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Integrated Transport Demonstration Project of Wuhan City Circle Supported by World Bank Loan

Environmental Impact Assessment of Urban Transport Infrastructure Subproject in Anlu Xiaogan

Executive Summary

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Foreword

This EA Executive Summary is prepared based on Integrated Transport Demonstration Project of Wuhan City Circle Supported by World Bank Loan-Environmental Impact Report on Urban Transport Infrastructure Subproject in Anlu Xiaogan and Environmental Management Plan (EMP) which have been developed by Hubei Gimbol Environment Technology Co., Ltd according to policy requirements for type A project of the World Bank (OP4.01, OP4.11, OP4.12, BP17.50, OP 4.04) and EHS guidelines.

With Urban Transport Infrastructure Subproject in Anlu Xiaogan as main part of Wuhan IIII Project, construction contents of Wuhan III Project regarding Wuhan do not include design of civil engineering, environmental and social impact is mainly related to Anlu. Hence, environmental and social impact as well as measures summarized in the Abstract is mainly specific to Anlu part.

Contents of the Abstract cover basic conditions of Urban Transport Infrastructure Subproject in Anlu Xiaogan, environmental and social impact generated by project construction, measures to mitigate these impacts, public participation of environmental protection, environmental management, monitoring plan, etc.

1 Overview of construction project

1.1 Project source

The State Council formally approved Wuhan City Circle as “pilot site for comprehensive supporting reform of construction of national resource-saving and environment-friendly society” in December, 2007. The construction objective of Wuhan City Circle is to build the whole urban circle as an energetic urban circle, rapid urban circle, safe urban circle and ecological urban circle. To achieve the construction objective, integration construction of urban circle shall be boosted and six integration processes shall be accelerated, namely, infrastructure integration, industrial layout integration, regional market integration, urban-rural construction integration, ecological environmental protection integration and public service integration.

Anlu is located in the northwest of Wuhan City Circle and called throat of north Hubei. With constant advancing of integration construction of Wuhan City Circle, the exchange of Anlu with Xiaogan, Wuhan and other cities in the urban circle in people flow, material flow and information flow is closer. To support integration of regional industrialization, regional and social development and made traffic advance, it is the priority of current urban development to boost improvement of transportation environment of Anlu and Wuhan. Hence, “Traffic Integration Demonstration Project of Wuhan City Circle Supported by World Bank Loan” has been proposed, with “Urban Transport Infrastructure Subproject in Anlu Xiaogan” as the demonstration of transportation integration of Wuhan City Circle by virtue of developing integration of transportation hardware and software facility of Anlu and Wuhan.

With urban development, external urban traffic volume of Anlu has increased continuously and further regional integration of Anlu with Wuhan, Xiaogan and Yunmeng raises higher requirements for regional transportation integration. Current urban space shape and scale in Anlu is suitable for slow-moving means of transportation. It plays a positive role of energetically boosting developing travel mode of slow-moving traffic to build resource-saving and environment-friendly city.

Public utilities in Anlu are mainly distributed in the core area of old town and population is mainly distributed in the east of the core area. Infrastructure supply of road network in the core area cannot satisfy traffic demand and the core area of old town is seriously blocked in the peak period of access way; public transportation supporting facilities in Anlu are insufficient and public transportation service mechanism is imperfect. Urban public transportation is of low service level, failing to satisfy demand of residential production and life. Illegal passenger transportation

influences normal order of passenger transportation and safety of transportation participant; in addition, there is no special social public parking lot in Anlu at present and most vehicles park on the street. Parking space planned for street in the core area of old town causes road capacity to decline and traffic jam is apt to be caused in the peak period; on the other hand, on-street parking occupies non-motorway space and motors and non-motors travel together, reducing safety of road traffic.

Anlu has precondition of sustainable development and there exists problems including imperfect road network, lack of road traffic facility, low development level of public transportation, backward road safety management facility and equipment. Hence, Urban Transport Infrastructure Subproject in Anlu Xiaogan plans to start from aspects such as perfection of urban road network, integration improvement of existing main traffic corridor, improvement of public transportation service capacity, improvement of road safety management facility and equipment level to mitigate current transportation problem and provide demonstration function for subsequent transportation infrastructure construction.

1.2 Geographical location of the Project

The construction contents of Traffic Integration Demonstration Project of Wuhan City Circle Supported by World Bank Loan-Urban Transport Infrastructure Subproject in Anlu Xiaogan cover Anlu city center and the Geographical Location Map is shown in Fig. 1.

