject from the proposed Project.

The second round of consultation was carried on March 31 2015 through a combination of public meetings, field interview, and questionnaire survey in project affected communities. Again the project received broad supports from public and the local authorities.

The concerns and feedbacks collected in the consultations have been adequately taken account into the mitigation measures in the EMP and RAP, and will be closely supervised during construction period.

The EIA and EMP have been locally disclosed with reports available in local communities.

Table 9 Summary of Public Consultation

	Time	Place	Participants
First EIA Consultation	November 2014	Affected people; relevant agencies	Individuals: Affected residents in project area; Groups: Xiaogan Environmental Protection Bureau; Xiaogan Land Resource Bureau; Xiaogan Water Resource Bureau, etc.
Second EIA Consultation	March 31, 2015	Affected people; relevant agencies	The public in affected area of project construction, officials from local government and authorities including the Linkong Planning Bureau, the Linkong Management Committee, the Xiaogan Water Resource Bureau, the Land Resource Bureau and the local EPBs.

In addition, a series of public consultation on social impacts and resettlement related issuers were conducted between October 2014 and May 2015. These activities are summarized in the Table 10 below.

Table 10 Resettlement related public consultations.

No.	Date	Content	Participants
1	Sept., 2014	Design	Design Institute, PMO, Resettlement Offices, Represents of affected people
3	Nov., 2014	Land acquisition and resettlement impacts	Wuhan University, PMO, Resettlement office.
4	Nov. 11, 2014	Compensation on land acquisition	PMO, Resettlement office.
5	Dec., 2014	Compensation on house demolishing	PMO, Resettlement Offices, Represents of affected people

No.	Date	Content	Participants
6	Jan. 2, 2015	Social impacts	PMO, Resettlement Offices, Represents of affected people and affected institute/units
7	Feb. 3, 2015	Resettlement methods and willingness	Wuhan University , PMO, Resettlement Offices, Represents of affected people and affected institute/units
8	May, 2015	Enterprise	PMO, Resettlement Offices, Represents of affected Institutes/units

8. ENVIRONMENTAL MANAGEMENT PLAN

A stand-alone Environmental and Social Management Plan (EMP)has been developed, which specify environmental management and supervision roles and responsibilities, mitigation measures, environmental monitoring plans, capacity training and budget estimates.

8.1 Roles and Responsibilities

The implementation of EMP requires the involvement of multi stakeholders, each fulfilling a different but vital role to ensure effective environmental management for the project. The main responsibilities of various stakeholders are summarized in the following table.

Table 11 Key Environmental Management Responsibilities

Organization	Stakeholder	Responsibility
Environmental management	Xiaogan Municipal PMO*	• Establish environmental and resettlement department with dedicated staff; • Ensure incorporation of EMP measures into bidding document and civil work contracts; • Supervise the implementation of EMP; • Organize and coordinate safeguards trainings; • Provide semi-annual environmental and social safeguards progress reports to the World Bank; • Entrust external environment expert to monitor the project; • Receive and resolve public complaints and provide resolution results to the public; • Ensure proper archive of project documents.
Environmental supervision	Xiaogan Municipal EPB	• Review and approve EIA • Supervise the environmental compliance of construction and operation.
EMP measures implementation	Contractor	• Implement mitigation measures as per bidding documents, contract and EMP; • Establish environmental management system with dedicated staff; • Receive supervision and guidance from project owner, environmental supervision engineers and local governments; • Provide regular environmental reports to PMO
Consultant	Design institute	• Prepare FSR and project designs

Organization	Stakeholder	Responsibility
		• Incorporate EMP requirements into design documents
	Environmental Supervision Engineer	• Supervise the implementation of EMP measures by contractors as per contract requirements; • Provide regular supervision reports to PMO.
	EIA consultant	• Prepare EIA and EMP
	Environmental monitoring institute	• Licensed institute to conduct monitoring plan of EMP for both construction and operation stages • Provide monitoring reports to PMO

*The PMO is established under the Xiaogan Urban Investment Company.

