

Executive Summary

ENVIRONMENTAL and SOCIAL IMPACT ASSESSMENT

For

**China: Three Gorges Modern Logistics Center
Infrastructure Project**

JULY 2016

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1. Introduction

1.1 General Background

This document summarizes the potential environmental and social impacts of the proposed Three Gorges Modern Logistics Center Infrastructure Project (**the Project**). 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 to avoid, minimize, mitigate and compensate adverse impacts.

The proposed project is located in Yichang City, southwest of Hubei Province in Central China. The World Bank is cooperating with Yichang Municipal Government (YMG) in this proposed project to increase the utilization of multi-modal transport and modern logistics services by businesses and consumers along the middle reaches of the Yangtze River by supporting the logistics infrastructure development and capacity building.

Considering its potential environmental and social impacts, this project is classified as a Category A as per OP4.01. The following World Bank safeguards policies are triggered: (1) OP4.01 Environmental Assessment, (2) OP4.04 Natural Habitats, (3) OP4.12 Involuntary Resettlement, (4) Environmental, Health, and Safety (EHS), General Guidelines (5) EHS guidelines for Shipping, (6) EHS guidelines for Ports, Harbors, and Terminals.

A comprehensive environmental assessment (EA) report has been developed by the Central-Southern China Safety & Environment Technology Institute Co., Ltd (CSSET) which has the Class A certified EA Consultant. The Social Assessment (SA) was prepared by the Wuhan University and consolidated into the Environmental and Social Impact Assessment (ESIA) Report. Both instruments have been prepared by the Consultants with recent experience in the World Bank projects in the region.

Based on the findings and recommendations of the ESIA report, a stand-alone Environmental and Social Management Plan (ESMP) has been developed. The preparation of these documents followed the relevant laws and regulations of China, World Bank safeguards policies, as well as relevant EHS guidelines, with comments and guidance from the World Bank task team.

1.2 Regulatory and Legal Framework

1.2.1 Chinese Laws and Regulations

The EIA is prepared fully in compliance with relevant China national laws, regulations, technical guidelines and procedures, as summarized in Table 1.

Table 1 Compliance with Key China Domestic Laws and Regulations

China Laws and Regulations	Project Compliance
<i>Classified Directory for Environmental Management of Construction Project</i>	The ESIA has been prepared according to proper classification
<i>Interim Measures for the Public Participation in Environmental Impact Assessment</i>	Two rounds of public participation conducted in surrounding villages/towns
<i>EIA Technical Guidelines on Atmospheric Environment (HJ/T2.2-2008), Surface Water Environment (HJ/T2.3-93), Noise Impact Assessment (HJ/T2.4-2009), Ecological Environment (HJ/T19-2011), Inland Waterway Project (JTJ227-2001), Port Construction (JTS105-1-2011)</i>	Impact assessment follows the technical requirements of these guidelines

1.2.2 Key Applicable Discharge Standards in China

Based on the project nature and the potential pollutants produced during construction and operation, a list of applicable effluent standards are summarized in the Table 2.

Table 2 Key Applicable Discharge Standards in China

NO.	Item	Discharge concentration and regulations	Applicability
Effluent standard for pollutants from ship (GB 3552-83), mg/L			
1	Oily water from vessels	Oil ≤15	Waste from ships using the facilities
2	Biochemical Oxygen Demand	BOD ₅ ≤50	
3	Suspended Substance	SS ≤150	
4	Food or other wastes	No discharge allowed	
Integrated Waste Water Discharge Standard (GB8978-1996) - Class III			
1	pH	6 ~ 9	Wastewater from the logistic park during operation.
2	SS	400	
3	BOD ₅	300	
4	COD	500	
5	Oil	20	
6	Animal and vegetable oil	100	
7	NH ₃ -N	/	
8	LAS	20	
Emission Standard for Industrial Enterprises Noise at Boundary (GB12348-2008) – Class II			
Class II	Day time	60 dB	Boundary of the logistic park near sensitive receptors
	Night time	50 dB	
Class III	Day time	65 dB	General boundary of the logistic park
	Night time	55 dB	
Emission Standard of environment noise for boundary of construction site (GB12523-2011)			
	Day time	70 dB	All construction sites
	Night time	55 dB	
Emission Standards for Motor Vehicles at Stage IV and Stage V			
		Stage V *	Stage IV
	NOX, g/km	0.18	0.25
	HC+NOX, g/km	0.23	0.3
	TSP, g/km	0.0045	0.025
	PN, g/km	*1011	-
*Stage V standards will be effectively from 2017.			

1.2.3 Key Applicable Ambient Quality Standards in China

Ambient quality standards applicable are summarized in the Table3.

Table 3 Key Applicable Ambient Quality Standards in China

NO.	Item	Discharge concentration and regulations	Applicability
Environmental Quality Standards for Surface Water (GB3838-2002)-Class III			
1	pH	6 ~ 9	Yangtze River Zhijiang Segment
2	BOD ₅ ≤	4	
3	DO ≥	5	
4	COD ≥	6	
5	TP (P Value)	0.2	
6	NH ₃ -N	0.5	

NO.	Item	Discharge concentration and regulations	Applicability
7	Oil ≤	0.05	
Environmental Quality Standard for Noise (GB3096-2008)			
2	Day time	60 dB	Residential area
	Night time	50 dB	
3	Day time	65 dB	Industrial area
	Night time	55 dB	
4a	Day time	70 dB	Certain areas along major roads
	Night time	55 dB	
Ambient Air Quality Standard (GB3095-2012)-Class II			
	Sampling time	Class II Standard Value (mg/Nm³)	Applicability
NO ₂	per day	0.08	All project areas
	per hour	0.2	
SO ₂	per day	0.15	
	per hour	0.5	
TSP	per day	0.3	
PM10	per hour	0.15	

1.3 Planning context

According to Yichang City Urban Master Plan (2011-2030), the Three Gorge Navigation Hub's positioning is to serve as a cross-dam transshipment port, industrial output port and tourism port. Yichang Municipality also developed a *Yichang Navigation Hub Master Plan*. Baiyang Port is in line with both master plans. Its operation will serve the Baiyang Industrial Park by providing logistic service for raw materials and products. The Baiyang Port development will play ground for the new urban development.

To facilitate the development of the Yangtze River Golden Waterway Navigation Network, National Development and Reform Committee (NDRC) prepared the Three Gorges Modern Logistics Development Plan (2010-2020). In this Plan, the Baiyang Logistic Park under this Project is one of the nine comprehensive logistic parks, which will be an important regional logistics node.

1.4 Gap Analysis

A GAP analysis was conducted to compare the difference between relevant domestic environmental standards and those of the WB. The general principle of the applicability is that, if there is inconsistency between the domestic standards and WB standards identified, the stricter standards will prevail. For the environmental management of port related facilities, the regulations on environmental management for ship pollution control in inner rivers issued by the Ministry of Transportation has recently become effective. Compared with the EHS Guidelines for Ports, Harbors and Terminals, and the EHS Guidelines for Shipping, the national regulation is more focused on management at operational stage while the EHS guidelines also cover issues on health and safety and at construction stages. For pollutant discharge, the EHS general guidelines also provided relevant requirements. However these domestic standards listed in Section 1.2.2 and 1.2.3 are equally or more stringent and more detailed, and therefore are applied to the project.

2. Project Description

The Project includes five inter-related components supporting the project development objective:

- **Component 1: Baiyang Port and operations area along the Yangtze River** (total area: 0.45square km). Itwill finance the construction of port facilities, and the purchase of equipment and installation to support port operations. Seven berths, a heavy container yard, a break bulk yard, an empty container yard, a bulk cargo yard, administration buildings, warehouses, and parking lots will be constructed under this component.
- **Component 2: Baiyang Logistics Park (total area: 0.90 square km)**.It will finance the construction of warehouses, container yard facilities, urban distribution facilities, living service facilities, business facilities, cleaning and maintenance work areas, internal roads, green spaces, administration buildings, and equipment.
- **Component 3: Transport Connection Infrastructure**. This component will finance the construction of: (i) an overpass road connecting Baiyang Port and the Logistics Park to Shawan Marshalling Yard; (ii) surrounding roads and underground utilities (power, water, drainage, etc.), including Guihu Road and Songgang Second Road; and (iii) Traffic engineering, involving traffic signals and junction channelization, etc.
- **Component 4: Baiyang Logistics Information Platform and Facilities**. This component will finance the purchase of: (i) computer hardware and equipment, and their installation in the information center; (ii) a system platform; (iii) field surveillance devices; and (iv) telecommunication infrastructure.
- **Component 5: Capacity Building**. This component will finance technical assistance to help the Yichang Transportation Investment Company (YTIC) to design and implement the port concession agreement and engage a private enterprise in the Logistic Park (LP) operation, develop port and logistics operations model, engage project management consultants, develop training and capacity building, and conduct port and logistics related sector studies.

The detailed physical activities are listed in **Table 4** and shown in **Figure 1**.

Table 4 Detailed Project Activities of Component 1, 2, 3 and 4

No.	Component	Activities
A	Baiyang Port and Operation Area	
A1	Water Area	Construct a series of facilities including: -2 sets of high-pile slab wharfs with areas 216*28m and 102*28m; -2sets of floating docks equipped with 90*16m steel barges; -2 sets of ramp wharfs, equipped with 65*16m steel barges.
A2	Land Area	Develop a series of facilities including: -One 3000-ton heavy duty cargo berth, four bulk berths, two multi-purpose berths (1036 m shoreline and 44.9 ha land, capacity 7 M tons/yr) -Associated loading/unloading equipments; -Associated container yard, roads, and auxiliary production facilities.
B	Baiyang Logistic Park	
B1	Mixed-use logistics area	Develop a series of facilities (518 mu) including: -Urban freight distribution area, food storage area, staging area, parking area, intelligent freight distribution center (third-party or fourth-party logistics enterprises), integrated management and logistics information center, living service area, and auxiliary operation area.
B2	Trade and logistics Segment A	Develop a series of facilities (357 mu) including: -Storage area, circulating and processing area, exhibition and trade area, auxiliary operation area, and storage yard.