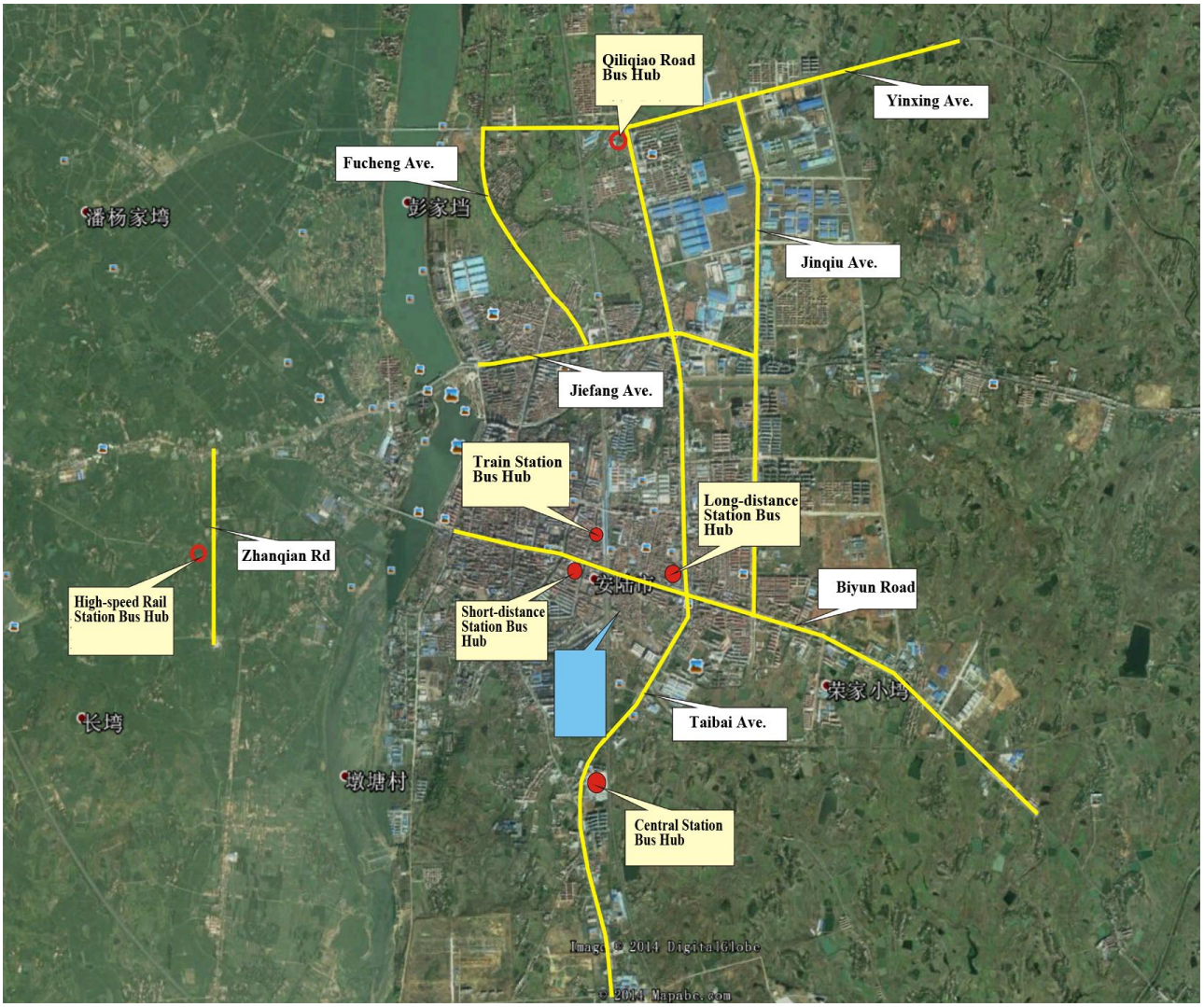


Fig. 1 Project Geographical Location Map

2 Project overview

Construction contents of the Project include five subprojects: integration traffic corridor and road network perfection project, supporting facility project of public transportation system, road safety project, slow-moving traffic system improvement and organization construction as well as technical assistance and related subproject construction contents are as follows:

1. Integration traffic corridor project

Integration traffic corridor project includes extended road 4.49km, reconstructed road 20.36km and newly-built road 4.29km. Specific construction contents are shown in Table 2-1;