8.2 Mitigation Measures

Mitigation measures have been developed and included in the EMP. The development of mitigation measures follows the national laws/regulations, technical guidelines and construction norms, with references to previous similar project experiences and World Bank safeguards policies and *Environmental, Health, and Safety General Guidelines.*

8.3 Environmental Supervision

During construction, environmental supervision shall be carried out by qualified supervision unit reporting to the PMO. Each supervision engineer company will be required by contract to assign dedicated Environmental Supervision Engineers to supervise the daily implementation of environmental protection measures by contractors. The key responsibilities of the environmental supervision engineers include:

- Develop environmental supervision plan prior to commencement of construction;
- Review preliminary design and detailed design to ensure that environmental mitigation measures in EMPs are incorporated into project design;
- Assist PMO to organize and implement environmental training for contractors and management staff;
- Review environmental specifications of the construction contracts;
- Review the mitigation measures developed by the contractor;
- Review construction organization plan, technical plans and construction schedule to ensure proper handling of environmental safeguards issues;
- Review environmental compliance of construction equipment and machines;
- Conduct daily supervision on ecological protection, water, air and noise impact, and supervise the implementation of environmental mitigation measures, and accept and sign off the completion based on environmental compliance;
- Identify problems of EMP implementation and enforce correction by contractors;
- Provide regular reports on EMP implementation status to PMO.

Furthermore, the local government will be issued a Commitment Letter on the Implementation of the EMP; it will be a strong environmental supervision measure. The local government will allocate the budget for the EMP implementation, the mitigation measures, training and monitoring tasks; etc provided in the EMP will be implemented and accomplished in the project's implementation and operation stages.

8.4 Environmental Monitoring Plan

Comprehensive environmental monitoring programs have been designed for construction and operation phases for the community infrastructure facilities and public service facilities. Monitoring includes water quality, noise, and ambient air quality. The PMO will entrust licensed environmental monitoring institutes to carry out these plans. (Please refer to the EMPs for detailed monitoring plans)

8.5 Capacity Training

To ensure effective implementation of environmental management plan, environmental training program has been developed. Environmental training will be conducted prior to the commencement of construction, with target groups of relevant staff of all PMO, contractors and supervision engineers. Training contents will include relevant national environmental laws/regulations; World Bank safeguards policies, environmental management plans, environmental supervision and monitoring techniques and procedures, Environmental Code of Practices (ECOPs), if any, and reporting requirements etc. A total budget of USD 117,460 has been planned for the environmental training plans in the EMP.

8.6 EMP Budget Estimates

All mitigation measures have been budgeted and fully incorporated in project costs including monitoring and supervision. The total EMP budget estimate for the project is USD 2,180,000 of which USD 385,000 is included in the engineering cost and USD 1,795,000 is additionally required by the EA.
In addition, a total of USD 14,703 will be used to compensate the land acquisition and resettlement.

Table 12 Cost Estimate for Environmental Protection measures

	Environmental protection measures			Quantity	Investment (1,000 USD)	Remark (1,000 USD)
	Part I. Environmental monitoring					
	Environmental monitoring during construction period			RMB 8,000USD/year for 4 years	8	Additional
	Environmental protection acceptance and monitoring upon completion			-	80	Additional
	Part II environmental protection measures					
Construction period	Wastewater	Domestic wastewater	Land use after septic tank treatment	4 sets	10	Engineering cost
		Construction wastewater	Reuse after oil separation and sedimentation	4 sets	10	Engineering cost
	Exhaust gas	Fugitive dust	Equip with water spraying vehicle to water the roads and work surfaces	1 set	16	Engineering cost
	Noise	Construction noise	Set up noise reduction facility such as temporary sound insulation baffle at the location near residential area	13	40	Engineering cost
	Solid waste	Domestic waste	Garbage bins in camps. Timely removal	4 locations	6	Engineering cost
	Ecological protection	Soil erosion control and ecological recovery			965	67 for Additional; 898 for engineering cost.

	Environmental protection measures			Quantity	Investment (1,000 USD)	Remark (1,000 USD)
	Social	Public	Media and public notice; billboard at construction site	13 locations	10	Engineering cost
Operation period	Wastewater	Sewage from information building	Class III standard	1	8	Additional
	exhaust gas	Exhaust gas	Ban of vehicles without sufficient exhaust treatment			
	Noise	Protection of sound sensitive locations	Speed limit and no honk signage	2	10	Engineering cost
	Solid waste	domestic waste	Set up garbage bins and timely cleanup		32	Additional
	Ecology Environment	Landscaping	Roads and information building		795	Engineering cost
	Part III environmental management					
	Training of environmental management participants during construction period				32	Additional
	Cost for external monitoring				160	Additional
	Total environmental protection investment				2182	

*Costs marked “Additional” are induced by measures required in the EA. Costs marked “Engineering cost” are costs included in the engineering cost.
Exchange Rate: 1 USD=6.3 CNY