No.	Component	Activities
B3	Trade and logistics Segment B	Develop a series of facilities (473 mu) including: Warehouse storage areas, cargo storage, processing zones, and auxiliary operation area etc.
C	Transport Connection Infrastructure	
C1	External access roads	Construct Shawan Road overpass bridge (secondary trunk road) connecting Songgang No.2 Road and Shawan Marshalling Yard, total length 675m.
C2	Internal roads	Construction of Guihu Road (secondary trunk road), south-to-north direction starts at Shawan Road and ends at Baiyang Avenue. Total length 1126m. And integrated utility tunnel for drainage, lighting, and communication.
		Construct of Songgang No.2 Road (secondary trunk road), east-to-west direction starts at Guihu Road and ends at Shawan Avenue. Total length 900 m. And integrated utility tunnel for drainage, lighting, and communication.
C3	Traffic engineering facilities	Construction of junction channelization, parking lots, in-park commuting system and traffic management system within the park.
D	Three gorge modern logistic information platform	
D1	Application system	Procure the software for: office automation, industrial park management service, logistic information service, business information service and regional logistics Big Data service platform
D2	computer and storage system	Procure the hardware including: Computer server, Data server, storage, emergency backup, virtualized resource platform, network communication etc.
D3	Central Apparatus Room	Construct and procure for: Computer mainframe room, cabinets, power system, fire-fighting systems etc.

Associated activities

There are mainly two associated facilities to provide basic service to the operation of the project. The Shawan WWTP (50,000 m³/day treatment capacity) is located 200 meters to the east of Baiyang Port. Currently the construction has completed. It will provide wastewater service to the Baiyang Port in the future. The Shibaoshan Sanitary Landfill is located 15 km to the east of the Baiyang Port. It is a class III sanitary landfill with treatment capacity 250 tons/day. It was built and put into operation in 2009. Since May 1, 2016, its service has covered the Baiyang Port. The locations of these facilities are also shown in **Figure 1**.

Linked projects

The Phase I development of Baiyang Port is currently undergoing and is expected to be completed in mid-2016. Its EIA was completed and approved in November 2011. Its construction activities complied with relevant requirements in its EIA report. The surface water quality is better than Class III surface water quality standards. No complaints were received during the construction stage. There was soil borrowed from the borrow pit in Wanlao Village. The borrow pit was left for natural recovery due to frequent soil excavation. No spoil ground was involved.

The re-routing/upgrade of about three kilometers of G318 national highway between the project site and the nearby expressway is also finishing with landscaping, lighting and dividing belt to be completed. Its EIA was prepared and approved in 2009. Its construction activities complied with relevant requirements in its EIA report with no complaints received during the construction stage. No spoil ground was involved. The borrow pits were only fairly restored.

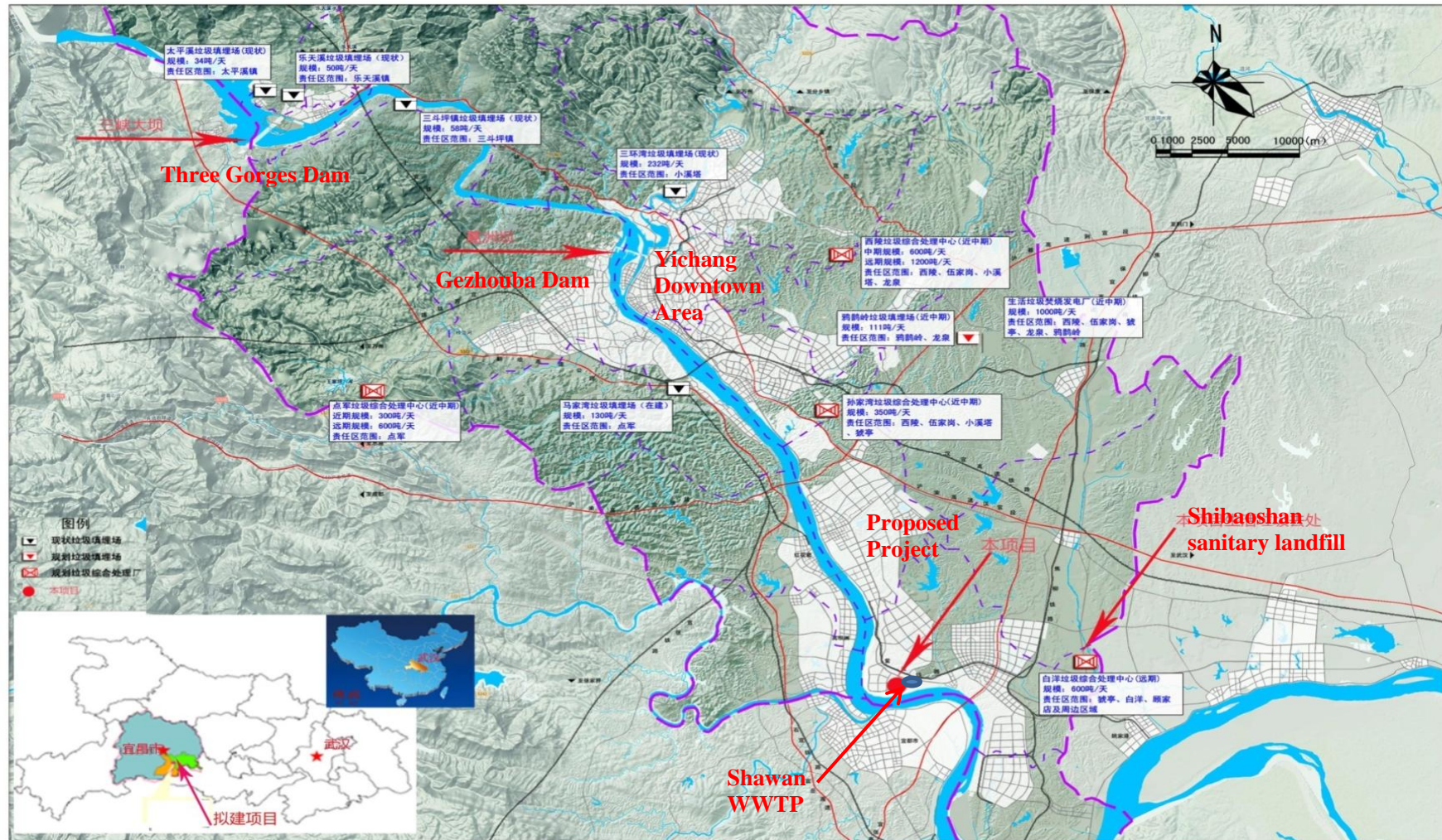


Figure 1 Location of the Proposed Project and its relationship with Three Gorge Dam and Yichang City

3. Environmental and Social Baselines

3.1 Natural Environment

Location

The project city of Yichang is located in the southwest of Hubei Province, at the center of China. Yichang city is famous as it is where the world class Three Gorges Hydraulic Dam and Gezhouba Hydraulic Dam are located at. As such, it is also an important location of transportation node and logistic node. The geographic extent of Yichang municipality is between E110°15'-112°04' and N29°56'-31°34'. The proposed project, is located at Zhijiang, a county level city to the east of Yichang city along the Yangtze River, approximately 35 km from the Yichang downtown area.

Topography

Yichang's topography is complicated and elevation differs greatly. Mountains are the major landform, accounting for 69% of total areas in the municipality to the west. Most mountains in this area have elevations higher than 1000 meters. The goddess peak in Xingshan County under Yichang Municipality reaches as high as 2427 m. There are also many gorges in the mountainous area, including the Xiling Gorge, one of the famous three gorges. The central area, accounting for 21% of total areas, is dominated by hills with elevations 100-500 m and inkling slopes of 5-25 degrees. Plain is the main landform in the east area, accounting for 10% of total area. The elevation in the east area is below 100 m. Karst landform dominates in the mountainous west and hilly central areas.

Meteorology

Yichang is located in the transitional zone between the middle subtropics and the northern subtropics and has humid subtropical monsoon climate. The annual average precipitation here is 1,215.6 mm. The average temperature is 16.9°C, with extreme high of 41.4°C in July and extreme low of -9.8°C in January. The frost-free period is 250~300 days long. The annual average radiation quantity is 100.7 kals per square centimetre. The annual average sunshine duration is 1,538~1,883 hours. The average relative humidity is 75.0%.

Hydrology and Hydrodynamics

There are several major rivers flowing through Yichang Municipality including the Yangtze River, the Qingjiang River, the Zuzhanghe River, the Huangbohe River, the Bolinhe River and the Xiangxihe River. Among them the Yangtze River is the biggest and the others are its tributaries. In the region where the proposed facilities are located, the main surface water is the Yangtze River.

Yangtze River Zhijiang Segment, where the proposed facilities are alongside, is the main water source and pollutant-receiving water. It has abundant water with good water quality, and it has enormous environmental capacity. According to the historic hydrological statistic data, its annual average flow rate is 14,300 m³/s with history high of 70,800 m³/s and low of 2,770 m³/s. Its annual average sand output is 526 million tons. Since the completion of the Three Gorges Hydraulic Dam Project was completed, the flow regulation capacity along the Yangtze River has improved significantly.

Ecological Environment

The proposed project area involves both terrestrial and aquatic ecological environments. Three surveys were conducted to study the ecological environment conditions between May 2015 and November 2015.

Terrestrial Ecology

The proposed port and logistics park will involve approximately 142.7 ha lands, most of which are farm land, with some small portion of ponds and construction lands. There is no presence of natural habitats in the project area. The survey did not find any national key public interest forest, forest park, famous scenery area, or cherish ancient trees, etc. Current natural vegetation is mostly shrubs and underbrush. The species are all common species that can be found in other places in Yichang municipality, including mulberry, *Rubuscoreanus*, smelly peony, imperata grass, Bermudagrass, mugwort grass, cattail grass, lotus and reed, etc.