Table 2-1 Table of Overview of Integration Traffic Corridor and Road Network Perfection Project

No.	Road names	Starting point	Ending point	Design vehicle speed (km/h)	Road class	Length (km)	Red line width (m)	Project contents
1	Taibai Road	Yinxing Avenue	Jiangxia Avenue	50	Urban arterial road	4.49	60	Reconstruction in the red line, not involving land acquisition. The reconstruction contents include: reconstruction engineering, building road traffic safety facilities.
2	Biyun Road	Yunshui Road	New G316	40	Urban sub-arterial road	6.13	24~52	Reconstruction in the red line, not involving land acquisition. The reconstruction contents include: paving asphalt on the pavement by sections, increasing guardrail, improving water drainage, greening, road traffic safety facilities, etc.
3	Jiefang Avenue	Fuhe Avenue	Jinqiu Avenue	50	Urban arterial road	3.34	43~53	Reconstruction in the red line, not involving land acquisition. The reconstruction contents include: paving asphalt on the pavement by sections, increasing guardrail, improving water drainage, greening, road traffic safety facilities, etc.
4	Jinqiu Avenue	Yinxing Avenue	Biyun Road	40	Urban sub-arterial road	4.46	60	Reconstruction in the red line, not involving land acquisition. The reconstruction contents include: paving asphalt on the lane, improving public transport and

								slow-moving system and other supporting facilities.
5	Yinxing Avenue	Fucheng Avenue	New G316	50	Urban arterial road	4.49	40	Reconstruction in the red line, not involving land acquisition. The construction contents include: expanding according to 40m red line on the basis of existing section width and reconstructing highway to urban sub-arterial road.
6	Zhanqian Road	Anjing Line (extension line of Jiefang Road)	Connection line of three bridges (Hengyi Road)	40	Urban sub-arterial road	2.10	40	The newly-built road connects Anlu West Railway Station of interurban railway, with overall length of 2.10km and width of red line of 40m
7	Fucheng Avenue	Yinxing Avenue	Jiefang Avenue	40	Urban sub-arterial road	2.19	40	Overall length of the newly-built road is 2.10km with width of red line of 40m.

2. Supporting facility project of public transportation system

Supporting facility project of public transportation system includes 3 public transport hubs, 1 small public transport hub, 2 public transport hubs+ highway passenger transportation center, public transportation e-card system, intelligent transport system and procurement of a batch of public traffic vehicles, with specific construction contents shown in Table 2-2;

Table 2-2 Table of Overview of Supporting Facility Project of Public Transportation System

Names	Total floor area (m^2)	Construction contents
Bus Transfer Hub at Passenger Transport Center Station	7490	Reconstruction and expansion within red line without newly increasing land; 40 parking spaces for public transportation; parking lot for non-motor vehicles accommodating 200 vehicles; furnished with 2-story public transportation supporting space and 1-story motor repair shop; build 10 motor vehicles and 21 non-motor vehicles.
Bus Arrival-departure Hub at Train Station	2030	Reconstruction and expansion within red line without newly increasing land; set up 6 parking spaces for public transportation, passenger getting-on and getting-off platform for public transportation, 1 1-story public transportation dispatching space and 2 waiting areas.
Bus Transfer Hub of Short-distance Station	10600	Reconstruction and expansion within red line without newly increasing land; set up 50 (9m)+22 (6m) parking spaces for public transportation; reconstruct public transportation supporting space with original 2-story current ticket sales station house (including public transportation dispatching center), along with 5 motor vehicles for parking and 10 non-motor vehicles for parking; set up 1-story public transport motor repair shop; set up 1 100-parking-lot underground public parking lot.
Bus Transfer Hub of	7280	Reconstruction and expansion within red line without newly increasing

Long-distance Station		land; set up 30 (9m)+20 (6m) parking spaces for public transportation; set up 2 public transportation motor repair shops on one floor; reconstruct public transportation supporting space with original 2-story current ticket sales station house, along with 20 motor vehicles for parking and 10 non-motor vehicles for parking.
Qiliqiao Road Passenger Transport Center + Bus Transfer Hub	16410	New construction, land acquisition area of 16410 $m^{2;}$ highway passenger transportation center: passenger transport occupying an area of 9130 m^2, 64 parking spaces for passenger car, newly-built 3-story passenger transport center with total area of 6480 m^2, with public transportation supporting space of 750 m^2 and bus transfer hub: public transport hub occupying an area of 7280m^2, setting up 54 (9m)+22 (6m) bus parking spaces, setting up 2 public transport motor repair shops on one floor, with area of 180 m^2, newly built 3-story passenger transportation center including public transportation supporting space.
Road Passenger Transport Center at High-speed Railway Station + Bus Transfer Hub	5000	New construction, land acquisition area of 5000 m^2; design as Class-III station of highway passenger transportation center and public transportation transfer hub.

3. Road safety project

Road safety project includes commanding center equipment and system construction, self-adaptation traffic signal control system, traffic video monitoring system, electronic police system and public traffic safety publicity education;

4. Slow-moving traffic system

Slow-moving traffic system improvement is mainly related to existing sub-arterial roads and slow-moving traffic of public channel in the old town and construction contents mainly include reconstruction of slow-moving exclusive way/exclusive road in the old town, perfection of mark and marking line system of slow-moving traffic, construction of non-motor vehicle parking facility and improvement of slow-moving railway passage.

5. Organization construction and technical assistance

Organization construction and technical assistance including organization operation, strategic research on Anlu traffic, research on optimization and reorganization of Anlu annual bus route, research on non-motorized traffic characteristics of Anlu, research on public rental bicycle system of Anlu, project engineering supported by the World Bank, technology management and consultation service, investigation and training, etc.

3. Overview of environmental impact

3.1 Identification of environmental impact

In the overall consideration of project nature, project feature, implementation stages (early stage, construction stage and operation stage) and environmental characteristics of the area, matrix identification method is adopted to identify environmental impact factors produced during construction stage and operation stage of the proposed project. During construction stage and operation stage of the Project, adverse impact to atmospheric environment, acoustic environment around the project, ecological environment along roads and water environment at crossing place of bridges and different levels of positive and negative influences on social environment and public life will be mainly caused.

Identification results of integrated traffic corridor, road network perfection engineering and supporting facilities engineering for public transport system are shown in Table 3-1 and Table 3-2.

Table 3-1 List of Identification Matrix for Environmental Impact Factors of Integrated Traffic Corridor and Road Network Perfection Engineering

Engineering activity / Environmental element		Early stage		Construction stage						Operation stage		
		Land occupation	Demolition and resettlement	Earth borrowing	Sub-grade	Road surface	Bridge and culvert	Material transportation	Construction	Driving of vehicle	Landscaping	Side ditch drainage
Natural environment	Water loss and soil erosion			-1S	-1S	-2S	-2S					
	Terrestrial vegetation	-1L		-2S	-2L	-2S	-2S					
	Atmospheric environment			-2S	-2S			-1S	-1S	-2L		
	Acoustic environment							-1S	-1S	-1L		
	Water environment			-2S	-2S	-2S	-2S				+2L	
	Land utilization	-1L	-2L	-1S								
Social environment	Industry									+2L		
	Agriculture	-1L		-1S								
	Traffic							-2S	-2S	+2L		
	Tourism									+2L		
	Social economy	-2S	-2S							+2L		
	Public health		-2S					-2S	-2S			
	Life quality of resident		-1S							+1L		

Notes: "+"——positive impact; "－"——adverse impact; "L"——long-term impact; "S"——short-term impact; "1"——obvious impact; "2"——slight impact; blank means that it is no impact.

Table 3-2 List of Identification Matrix for Environmental Impact Factors of Supporting Facilities Engineering for Public Transport System

Engineering activity / Environmental elements		Early stage		Construction stage			Operation stage	
		Land occupation	Demolition and resettlement	Foundation construction	Structural construction	Equipment installation	Vehicle access	Landscaping
Natural	Water loss and soil erosion			-2S	-2S			
	Terrestrial vegetation	-1L		-2S	-2S			

environment	Atmospheric environment			-1S	-1S	-2S	-1L	
	Acoustic environment			-1S	-1S	-2S	-1L	
	Water environment			-2S	-2S			+2L
	Land utilization	-1L	-2L	-2S				
Social environment	Industry							
	Agriculture							
	Traffic					-2S	+1L	
	Tourism						+1L	
	Social economy	-2S	-2S				+1L	
	Public health		-2S	-2S	-2S			+2L
	Life quality of resident		-1S				+1L	+2L

Note: "+"——positive impact; " — "——adverse impact; "L"——long-term impact; "S"——short-term impact; "1"——obvious impact; "2"——slight impact; blank means no impact.