There are five amphibians' species, nine reptile species, 21 birds species and 10 beasts species identified in the project area. Among them, 5 amphibians species, three reptile species, 11 bird species and two beast species are provincial protected species. None of them are national protected species. However, these provincial protected species are also common and wide spread in the region.

Aquatic Ecology

The construction of proposed wharfs and their operation will involve small amount of shoreline and some water area in the Yangtze River Segment. This ecological environment of this segment of river was covered by the environmental assessment of a recent project, the "Yangtze River Jingjiang Segment Rehabilitation Project" in 2012. According to the survey results of this project, the algae biodiversity is higher than 3.0; the plankton biodiversity is between 0.58 (July) and 1.21 (April); the benthonic biodiversity is between 2.1(July) and 2.4(April). These indicators suggest that the river water quality is very good.

In addition, the reference EA suggests there are 123 different fish species in the region, among them, this river segment is within the 300 km spawning and breeding area of 4 major fishes, including herring, grass carp, chub and big head carp. Other important fish species include *Psephurusgladius* (or Chinese Sturgeon, National Class I Protection target), *Neophocaenaphocaenoideaorientalis* (or Pilleri, National Class II Protection target), *Myxocyprinusasiaticus* (or bleeker, National Class II Protection target), and *Acipenser dabryanus* (or Riversturgeon, National Class I Protection target). Among them, the project area is approximately 4 km downstream of outside boundary of provincial nature reserve for the Chinese sturgeon.

This natural reserve is for the protection of Chinese Sturgeon, an endangered species in China. It is a migrant species that lives in the ocean but migrates up along the Yangtze River for nearly 3000 km to spawn in the up reach. After the dam was built, its migrant routes were interrupted and its community size keeps shrinking ever since. However, over years new spawning sites have formed downstream the dam but the sizes are small to sustain the species. Currently there are approximately 1000 heads of Chinese Sturgeon left and the species is relying on artificial proliferation to sustain its population. Therefore the Chinese Sturgeon is in critical condition and the species' survival is vulnerable to water-related development along Yangtze River. Other important fish species are in similar conditions.

3.2 Socio-economic Context

Yichang Municipality has a total population of 4.05 million (2009). Under the municipality there are five districts, five counties and three county-level cities. The Municipality has a land area of

21,084 km², with an urbanization rate of approximately 40%. In 2014, the total GDP in Yichang Municipality amounted to 48.19 billion USD, representing a growth of 9.8% over the previous year. Among the total GDP, the primary industry contributed 11.2%, while the secondary and tertiary industries contributed 59.3% and 29.5%, respectively. Urban residents' per capita disposable income was 3850USD, and the per capita net income of rural farmers was 1821USD.

3.3 Environmentally and Socially Sensitive Receptors

During EA preparation, detailed survey of environmentally and socially sensitive sites within in the area of influence has been conducted through field investigation and consultation with local agencies and communities. Other than the natural reserve for Chinese Sturgeon mentioned above, there are no special protected area, ecological sensitive area, natural habitat and physical culture resources in the area of influence of the project. .

The protection sites in the vicinity of the project that are sensitive to noise and ambient air quality impacts are mostly residential households in villages, including approximately 510 households sensitive to noise impacts and approximately 2,100 households sensitive to air quality impacts. The protection sites in the vicinity of the project that are sensitive to water quality impacts are the intakes of the local water treatment plants, namely the Baiyang Township Water Treatment Plant (WTP) and the Tianjiahe WTP. The ecologically sensitive site is the Chinese Sturgeon Natural Reserve. The detailed list of sensitive sites identified during the EA preparation is included in the ESIA and the ESMP to guide implementation.

3.4 Ambient Environmental Quality

Source of information is from site monitoring conducted during ESIA preparation.

Ambient Air Quality

Ambient air quality (PM₁₀, TSP, SO₂, and NO₂) was monitored at four selected sites in the project area. The testing results show that the average concentrations of the indicators are all below the threshold values of the Class II standards in the Ambient Air Quality Standard (GB3095-2012)(see **Table 3**).

Ambient Noise

Ambient noise monitoring was conducted at 6 selected sites at or outside the borders of project area. The monitoring results show that the noise levels during daytime at all sites are in compliance with relevant standards in the Environmental Quality Standard for Noise (GB3096-2008) (see **Table 3**). However for 2 out of 6 sites, the noise levels during night time exceeded relevant threshold values, probably due to their proximity to the State Road G318. The noise levels for the other 4 sites during night time were below the threshold values.

Surface Water Quality

Water quality monitoring at five cross-sections in Yangtze River Zhijiang Segment was carried out during EA process. Parameters analyzed include pH, SS, COD, BOD₅, DO, permanganate index, ammonia nitrogen, and oil. The monitoring results show that the water qualities at all cross-sections can meet the requirements of the Class III standards in the Environmental Quality Standards for Surface Water(GB3838-2002) (see **Table 3** in Chapter I).

4. Analysis of Alternatives

Alternative analysis has been conducted for the project with comprehensive considerations of environmental, social, technical and economic factors, based on which the overall optimum option is selected. The analysis of main alternatives is summarized as follows:

4.1 With/Without Project

With/Without project scenarios were compared, with main consideration of environmental and social perspectives. Without project, the logistics service level in Yichang will remain behind the growing demand. In addition, the logistics service will rely on the existing Yichang Port which has several potential environmental risks including (1) potential impacts on the protection of Chinese Sturgeon as it is located in the Natural Reserve area; (2) some berths are located near sensitive sites such as water intakes; (3) some berths are located near residential areas; and (4) insufficient garbage collection system in the port. With the project, Yichang Municipality can promote the logistic service level to match the demand, and at the same time improve the overall efficiency of shoreline utilization and of surface water source protection. It can also help improve the waste management induced from the logistics service. Therefore it is necessary to implement the proposed project, which will benefit the protection of regional environment.

4.2 Drainage Management

Two options were compared regarding the drainage plan in the proposed project site. Both options will adopt separate drainage system. The first option is to discharge storm water directly into water bodies near the site. The second option is to collect the initial flush (usually the first 15 minutes) of the storm water into a settling tank. The supernatant will be used for dust quenching. After the initial flush, other storm water will be directly discharged into the open trench along the east side of the site. Though the first option is more popular in domestic ports development, the second option can avoid the wastes or pollutants on the ground from entering water bodies. Therefore the second option is recommended as it can help protection the surface water quality.

4.3 Garbage Management

Different options were compared regarding the garbage management plan in the proposed project site. Garbage will be produced both on the site during operation and from the ships stopping at the port. For the garbage on the site, because the area is covered by the service of several existing garbage transfer stations and the garbage production will be small (approximately 1.2 tons/day), no additional garbage transfer station will be established and the garbage transfer will be conducted at existing stations. For the garbage from ships, there are two options. The first option is to allow the ships to handle it while the second option is to collect and handle it on the land. The second option is what is recommended by the General EHS Guidelines for Port and Ships, by the Ministry of Transport. Therefore the second option is also recommended for the proposed Project.

4.4 Oily wastewater Management

Oil containing wastewaters are mainly from the cleansing water in the land area and the bilge water from ships in the water area. For the handling of bilge water, three options are compared. The first option is to request the ships entering the port area to be installed with oily water treatment device. The bilge water is treated in-situ before discharged. The second option is to collect the bilge water for centralized treatment via either collection ship or on-shore facility. The oily water is then treated in the collection ship or transferred on-shore for treatment. The second option is recommended because it is more environments friendly. Detailed, on-shore facility will be built to collect bilge water from ships for treatment.

Other alternatives compared include the facility layout and Loading/unloading processes and techniques. Low pollution and low emission options are selected for each of them.

5. Assessment of Impacts during Construction

The project will have overall positive environmental and social benefits by improving the regional logistics service capacity which will promote the local economic development, improving local employment and economic structure which will help facilitate urbanization and social stability, improve the regional transportation network and facilitate local economic development. However, there will be potential adverse environmental and social impacts during the project construction and operation stages.

5.1 Wastewater

During construction, there will be limited amount of sewer or wastewater generated from construction workers (36 m³/day), and construction boats (9.6 m³/day). The main pollutants of these waste waters are mainly suspended solids (SS) and BOD. In addition, there will also be limited wastewater generated from construction site cleaning, which will contain small amount of oil. The construction of high-pile slab wharf will produce slurry and the cofferdam will cause temporary disturbance to water quality. All these wastewater, if not properly collected and treated, will have adverse impacts on environment and community. However, these wastewaters can be easily handled through a series of measures that are summarized in the EMP. With these measures taken, the impacts from these wastewaters can be controlled at an acceptable level.

5.2 Air Emission and Dust

A major environmental impact of the civil works for the proposed facilities is construction dust and air emission, mainly from earth excavation, cement mixing, on-site storage, secondary dust from material/waste transportation, and vehicle exhaust emissions. Based on survey statistics from similar construction projects, main dust sources are the dusts from cement mixing and transportation vehicles. Under normal weather condition, the dust from construction site and transportation may have impact scope of 50-200m.

The fuel gas powered vehicles and machineries can emit CO, NO₂ and THC. Based on survey statistics from similar construction projects, under normal weather condition, the emission from heavy vehicles or machineries may have impact scope of approximately 50m.

5.3 Noise

Construction noise mainly comes from construction machines and transportation vehicles. Noise impact scope is estimated, based on empirical statistics, within 25-55 m during the day and 230-330 m during the night time for single machinery or vehicle. If multiple machineries and vehicles are operating simultaneously, the impact scope will increase to 60 m during the day and 405 m during the night time. Some local residents in Guixihu Village and Yazishan Village will be adversely impacted by the construction noise. Proper measures will be needed to reduce the noise impact. Such measures have been proposed and included in the EMP.

5.4 Solid Waste

Solid waste during construction mainly comes from excavated spoil, debris from building demolition, construction debris of sand/aggregate/cement, as well as garbage generated by construction workers.

According to the Soil Erosion Control Plan prepared by PMO, this project will not cause net permanent disposal. Instead, a net borrow of 536,300 m³ will be needed (1.27 million m³ filling and 743,700 m³ of excavation) from construction of the Baiyang New Town Development

project in the region. However, if the disposals and borrows are not stored and handled properly, they can cause adverse impact on the vegetation and water qualities.

The garbage generated from the construction workers is estimated to be 0.4 tons/day. They can also be a particular concern, and may have similar adverse impact if not handled properly.

5.5 Soil Erosion

Earth excavation activities in the project will disturb the original land surface, and if not well managed, will cause soil erosion problems during rainy season. According to the Soil Erosion Control Plan, an estimated area of 183.12 ha will be disturbed, causing 42,524 tons or an incremental 35,920 tons soil loss during construction period of the proposed Project.

5.6 Ecological Environment

The construction of the port and logistics park will change the current land use of the project site (142.7 ha). Currently the land is mostly farm land, with some small portion of ponds and construction lands. There is no presence of natural habitats in the project area. Land use has been intensively modified by human agriculture activities for long history. Therefore, no significant terrestrial ecological impact is envisaged.

The construction of the wharfs will cause increased suspended solids in the water, which will cause adverse impacts to fish species. However the construction area is limited to a very small portion of the river section (i.e. 100 m vs. 1200 m) and the construction period is limited to dry seasons, and the fishes can freely mobilize to avoid the construction area. Thus the construction activity will only change the temporary spatial distribution of fishes. The impact on the overall fishery resource is minimal.

In addition, extensive greening is planned for the facilities upon completion of civil works, which will restore the loss of vegetation during construction.

5.7 Health and Safety

During construction period, if wastewater is randomly discharged and garbage is not well contained, or puddles not well drained, they may cause increase of vectors such as flies and mosquitoes and result in increase of infectious diseases. Increase of labour force may also increase the opportunities of infections.

In addition, construction activities will also pose potential health and safety hazards, e.g. construction noise may damage hearing ability of workers and dust may affect respiratory system of workers. Operation of construction machines, vehicles and tools is of particular concern for vocational safety, e.g. operation of heavy equipment like excavators, bull dozer and crane etc., use of electricity, fire hazards etc.

5.8 Physical Cultural Resource

A survey conducted during the EA did not find any physical cultural resource in the project area. However if any chance findings are identified during the construction stage, relevant measures should be taken to protect such findings.

6. Assessment of Impacts during Operation

Operation of proposed facilities will have impacts on residents and the surrounding environment, such as waste generated in the site and by ships, noise from loading/unloading, and exhaust emission from vehicles etc. In addition, there will be health and safety concerns in the operation of the port and logistic service.

6.1 Wastewater Pollution

The wastewaters during operation stage include the oil-containing wastewater and domestic wastewater from ships, and oil-containing wastewater, domestic wastewater, and road cleansing and initial flush storm water from park and port.

It is estimated the total volume of oil containing wastewater from ships is 2,138.4 tons/year, containing 10,692 kg/year of oil, assuming the average concentration is approximately 5,000 mg/L. Oil is the main pollutant. The domestic wastewater volume from ships is estimated at 6000 tons/year. Main pollutants include SS, ammonia and BOD. These wastewaters, if not properly treated and randomly discharged into the Yangtze River, can have significant adverse impact on the water quality in the river. Therefore both of these wastewaters will be collected for centralized treatment by special ships or facilities in the park.

The oil-containing wastewater from the park and port are mainly cleansing water. The main pollutants are oil and some SS. It is estimated that the total volume of oil-containing wastewater is 15,312 tons/year, containing 6,868 kg/year of oil. These oil-containing wastewaters will be treated by oil-separation, and then be discharged to the sewer system in the park. The domestic wastewater is mainly from the workers in the park and port. The estimated production is 46,421 m³/year. The main pollutants are SS, ammonia and BOD. The domestic wastewater will be discharged to the sewer system in the park. The major pollutant in the road cleansing and initial flush (15 minutes) storm water is SS. The volume of this wastewater is estimated to be 11,099 tons/year of cleansing water and 5,200 m³/time of initial flush storm water. These wastewaters will be collected for sedimentation treatment. The effluent will be used for dust quenching.

6.2 Solid Waste

The solid wastes during operation stage include the garbage from ships, garbage from park and port, and hazardous oil containing waste.

The garbage from ships is estimated to be 75 tons/year. The garbage from park and port is estimated to be 200 tons/year. Both of them can pose significant adverse impact on the river water quality if randomly discharged. They will be collected and transferred out through the garbage transfer stations nearby.

During operation there will be waste produced by machine repair and maintenance. These wastes are usually oil-containing and considered as hazardous waste. It is estimated that the volume of such waste will be 4 tons/year. They will be collected and handled by qualified contractors, or be sent out for treatment and disposal by qualified contractors.

6.3 Air Emission

The impact of dust from port operation is considered negligible. The major air pollution concern is the exhaust emission from vehicles, machineries and ships. These exhausts mainly contain SO₂, CO, NO_x and Hydrocarbon. The EA estimated that the impact scope is usually limited to 50 m from the source within which there are no sensitive receptors. In addition, in Yichang Municipality, it is mandatory for ships to adopt the powers supply on shore when they are parked in the ports. This helps further reduce the exhaust emission from ships. According to the acceptance test results for a similar port (Yidu Port), the relevant air quality indicators are less than one fifth of the threshold values in the ambient air quality standards. Therefore the impact of exhaust emission on ambient air quality is considered insignificant.

6.4 Noise

The main noise sources are the loading/unloading equipments (mechanic Noise) in port operation area and vehicles (traffic noise) on the road. For the two sensitive receptors, the Yazishan Village will be affected by both mechanic noise and traffic noise, while the Guixihu Village will be affected by mechanic noise only. It is estimated that the night-time noise at Yazishan Village will exceed threshold value by 6.8 dB(A). For the Guixihu Village, the noise levels will be below threshold values.

6.5 Impacts on Ecological Environment

Territorial ecology

The operation of the facility will cause disturbance by noise, vibration and air emission. Some animals will thus leave the area and find other places to live. However, given that the animals in the area are already adapted to human activities and they do not have unique reliance on certain habitats, they can easily survive in other places. Thus the project operation will not cause extinction of the animals or change their life pattern significantly.

Aquatic ecology

The operation will affect the aquatic ecology by means of pollution and traffic disturbance. The waste produced in ships, if not properly handled, will cause adverse impact on the water quality. In addition, the vessel propellers can be dangerous for small fishes swimming near them. However the wharfs and berths under the Project only occupy a small portion of the river cross-sections (less than 5% of the wetted cross section area). The chances of such damage will be small. Therefore it is considered that the impact on aquatic ecology is acceptable.

The EA also carefully reviewed the Chinese Sturgeon Natural Reserve and the spawning and breeding area of major fishes in the region. It was found that the proposed facilities are still miles away downstream from these areas. Therefore the port operation has insignificant impact on the spawning of these fishes. However, research by the Yangtze River Fisheries Research Institute suggests that the adult sturgeons migrate along the north side of the river (on the Baiyang Port side) while baby sturgeons are carried by the main stream. Therefore the port operation will have some impact on the adjust sturgeons' migration but insignificant impact on the baby sturgeons' migration. In addition, as there will be more and more such development in the region in the future, the accumulative impacts should be carefully reviewed for future projects.

6.6 Indirect/Induced impacts

The project is part of the ports consolidation initiative in Yichang given over-development of ports in urban area which is also the Chinese Sturgeon Natural Reserve. The first step is to phase-out the illegal sand mining along the river. This will bring positive impacts as excessive sand mining can pose threat to the river bank and bed (e.g. causing erosion), integrity of hydraulic facilities, aquatic environment, and water quality. The negative impacts are the livelihood and employment of sand mining workers and enterprises relying on the sand mining wharfs. Necessary measures need to be taken to restore their livelihood.

As the project can facilitate the industrial development and urban development, it can induce prosperity in labor market and employment. As the economic development extends, the local people's income level will also increase. At the same time, the urban development will bring in improved infrastructure service, which will help improve the living standard of local residents.

7. Risk Assessment

A risk assessment has been conducted in accordance with WB EHS guidelines and relevant national regulations and guidelines including the Environmental Risk Assessment Technical guideline (HJ/T169-2004) and the Standard of Major Hazard Source Identification (GB18218-2000). Per domestic requirement, a safety assessment report (SAR) was conducted.

7.1 Risk during Construction

The main risks during construction are safety risks to construction workers, including erection and dismantling of scaffold, crane (including float crane) operation, electricity usage, welding and cutting, and other common safety issues in civil works construction. In addition, there are also pollution risks from construction vessels, i.e. oil spills. Risks specific to water front port construction are drowning of construction workers due to accidental falling into water.

7.2 Risk during Operation

Based on consultation with the Yichang Maritime Affairs Bureau, the main accidents types in the port operation in Yichang are related to ships and wharfs. Ships related accidents are mainly grounding and collision both which can cause oil spill. Others can be fire accidents, mainly caused by aged electric circuit, failure to use flame-resistant decoration material, and usage of subgrade oil product, etc. Wharf related accidents include ship overturn, personnel injury or drowning due to uneven loading, and fire or explosion. Fires or explosions are often induced by usage of substandard oil product.

Main results of above accidents and risks are leakage of oil products. Since the threshold concentrations of oil products' toxicity to aquatic organisms are generally very low, the spill of oil products can have significant adverse environmental impacts. Thus it is also the focus of risk assessment during operation stage.

The EIA modeled a point-source spill in wet seasons with these parameters: wind speed 1.9 m/s, oil spill amount 90 tons, flow rate 2.0 m/s (near shore), and oil layer speed 2.067 m/s. The modeling results suggest that the Tianjiahe Water Intake (3.8 km downstream) for the local water treatment plant will be affected within 31 minutes. To mitigate such risks, emergency response plans have been developed. With proper measures and procedures taken, the environmental risks can be mitigated to an acceptable level.