3.2 Evaluation factors and evaluation scope

Evaluation factors are decided according to engineering contents of the project, environmental impact identification, features of all environmental factors of the place where the project is located and existing environmental problems; evaluation scope is decided according to *Technical Guide of Environmental Impact Evaluation* and *Evaluation Specification for Environmental Impact of Road Construction*. Please refer to Table 3-3 for details.

Table 3-3 List of Evaluation Factors and Evaluation Scope

Type			Evaluation factor	Evaluation scope
Evaluation of current situation of environment quality		Current situation of ambient air quality	NO_2, CO, PM_{10} and SO_2	Both sides of road center line and bus station Area of surroundings within the scope of 200m
		Current situation of quality of surface water environment	PH value, BOD_5、SS, TP, NH_3-N, petroleum, DO and permanganate index	Take proposed engineering area as the boundary and enlarge evaluation scope of the water body accepting wastes when necessary.
		Current situation of quality of local acoustic environment	Equivalent A sound-level	Both sides of road center line and bus station Area of surroundings within the scope of 200m
		Ecological environment	Animals and plants, water loss and soil erosion	Both sides of proposed engineering and area of surroundings within the scope of 300m
Forecast and evaluation of environmental impact	Construction stage	Evaluation of impact on surface water	SS, COD, petroleum, BOD_5 and NH_3-N	Water section of Fuhe River from Jiefang Mountain Section to Yuxiuge Section
		Evaluation of impact on atmospheric environment	Flying dust and asphalt fume	Scope of 200m from each side of road center line; possibly involved areas of engineering construction for public transport hub and passenger transport center.

Type			Evaluation factor	Evaluation scope
		Evaluation of impact on acoustic environment	Equivalent A sound-level	Scope of 200m from each side of road center line; possibly involved areas of engineering construction for public transport hub and passenger transport center.
		Environmental impact evaluation of solid waste	Waste slag, construction waste and domestic waste	Both sides of proposed engineering and area of surroundings within the scope of 300m
		Ecological environment	Animals and plants, water loss and soil erosion	Scope of 100m from each side of road center line; possibly involved areas of engineering construction for public transport hub and passenger transport center.
	Operation stage	Evaluation of impact on surface water	SS, COD, petroleum, BOD_5 and NH_3-N	Water section of Fuhe River from Jiefang Mountain Section to Yuxiuge Section
		Evaluation of impact on atmospheric environment	CO, NO_2, non-methane hydrocarbon and lampblack, etc.	Both sides of road center line and bus station Area of surroundings within the scope of 200m
		Evaluation of impact on acoustic environment	Equivalent A sound-level	Both sides of road center line and bus station Area of surroundings within the scope of 200m
		Environmental impact evaluation of solid waste	Animals and plants, water loss and soil erosion	Scope of 100m from each side of road center line; possibly involved areas of engineering construction for public transport hub and passenger transport center.

4. Investigation and evaluation of current situation of envioroment

4.1 Overview of natural environment

Geographic position

Anlu is located at the northeast part of Hubei Province, middle reach of Fuhe River-the branch of the Yangtze River and connection part of Xiaogan, Jingmen and Suizhou. It crosses through E 113°18′-113°56′ and N 31°03′-31°28′, with length from east to west about 60km and width from south to north about 46km. Construction contents of the Project covers urban area of Anlu. The Geographical Location Map is shown in Fig.1.

Topography and landform

Anlu is located at middle reach of Fuhe River-the branch of the Yangtze River and connection zone of Mound of North Hubei and Jianghan Plain. For overall landform, terrain within the border leans from north to south; the main geomorphic type is hill and hilly area accounts for 90% of national territorial area of the whole city; the other parts are plains. Anlu is located at the northeast edge of Neocathaysian Jianghan Plain Subsidence Zone. Main composition materials of the earth surface are basalt and red sandstone; north of the city is on stone transition zone and sand loams are distributed along banks of Fuhe River.

Geology

Place of the Project is located at the northeast edge of Neocathaysian Jianghan Plain Subsidence Zone. Owing to the coverage of quaternary deposits, its structural feature is unclear, but its stratum is in monocline. Fracture of the region is not developed and there are many low-order fracture structures. High-order regional big fracture structure cannot be seen there. A group of high-dip-angle tenso-shear fractures is developed. In which, F1 fracture has large scale, with broken width of 0.10-0.50m, fault displacement of 1.5m and length of 30m. It is in the form of peg-shaped funnel, developed with fault breccia and filled with argillo arenaceous soil; local cementation is fine. The fault is uneven and corroded, as well as filled by small calcite crystal cluster: obvious striation can be seen.