7.3 Navigation Safety Risks Assessment

Based on the SAR and consultation with the relevant stakeholders, main navigation safety risks include the ship collision during navigation, accidents during ship approaching and departing, and the river shore stability accidents. The risks of accidents in port operation and ships navigation can cause injuries or even casualties. To address such risks, the port management entity and the navigation management entities should development standard operation protocols and enforce such protocols during operation stage. As the port will be managed by the same agency that has managed the Yichang Urban Area Port for many years, it is considered that such risks, if proper management measures taken, can also be mitigated to an acceptable level. The detailed risk prevention measure and emergency response plans have been developed and included in the ESMP.

8. Cumulative Impacts Analysis

8.1 Methodology

Because there is no domestic guideline for cumulative impacts analysis (CIA), the WB/IFC handbook on CIA was followed in such exercise during the EA process. A 6-step approach was taken including (1) identification of key VECs (valuable ecological components) and scoping; (2) identification threshold of VECs taking into consideration of relevant laws and regulations, standards, and experts and public consultation; (3) establish baseline of the VECs; (4) qualitatively and quantitatively predict the incremental impacts from the project; (5) predict accumulative impacts with past, current and future activities and compare against the thresholds; (6) propose mitigation and management measures as appropriate.

8.2 VECs and scope of CIA

In order to identify appropriate VECs, a pool of potential impacts was identified first based on the strategic EA (SEA) conducted in 2010 for the Yichang Navigation Hub Master plan. Then extensive consultations were conducted with key stakeholders and some local specialists in the industry in Hubei Province. Based on the SEA and consultation with public and experts, three VECs were selected: the water quality in Yangtze River, the shoreline resource and the Chinese Sturgeon.

As the Baiyang Port is part of the Yichang Navigation Hub, the layout and timeline in this project match that of the Yichang Navigation Hub Master Plan. Therefore the scope of CIA is the same as that of the SEA for the Master plan of Yichang Navigation Hub.

8.3 Thresholds of VECs

The thresholds of VECs were determined through literature review and specialists consultation. There was no conclusion regarding the ecological threshold of shoreline utilization, though the shoreline in Yichang was considered already over-developed. Threshold for the water quality was determined based on the function zoning of the river as drinking water source, thus Class III surface water quality standards need to be met. For Chinese Sturgeon, the analysis in chapter 6 suggested that the current status of hydrology and water quality need to be maintained in order not deteriorate its survival. Ecological threshold for the VECs are summarized in the table below.

Elements	Target	Indicators	Threshold values or recommended limit
Shoreline	Protection of shoreline ecological function	Planned shoreline occupation for ports development in total shoreline resource (km, %)	No clear understanding on the ecological threshold value yet. More study is needed.
Water quality	Protection of water quality	Class III surface water	$COD_{Mn} \leq 6 \text{ mg/L}$; $NH_3\text{-N} \leq 0.5 \text{ mg/L}$
Chinese Sturgeon	Protection of the safety of Chinese Sturgeon during migration in this region.	Migrate passage, depth, flow rate, mid-stream width; navigation speed and construction schedule.	Maintain current state: water quality no worse than Class III, average depth 38.32 m, average flow rate 1.14 m/s; 1/5 of river width reserved, navigation speed limit 15 km/h.

8.4 Incremental Impacts of this Project

The facilities will occupy 1,036 m of shoreline. However, the shoreline to be occupied has already been planned for port development according to the Yichang Navigation Hub Master Plan. It is only 1% of the total shoreline planned to be developed into ports (94.68 km). Thus the incremental shoreline occupation is minimal.

After the facilities are completed, the operation will produce an incremental pollutant load of 13.93 tons/year of COD and 1.62 tons/year of ammonia, which accounts only for 0.05% and 0.15% of the available carrying capacity (27,834 tons/year of COD and 1058.3 tons/year of ammonia) according to the Yichang Navigation Hub Master Plan. In addition, the pollutants produced will be sent to the Shawan Waste Water Treatment Plant (WWTP), instead of being discharged directly into Yangtze River. Therefore the project will not cause accumulation of pollutant load in the Yangtze River.

The port will occupy approximately 0.49% of the river cross section, which will induce only 0.5-2.0 cm/s of flow rate change. The impact on flow rate is negligible. The operation will bring in an estimated incremental increase of 2400 ships per year. Compare with the existing over 100,000 ships navigating in the waterway each year, the increment is negligible and will not cause significant impact on the migration routes of the Chinese Sturgeon.

8.5 Cumulative Impacts

Cumulative impacts of all activities in the past, present and foreseeable future on the VECs are analyzed. The VEC's current state is the result thus proxy of past activities' impacts. The future activities impacts are assessed by looking into the analysis in the relevant master plans.

Shoreline

The main stream of Yangtze river has total the 468.3 km shorelines in the region on its both banks. Of which, 64.12 km have been developed into ports and 82.53 km have been developed into other uses. The remaining 321.65 km shorelines (68.7%) are undeveloped but some of which are farm land, leaving natural shoreline even less. Therefore shorelines in Yichang have already been over-developed. The municipal government's strategy is to gradually phase out the wharfs in the urban area and integrate them into high-standards new wharfs in suburban or rural areas (such as the Baiyang Port under this project). No detailed plans have been made but some initiatives, such as phasing out sand mining wharfs, have been started. The phasing out of these wharfs will offset some of the new shoreline occupation and alleviate the overdevelopment situation. Its possible indirect/induced impacts are analyzed in 6.6.

Water quality

According to the monthly report on water environmental quality from February-May 2016 issued by the Yichang Municipality EPB, the water qualities at the nearest control cross-section (Yunchi) met the Class III surface water quality standards. This suggests that the past and current development activities along the river did not cause deterioration of water quality as it has maintained Class III standards.

For future, according to the Yichang City Urban Master Plan, the total waste water production in the city area will be 808,000 tons/day by 2020 and 1.083 million tons/day by 2030. Assuming Class I B discharge standard will be adopted, the total pollutant discharge will be 17520 tons/year of COD and 2336 tons/year of ammonia, approximately 14.1% and 44.8% of the environmental carrying capacities, respectively. The pollutant discharges in the ports are very small portions of the total discharges from the city. It is estimated that the pollutant discharges from the ports are 0.04% or 0.1% of the environmental carrying capacities of the river sections, in terms of COD or ammonia, respectively. As the pollutants load are within the water environment carrying capacities, the water body can self-purify. If the future development

activities can strictly follow relevant plans and the wastewater is collected and treated properly, the current water quality can be maintained.

Chinese sturgeon

Earlier analysis shows that in order to prevent Chinese sturgeon critical state from deteriorating, water quality and hydrological conditions of Yangtze River in Yichang need to be maintained at its current state or even improved. Cumulative impacts of present and future activities on hydrology are analyzed below (that on water quality is discussed above already).

Due to river condition in this segment, little or no dredging is needed in the ports development (e.g. Baiyang port). Other shoreline activities will not cause significant impacts on the river channel, depth and mid-stream line as the dredging does. The wharfs will occupy some of the wetted cross section area of the river, thus will influence the flow rate of the water. However the new wharfs in the downstream will substitute and lead to phase-out of some existing wharfs in the urban area, which therefore will offset some of the influence on the flow rate. In addition, the large scale ports and wharfs development is phased, thus its impacts on the hydrology are also gradual, providing the sturgeons opportunity to adjust. Therefore the accumulative impacts of ports development on sturgeon are acceptable.

The ports operation will also cause impacts on the migrant routes, as it could lead to increased navigation activities. Some fishing activities and practices in the river can also cause some negative impacts on the Chinese Sturgeon. However, if relevant management is strengthened, such as enhanced navigation management, enhanced fishery management and enhanced ports integration, these impacts can be controlled to an acceptable level.

8.6 Proposed Measures

To further mitigate the potential accumulated impacts, relevant measures are proposed in the ESIA.

For shoreline resource protection, the ESIA recommended conducting further study on the carrying capacity to identify appropriate threshold value of shoreline utilization. In addition, the ESIA recommended establishing a shoreline utilization permit system to enforce such threshold. Further, the SEIA recommended shoreline restoration by integrating the shoreline development.

For the water quality protection, the ESIA recommended strengthening industrial pollution control, enhancing domestic wastewater treatment and rural non-point source control, enhancing ecological protection and restoration, and strengthening monitoring system.

For Chinese Sturgeon, the EIA recommended dismantling ports in the core areas and relocating them to non-core areas of the Chinese Sturgeon Natural Reserve. In addition, strengthening pollutant discharge control and fishery management is also recommended.

9. Social Impacts Analysis

The project needs to permanently acquire 2139.8 mu (142.7 ha) collectively owned lands, including 1516.7 mu of orchards, 184.2 mu of fish ponds and 438.9 mu of other lands. There will be 137,000 m² (Gross Floor Area or GFA) private buildings to be demolished, involving a total of 252 households (911 people) will be affected. In addition there will be 6 enterprises or units (6019 m² in GFA) to be demolished, involving 44 affected staff. No temporary lands acquisition is needed. To address land acquisition and resettlement, Project Management Office (PMO) has prepared a Resettlement Action Plan (RAP) to address involuntary resettlement impacts caused by project constructions following the relevant Chinese laws/regulations and World Bank *OP 4.12 Involuntary Resettlement*.

The project construction will cause disturbance to local communities during construction of proposed facilities. However these impacts are temporary and can be mitigated through strengthened management. Relevant measures have been proposed to strengthen the management of construction workers and camps and included in the EMP to mitigate such disturbance.

The project will also have positive social impacts through improved local economy and employment due to ports and industrial park development, and improved traffic condition due to roads development.

10. Information Disclosure and Public Consultation

Public consultation and information disclosure have been conducted following the national laws and regulations, as well as World Bank *OP4.01 Environmental Assessment and BP17.50 Disclosure of Information*. Two rounds of consultation and information disclosure were carried out during November 2015–February 2016 through a combination of public meetings, field interview and questionnaire survey in the project affected communities. Other consultations include stakeholder interviews, interactive seminars, etc.

The first round of consultation was conducted shortly after the disclosure of the outline of environmental assessment in November 2015. In the first round of consultation, a total of about 45 project affected people (100% recovery rate) participated in the consultation through a public questionnaire survey. The project received a broad support (98% supportive and 2% neutral) from the public consulted who expressed strong wishes to speed up this project. In addition, five organisations or enterprises participated the questionnaire survey towards units. Most of them are supportive for the project except the Guixihu Waxing Plant, who objected due to a misunderstanding that the project will permanently acquire the land of the plant while in fact it will only be temporarily acquired.

The second round of consultation was conducted in March 2016 after the disclosure of the draft EIA. In the second round of consultation, 143 (out of 150) project affected people (95.3% recovery rate) responded with 82% being supportive and 18% being neutral. The key environmental concerns by the public are mainly related to noise (46%), dust (36%), water quality (24%), ecological (22%) and landscape (6%) impacts, most of which are related to construction site management during construction stage. These concerns have been adequately addressed in the EIA through development of mitigation measures, and will be closely supervised during construction period. In addition, 9 organisations or enterprises participated the questionnaire survey towards units, all of which are supportive for the project.

Information disclosure has been conducted along with the consultation. A summary of information disclosure is shown in the following table.

Table 5 Summary of Information Disclosure

Date	Information Disclosed	Locations
November 3, 2015	Project contents	Websites of Hubei Province Environmental Protection Bureau. Posters in each project affected villages
December 7, 2015	Simplified version of EIA Report	Websites of Hubei Province Environmental Protection Bureau.
February 4, 2016	Full version of EIA Report	Websites of Yichang City Transportation Investment Company Limited (IA).
February 5, 2016	Summarized environmental impacts; Download information on full version of EIA Report	The local press “Three Gorges Tribune”.

11. Environmental & Social Management Plan (ESMP)

A stand-alone Environmental & Social Management Plan (ESMP) has been developed, which specifies environmental management and supervision roles and responsibilities, mitigation measures, environmental monitoring, capacity building programs and EMP budget.

11.1 Roles and Responsibilities

The main responsibilities of various stakeholders are summarized in the following table.

Table 6 Key Environmental Management Responsibilities

Stakeholder	Responsibility
<u>Design and preparation</u>	
PMO/Project Owner	<ol style="list-style-type: none"> Overall supervision of EMP preparation; Liaison with relevant government authorities for environmental management; Organize the FSR, and EMP preparation; Ensure inclusion of environmental measures in works contracts
Design Institute	<ol style="list-style-type: none"> Incorporate mitigation measures into technical specifications of bidding documents.
Local EPB	<ol style="list-style-type: none"> Review and approve EIA, ensure EMP funding availability
Others	Information disclosure and public consultation.
<u>Construction</u>	
PMO/Project owner	<ol style="list-style-type: none"> Ensure that contractors' environmental responsibilities are clearly specified in relevant contract documents; Manage and supervise the EMP implementation, ensure the contractors will fulfill their environmental responsibilities; Hire independent environmental monitor to check the EMP implementation and monitor discharges;
Contractor	<ol style="list-style-type: none"> Implement mitigation measures as per bidding documents, contract and EMP, provide regular reports accordingly. Designate special staff to conduct on-site environmental management, and especially conduct management on various pollution sources.
Supervision Engineer	<ol style="list-style-type: none"> Supervise the construction activities and the implementation of EMP measures by contractors as per contract requirements.
Local EPB	<ol style="list-style-type: none"> Inspect the operation of discharge treatment facilities and discharge; Review the appropriateness of mixing stations, inspect the flying dust and noise control, determine the construction time. Receive and handle public complaints if any. Regular inspection to construction sites on implementation EMP measures, identify non-compliance and request corrections timely.
Others	<ol style="list-style-type: none"> Local government to develop a mechanism for the public to participate in the supervision; and ensure disposal and borrow that pits are well managed.
<u>Operation</u>	
PMO	<ol style="list-style-type: none"> Project handover.
Project Owner and operation units	<ol style="list-style-type: none"> Establish environmental protection teams to be responsible for the environmental mitigation measures and monitoring plan during operation stage; prepare emergency response plan and organize drills.
Environment Monitor	<ol style="list-style-type: none"> Conduct monitoring upon request of project owner.
Local EPB	<ol style="list-style-type: none"> Monitor the implementation of monitoring plans; Review the

Stakeholder	Responsibility
<u>Design and preparation</u>	
	effectiveness of environmental protection measures and identify the needs of additional environmental protection measures.
Fishery bureau	1. Fish proliferation; 2. Supervise the fishing activities, including fishing boats, machines and nets.
Chinese Surgeon Natural Reserve Managt Office	1. Protection and proliferation of Chinese Sturgeon.
Water conservancy and Hydropower Bureau	1. Supervise the soil erosion control plan implementation, ensure relevant measures are taken accordingly; 2. Hydraulic monitoring; 3. River section stabilization to ensure flood safety and navigation safety.
Maritime Affairs Bureau	1. Navigation management; 2. Ships management; 3. Pollution control in navigation routes.
Ports and Navigation Bureau	1. Development, maintenance and management of navigation facilities; 2. Development and management of all ports, participate in port plans, develop port area border plan, and maintain the use of navigation routes and shoreline; supervise the port operation.
Transportation bureau	1. Guide the highway and waterway science and technology, environmental protection and energy saving; 2. Organize management of key development projects for highway or waterway; 3. Logistic park management.

11.2 Mitigation Measures

Mitigation measures have been developed based on the national laws/regulations, technical guidelines and construction norms, World Bank safeguards policies and *EHS Guidelines*, and drawing lessons and experiences from previous similar projects. The key impacts mitigation measures are summarized in the following **Table A** standard Environmental Code of Practice (ECOP) has also been developed by project implementation unit (PIU) and included in the ESMP report. In addition, the Environmental, health and safety risks in the construction and operation stage of the project are assessed, with detailed risk prevention measures in the ESMP, as summarized in **Table 8**. The budget for implementing the ESMP is included in the engineering design thus in the civil works contracts, or provided by the project leading group office.

Emergency response plans have also been developed. The emergency response plan covers the requirements or arrangements on organizational structure and chain of command, tasks force composition, equipment needs, spills recovery, reporting, personnel training, practice and inspection. The commanding organization is composed of leaders from the Maritime Affairs Administration Center under the Yichang Maritime Affairs Bureau and the safety department of the Baiyang Port management entity and technical experts. Detailed emergency response plan is included in the ESIA and ESMP.

Table 7 Summary of Key Mitigation Measures of ESMP

Activities/Impacts	Mitigation/Prevention Measures	Budget 1,000 \$	Implement by	Supervisors
Design Stage				
Feasibility study (FS) alternative assessment	<ol style="list-style-type: none"> Design reasonable layout, pollution sources such as storage sites and noise machinery should be arranged with sufficient distance from facility borders; Achieve earthwork balance to minimize borrow and spoil. If necessary the soil balance can be achieved together with other projects in the region. Comply with Yichang Navigation Hub Master Plan and Yichang Baiyang Industrial Park Master plan. Include the budget of environment measures into project investment 	-	FS consultant	PMO
Bidding and contract management	<ol style="list-style-type: none"> Incorporate EMP into detailed design, and bidding documents; Environment mitigation measures included in the contractors contract; 	-	IA	PMO, WB
Public Consultation	<ol style="list-style-type: none"> Optimize alternative to reduce land acquisition; RP should be based on sufficient public consultation. 	Project prep. budget	Resettle-ment consultant	PLG
Construction Stage				
Site preparation	<ol style="list-style-type: none"> The construction area should be limited to pre-designated scope. Minimize water area usage; establish information board and hoardings; Construction site should be properly paved; After construction is completed, the construction site should be restored based on planed use. 	53.8	Contractor	PMO, EPB, PB, Environment supervision engineer.
Water pollution of construction activities	<ol style="list-style-type: none"> Sedimentation tank will be built at construction site, recycle as much as possible; Establish septic tank for sewage treatment; the effluent will be applied on farm lands. Random discharge is prohibited; No construction garbage/waste may be dumped into nearby rivers. 	18.5	Contractor	PMO, EPB, Environment supervision engineer.
Air pollution from excavation, storage and exhaust gas emission of construction organizations	<p><u>For excavation and storage</u></p> <ol style="list-style-type: none"> Prepare and apply for relevant approval for spoil; Temporary fences will be installed around the excavation site; Suspend construction in heavy windy days; Strengthen earth storage management, prepare covering and watering plans. Spoil should be transported out in a timely manner; <p>For transportation dust and exhaust emission</p> <ol style="list-style-type: none"> Sprinkle water regularly to suppress dust; Covers should be used during material transportation to avoid spill; no over-loading allowed; transportation routes and schedule should be well developed to avoid disturbance to residential area. Reuse waste soil as much as possible, or timely disposal in landfill. No burning of waste (construction material, waste oil, etc.) allowed. 	Listed in engineer ing cost. 30.8	Contractor Contractor	PMO, EPB, Environ supervision engineer. Environ. monitoring station

Activities/Impacts	Mitigation/Prevention Measures	Budget 1,000 \$	Implement by	Supervisors
Solid waste pollution from earthwork, transportation and disposal of waste soil, generation of living solid waste	<ol style="list-style-type: none"> 1. Waste building materials will be sorted and recycled as much as possible. Non-useable waste should be shipped out in a timely manner to designated place. It is not allowed to be dumped to garbage transfer stations. 2. Spoil waste will be reused as backfill as much as possible, and additional waste will be sent to landfills assigned by local authorities. 3. Garbage should be collected at garbage bins arranged in the construction site and be cleaned and transferred to transfer stations in a timely manner. 4. Drilling/piling waste should be reused as much as possible. 	-	Contractor	PMO, EPB, Environment supervision engineer.
Noise	<ol style="list-style-type: none"> 1. Use low-noise equipment will be adopted; avoid use of high-noise equipment, especially during night time; 2. Properly arrange schedule of construction to minimize noise impact on sensitive receptors; 3. Strengthen monitoring during night time construction; 4. For night time construction, seek EPB approval in advance; disclose the construction schedule to local residents; take noise attenuation measures such as acoustic shields, etc. 	40	Contractor	PMO, EPB, Environment supervision engineer. Environmental monitoring station
Soil erosion and ecological environment	<p><u>For soil erosion control</u></p> <ol style="list-style-type: none"> 1. Avoid large-scale earth excavation and backfill in rainy seasons; 2. Recover temporary land occupation in a timely manner. 3. Timely clear and transport waste spoil. 4. Other measures stipulated in the soil erosion control plan. <p>For terrestrial ecology</p> <ol style="list-style-type: none"> 5. Store farm land top soil for land restoration and landscaping use; 6. Construction area should be limited to acquired or designated lands to minimize the farm land acquisition and enhance protection to grass land and forest land. Concentrated construction camps should be established or utilizing local residential houses to avoid random camps; avoid random disposal of garbage. 7. Promote protection awareness of workers, forbidden hunting wild animals. <p>For aquatic ecology</p> <ol style="list-style-type: none"> 8. Strengthen trainings to contractor workers and forbid capturing protected fishes and animals during construction activities in the water. Make proper construction arrangements to avoid breeding period for Chinese Sturgeon (Mid-October to Mid-November) and for other fishes (April-June), and avoid activity period of cherish protected aquatic fish/animals (December to February). The in-water construction should be arranged during dry seasons to avoid migration routes of protected fish/animals. 9. Optimize construction methods to avoid detrimental impacts on protected fish/animals due to construction activity. Contractors should avoid pollution discharge and shorten in-water 	<p>1,527for soil erosion control;</p> <p>15.4for others.</p>	Contractor	PMO, EPB, Environment supervision engineer. Chinese Sturgeon Natural Reserve Management Office.

Activities/Impacts	Mitigation/Prevention Measures	Budget 1,000 \$	Implement by	Supervisors
	construction period. 10. Advanced technology should be used to minimize suspended sediments and minimize disturbance to sediments. 11. All wastes should be collected for treatment/disposal. No random discharge into the Yangtze River is allowed.			
EHS and physical resources	<p><u>For chance finding relics</u></p> 1. If any cultural relic is found, the construction must be suspended, the site must be preserved, local cultural relics preservation departments must be timely informed, and the excavation may not be resumed before the completion of cultural relic identification and protection. <p><u>For EHS</u></p> 2. Provide necessary protection gears for workers, such as safety helmet and earplugs, etc. 3. Provide necessary trainings to workers to control outbreaks of contagious diseases; 4. Provide necessary trainings to workers and strengthen construction camp management to prevent HIV; 5. Strengthen sanitation management on construction camp, arrange garbage bins and designate cleaning personnel; 6. Carry out disinfection, deinsectization, mosquito eradication, etc. 7. Strengthen the electricity management, avoid random electricity usage; 8. Strengthen toilet management by regular cleaning and disinfection;	23	Contractor	PMO, EPB, Environment supervision engineer.
Social impact and resettlement impact	<p><u>For social impact</u></p> 1. Properly arrange construction to minimize traffic disturbance; 2. Set up bulletin boards in construction sites with information of project contents, time of construction, contact persons and complaint hotline, etc.; <p>For resettlement impact</p> 3. Before construction commence, disclose in local media the resettlement arrangements and carryout the resettlement works; 4. Organize visits to the resettlement community (Taibaochang Community or others) for project affected people; 5. Organize inspection on the quality of resettlement housing; 6. Give employment priority to local affected people during construction and future operation; provide skill training to the affected villagers; 7. Disclose the accounts for land acquisition and resettlement. Allow the village to decide the income distribution publicly. Enhance monitoring of the utilization and distribution of income from land acquisition; 8. Minimize the difference of compensation standards for Baiyang Port Phase I and Phase II projects to avoid social instability; 9. PMO should coordinate the Baiyang Township and each village to provide assistance to	-	Local government	-

Activities/Impacts	Mitigation/Prevention Measures	Budget 1,000 \$	Implement by	Supervisors
	vulnerable families.			
Operation Stage				
Road operation and traffic management	<p><u>For noise</u></p> <ol style="list-style-type: none"> 1. Install acoustic shield (covered by the SR 318 Wancheng Bridge to Yunchi section Project) for certain areas; 2. Strengthen vehicle management, do not allow high-noise vehicle to enter the port, phase out high-noise equipments; 3. Strengthen road management for Guihu Road and Songgang No.2 Road. <p>For safety</p> <ol style="list-style-type: none"> 4. Design and install road crossings, such as zebra crossing; 5. Maintain such crossings regularly; 6. Strengthen traffic management to ensure smooth traffic. 	26.9	Yichang Transportation Bureau	Hubei provincial EPB, Yichang EPB; Yichang Transportation Bureau
Park and port personnel	<p><u>For wastewater</u></p> <ol style="list-style-type: none"> 1. Ensure that the domestic wastewater meet with Class III standard of the “Comprehensive wastewater discharge standard”, i.e. treated by septic tank, before entering city sewer; 2. Ensure that the kitchen wastewater meet with Class III standard of the “Comprehensive wastewater discharge standard”, i.e. treated by oil-separation tank, before entering city sewer; <p>For garbage</p> <ol style="list-style-type: none"> 3. Designate garbage point and arrange sanitation department to clean timely. 		Yichang Baiyang Port Container Co., Ltd.	Hubei provincial EPB, Yichang EPB; Yichang Maritime Bureau
Port operation	<p><u>For wastewater</u></p> <ol style="list-style-type: none"> 1. Port cleansing water and initial flush storm water needs to be collected and treated by sedimentation. The effluent will be used for dust quenching. 2. Oil-containing wastewater will be treated in oil-separation tank to comply with Class III standard of the “Comprehensive wastewater discharge standard” before entering city sewer; <p>For exhaust gas and flying dust</p> <ol style="list-style-type: none"> 3. Strengthen port management to keep equipments and vehicles in good condition; adopt low-pollution vehicles and clean fuel; turn off engines during loading/unloading; 4. Use watering to quench flying dust sources; reduce fall distance of materials; suspend operation in windy (>10 m/s) condition; 5. Install 8 m tall wind-proof net on east (150 m), north (460m) and west/southwest (320m) sides; 6. Strengthen landscaping by planting trees that can absorb harmful exhaust gas. <p><u>For noise</u></p> <ol style="list-style-type: none"> 7. Strengthen machinery maintenance; 8. Phase out outdated vehicles and machineries. <p>For solid waste</p> <ol style="list-style-type: none"> 9. For hazardous waste such as oil-containing cotton etc., follow relevant requirements in the 	307.7 for WW; 4,307 for air (4,292 for wind-proof net and 150 for water spraying vehicle) Others included in Operational service contract	Yichang Baiyang Port Container Co., Ltd.	Hubei provincial EPB, Yichang EPB; Yichang Maritime Bureau

Activities/Impacts	Mitigation/Prevention Measures	Budget 1,000 \$	Implement by	Supervisors
	<p>Hazardous waste containing and pollution control standards (GB18597-2001) to contain, store, and turnover to qualified contractor for handling; maintain records and conduct regular checking.</p> <p>10. Designate garbage point to gather garbage for sanitation department to clean and transfer.</p> <p>11. Clean up spills timely</p> <p>12. Recycle packing materials as much as possible.</p>	s		
Industrial park operation	<p><u>For solid waste</u></p> <p>1. For hazardous waste such as oil-containing cotton etc., follow relevant requirements in the Hazardous waste containing and pollution control standards (GB18597-2001) to contain, store, and turnover to qualified contractor for handling; maintain records and conduct regular checking.</p> <p>2. Designate garbage point to gather garbage for sanitation department to clean and transfer.</p> <p>3. Recycle packing materials as much as possible.</p> <p>For noise</p> <p>4. Strengthen machinery maintenance and phase out outdated machineries.</p> <p>5. Enhance vibration cushion for vibrating processing machinery and envelop the work area.</p>	76.9	Resident enterprises in the park	Hubei provincial EPB, Yichang EPB; Yichang Transportation Bureau
Ships management	<p><u>For wastewater</u></p> <p>1. No wastewater is allowed to discharge into river; apply to the maritime department for oil-containing wastewater acceptance so that relevant wastewater receiving ships can be arranged.</p> <p>2. Install on-shore wastewater acceptance facilities as soon as possible.</p> <p><u>For air emission</u></p> <p>3. Develop air quality management procedure for ship owners;</p> <p>4. Do not allow NOx and SOx discharge beyond allowable threshold;</p> <p>5. Use low-sulfur fuel;</p> <p>6. Reduce speed when approaching or near port;</p> <p>7. During parking or in unfavorable air conditions, avoid or forbid boiler room to conduct smoke channel cleanup</p> <p>8. If on-shore power is available, turn off engine when parked for longer than certain period time;</p> <p>9. Follow Marpol 73/78 protocol Annex VI for air pollutant from ships.</p> <p><u>For noise</u></p> <p>10. No honking when entering port;</p> <p>For solid waste</p> <p>11. Strengthen inspection and forbid solid waste dumping, keep record of ship garbage;</p> <p>12. Strengthen the ship waste information tracking system to avoid random dumping, provide training to improve awareness;</p>	76.9for wastewater; 15.4for air emission ; 76.9for solid waste; 185for ecological protection	Yichang Baiyang Port Container Co., Ltd. For ecological impact: PMO For diesel leakage risks: Port management body;	Hubei provincial EPB, Yichang EPB; Yichang Maritime Bureau port management department; Yichang Fishery Administration Bureau;

Activities/Impacts	Mitigation/Prevention Measures	Budget 1,000 \$	Implement by	Supervisors
	13. Collect garbage to handle on-shore. For ships from infected area, necessary hygiene and quarantine procedure should be followed. If needed, disinfection needs to be conducted. 14. The port should provide sufficient waste acceptance and handling capacity; 15. Provide such acceptance and handling information to ship captains 16. Follow Marpol requirements, forbid solid waste discharge from ships into water bodies; 17. Follow International Maritime Organization (IMO) port acceptance facility manual to design and equipment relevant solid water acceptance and handling facilities. 18. For the solid waste transferred from ships to port, relevant laws and regulations should be complied with when handling. For Ecological impact 19. Strengthen fish proliferation for Chinese Sturgeon, mullet, black carp, grass carp, silver carp, bighead carp etc. 20. Promote port oil spill emergency measures. For diesel leakage risks 21. Strengthen navigation guide near port; 22. Promote vessel traffic service (VTS) system development; 23. Strengthen waterway traffic management; 24. Develop emergency response plan.		Yangtze River Waterway Bureau; Yichang Maritime Bureau	

*IA: Yichang Transportation Investment Company Limited.

** Budget is converted to USD with 1USD=6.5RMB conversion rate.

Table 8 Summary of Key Risk Mitigation Measures of ESMP

Risk	Mitigation/Prevention Measures
Lightening	1. Install lightening protection device for tall equipment and structures, such as crane or platform in high elevation; 2. Install grounding system for port and park; 3. Design reliable lightening protection device for electric or electronic devices; 4. Prepare lightening hazard emergency response plan.
Storm and Snow	1. Protect the personnel from slipper and freezing. Suspend construction in extreme conditions; 2. Under heavy storm and fog conditions with poor visibility (<1km), the port should suspend ships approaching or departing procedures; 3. After large scale snow or frozen conditions, inspect structure integrity to avoid secondary hazards.
Flood control in port area	1. Under water construction should avoid flooding seasons. Remove temporary blockages after construction is completed to minimize the impact on flood carrying capacity; 2. Stabilize the shores in port area; strengthen the connection of bridge approach and dikes. Minimize disturbance to shores in piling;

Risk	Mitigation/Prevention Measures
	<ol style="list-style-type: none"> 3. Prepare for flooding before its arrival: the port should suspend load/unload process and start to practice emergency response plans; 4. Take measures to avoid disturbance to the dikes from bridge approach or belt conveyors.
Gale	<ol style="list-style-type: none"> 1. Suspending crane operation at stronger wind than Category 6; 2. Large machinery should be installed with stabilizing device against gale and typhoon; 3. The stabilizing device should interlock with the moving parts to avoid overturning; 4. Seal transfer point of belt conveyors to avoid flying dust.
Loading/unloading	<ol style="list-style-type: none"> 1. The cranes should be installed with safety devices required by relevant regulations and should be inspected regularly; 2. The cranes should be functioning well. 3. All ladders, platforms and aisles on the crane should have protection rail in good condition. 4. The cranes should have good sound signal device and lighting device. All metal surfaces should be grounded. 5. Crane should be manufactured by qualified supplier and has to be tested and inspected by qualified safety department; 6. Before crane operation, crane parts should be inspected to make sure they are in good condition. The operators should wear safety gears. 7. During operation, special commanding staff should be on site. The signals to be used should be understandable by all personnel. 8. Shut down power gage during maintenance. When electricity is needed, special staff should be on site for supervision. 9. All exposed moving parts should have safety device. 10. Moving machinery should have warning device with light and sound during operation. 11. Elevated platform should have protection rail and safety net. 12. Safety belt and anti-slippery shoes should be used when working 2 meters above ground. 13. Equip safety devices for large machineries, lighting towers or dangerous positions; 14. Provide safety gears for all personnel; 15. The operation at berth No. 7 should follow large size loading protocol when loading such materials. 16. No overload is allowed. 17. For No. 7 , No. 12, 13 berths, design minimum distance warning and emergency stop device to avoid collision; 18. For berths No.8-11, arrange escape route that is clear of way. 19. For berth No. 8-9 floating berth, make sure the positioning and lifting device are in good condition.
Storage yard	<ol style="list-style-type: none"> 1. Access roads for personnel and vehicles are reasonably arranged and clearly marked. 2. Containers should be arranged reasonably based on the nature of cargo and loading process. 3. Containers should be stacked well. 4. Containers stacking should follow relevant regulations;
Port	<ol style="list-style-type: none"> 1. Pay attention to the design of port, strengthen the base structure for approach to minimize the impact of uneven settling;

Risk	Mitigation/Prevention Measures
	<ol style="list-style-type: none"> 2. Enhance the stability monitoring for No.7, 12, 13 berths; 3. Strictly follow the port embankment design and construction code. Enhance monitoring during operation; 4. Pay attention to the strength and carrying capacity of crane to avoid settling; 5. Strictly follow relevant regulations to design collision protection facilities. 6. During operation, close monitor the deformation of the shores.
Dust and noise	<ol style="list-style-type: none"> 1. Select low noise equipment; 2. Install vans at heavy dust areas and provide masks for personnel 3. Install water spraying device at transfer points; 4. Regularly monitor the flying dust concentration, enhance awareness promotion. 5. Arrange safety cabinet with safety gears, regular inspect 6. Adjust the working hours at high temperature period. 7. Provide warm cloth at cold weather.
Navigation safety	<ol style="list-style-type: none"> 1. Strengthen the management of ships approaching and departing. 2. Establish the ships parking management with communication, traffic management and navigation assistance facilities.
Construction period	<ol style="list-style-type: none"> 1. Follow formal tendering procedure. Select qualified contractors and supervising engineers to ensure quality; 2. Prepare construction method statement for approval; 3. Reasonably arrange work schedule, avoid impacts on construction quality due to schedule crashing; 4. Use reliable material 5. Establish appropriate safety protocol. 6. Enhance equipment maintenance; 7. Prepare special construction plan for dangerous sections and arrange expert panel review. Special equipment should be installed and inspected following relevant regulations; 8. Flame should be supervised by special staff, develop emergency plan when working with flame; 9. Construction site should be reasonably arranged following relevant safety regulations; 10. Strengthen safety management on subcontractors or loaned equipment; 11. Supervise and inspect the safety production to eliminate safety risks. The risks identified should be recorded; 12. Establish safety training system; 13. Develop emergency mechanism and response plans, establish emergency task forces; 14. For port construction: follow the inner river safety management regulation, and navigation safety management regulation 15. For road construction: (1) develop construction safety plan and management mechanism, strengthen inspection; (2) Stick to the “3-forbid” rules and “3-implementation” rules; (3) establish the safety responsibility reward and punishment mechanism; (4) carefully review design documents before construction commence; (5) the traffic marks should provide maximum protection for construction workers and road users.

11.3 Environmental Monitoring Plan

Environmental monitoring plan has been developed to monitor the ambient environmental quality and pollution discharges during construction and operation stages. Project owners will hire licensed environmental monitoring institute to conduct monitoring, and provide the monitoring results to local EPBs and the World Bank.

The monitoring plan is summarized in Table 9. The budget for monitoring is 23,000 USD (equivalent to 150,000 RMB) for the 3 years of construction stage and 27,700 USD (equivalent to 180,000 RMB) for the 3 years post construction. For more details, please refer to the separate EMP document.

Table 9 Tentative Monitoring Plan

	Item	Construction Stage	Operation Stage
Ambient air	Pollutant source	Flying dust	Flying dust, vehicle exhaust
	Indicator	TSP, PM10	TSP, NOx
	Standards	Ambient Air Quality Standard (GB3095-2012)	Ambient Air Quality Standard (GB3095-2012)
	Location	Mixing station, residential areas in Guixihu Village, Yazishan Village, Baiyang Township, Wanfunao Village, etc.	Guixihu Village, Yazishan Village
	Frequency	One every quarter, 3-4 days each time (increase accordingly during construction peak times)	Once a year, one day each time
Noise	Pollutant source	Construction machinery and vehicle	Traffic noise
	Indicator	LAeq(dB)	LAeq(dB)
	Standards	Environmental Quality Standard for Noise (GB3096-2008) Emission Standard of environment noise for boundary of construction site (GB12523-2011)	Environmental Quality Standard for Noise (GB3096-2008)
	Location	Guixihu Village, Yazishan Village	Guixihu Village, Yazishan Village
	Frequency	Once every quarter, two days each time including day time and night time separately	Once every year, two days each time including day time and night time separately
Water	Pollutant source	/	Production waste water and sewer
	Indicator	/	pH, NH ₃ -N, COD, BOD ₅ , oil, etc.
	Standards	/	Class III standards in Integrated Waste Water Discharge Standard (GB8978-1996)
	Location	/	Wastewater outlet
	Frequency	/	Once every year

11.4 Environmental Training Plan

Environmental capacity training is part of technical assistance of the project, which will be provided to environmental management and supervision staff in PMO, project owners, contractors, supervision engineers. An environmental training plan has been developed in EMP. The focus on the training plan is the implementation of the ESMP rather than general knowledge of environmental protection.

11.5 Supervision and Reporting

Contractors, operators, monitoring institutes, supervision engineers and PMO shall prepare environmental reports concerning the project progress, EMP implementation, environmental monitoring results and report to relevant government authorities and the World Bank. The purpose of such reporting is to ensure the effective implementation of EMP mitigation measures, identify any inadequacy or problems at early stage in order to implement timely remedial action, and learn experiences/lessons to guide future works.

The main reporting requirements are as follows:

- 1) Project environmental supervision engineers will provide weekly and monthly report to PMO on the EMP implementation status;
- 2) PMO will regularly and/or randomly inspect the EMP implementation status. Findings will be recorded and incorporated into semi-annual progress report;
- 3) The external monitoring agency will timely monitor the implementation of relevant mitigation measures and regular monitor quantitative indicators, and provide external monitoring reports to PMO based on the EMP requirements and contractual requirements;
- 4) If a claim occurs, the external monitoring agency and PMO should notify local EPB. Further reporting to superior agency is required if necessary;
- 5) Based on (1)-(4), PMO will prepare EMP implementation progress chapters with external monitoring agency and specialist's assistance, and incorporate into the project implementation semi-annual progress reports for timely submission to WB.

The EMP implementation progress chapters should include (but not limited to):

- a) EMP implementation status: actual construction activities, actual environmental trainings conducted, actual mitigations measures implemented, existing issues and causes, next stage remedial actions;
- b) Environmental monitoring results: descriptions and brief analysis on monitoring data, identification of existing issues and non-compliance and their causes; proposed remedial actions; if necessary, claims received and resolving results;
- c) The overall assessment of the EMP implementation at this stage, the plans of and recommendations to next stage of work.