Place of the Project has simple stratum and single lithology. Quaternary deposits are widely distributed there, while some bed rocks are exposed. Bed rocks mainly include red sandstone and basalt of Cretaceous Gonganzhai Group, as well as gabbro, etc.

Climate and weather

Anlu belongs to the region with subtropical monsoon humid climate with clear four seasons, abundant heat and rainfall, long frost-free season and with features of “light, heat and water” reflected in the same season. The hours of sunshine all year round are 4,427.2 hours and it is 10.1 hours to 14.1 hours every day. For the shelter of cloud and mist, the hours of sunshine all year round are about 2150 hours in fact. The one with highest percentage

of sunshine is August, which is up to 66.7%; the one with the lowest percentage of sunshine is March, which is 35.9%. The average percentage over the years is 48.5%. Total solar radiation in one year is 111.5kcal/cm² and the intensity ratio is: progressive increase month by month in the first half year and progressive decrease month by month in the next half year. The peak value in one year appears in July and August and the minimum value appears in January and December. Effective radiation all the year round is 52.5kcal/cm². And the general tendency of seasonal distribution is: the solar radiation in summer is more than that in winter and the solar radiation in spring is more than that in autumn. The heat in one year is in maximum value in July and August and in minimum value in January and December.

Average annual precipitation in Anlu is about 1130mm. The distribution of precipitation has obvious seasonal change. Annual average temperature in Anlu is 16.1℃ and the extreme minimum temperature is -14.9℃ (on December 28, 1991); and the extreme maximum temperature is 38.5℃(on August 9, 1967).

Seasonal change of wind direction in Anlu is very obvious. Northerly winds happen most in Winter, Spring and Autumn and Southerly winds happen most in Summer with 2.6m.s annual average wind speed. The maximum wind speed varies for topographical influences and wind speed in some places can reach 27m/s (equal to 10-grade strong wind) and annual time of strong wind above 8 grades in the whole country is about 14 days. Low temperature damage in autumn usually happens in October every year.

Hydrology and river system

River system in Anlu can be divided into river system of Fuhe River and Yun River, which belong to Yangtze River basin and most of them belongs to river system of Fuhe River with 90% drainage area. But the drainage area of river system of Yun River only takes up 10%, which is only restricted to the edge in the east.

In urban area, the main river is Fuhe River which flows from north to south through urban area. Fuhe River belongs to seasonal stream and the river water is prone to go up and go down. It average water level is 35.88m and average annual discharge is 58.5m^3/s. The city moat and Haizi River flow through the east and north of urban area and finally flow into Fuhe River.

Average annual runoff volume of surface water is 422 million cubic meters. The per capita water resource is 681 cubic meters. Ground water storage in the whole city is about 110 million cubic meters and the workable reserve is 85 million cubic meters. In water resources quantity, for surface water of Fuhe River and Zhanghe River is supplemented for each other, the repetition amount is 81,118,400 cubic meters and total water resources in Anlu is 451 million cubic meters.

Vegetation

The vegetation area of the project area belongs to the mingled forest with evergreen broad leaf and fallen

broad leaf in northern subtropical region with a wide range of plants. Possessing floral elements of the south and north, the mingled forest with evergreen broad leaf and fallen broad leaf is the typical vegetation form in the whole district, which mainly includes pinus massoniana, sapium sebiferum, castanea mollissima, iron sharp cedar, cedar, camphora officinarum, cork oak, oriental arborvitae, Chinese ash, robinia pseudoacacia, paper mulberry, elm, populus tomentosa and so on. Shrubs include azalea, lespedeza, five-leaved chaste tree, fructus crataegi cuneatae, rhododendron fortunei, seguin chinkapin cup bark or root and so on; grass seed mainly includes miscanthus floridulus, yellow-back grass, white Chinese wildrye, globose phaenosperma herb and so on. Manually-planted vegetation mainly includes castanea mollissima, sapium sebiferum, and jujube and so on. Tree species of water and soil conservation include masson pine, oriental arborvitae, robinia pseudoacacia, amorpha fruitcosa and so on and the grass seed mainly includes clover, Bermuda grass, eremochloa ophiuroides and so on. Due to unique climate conditions in area of the Project, the vegetation is in good growing conditions.

Soil

The types of soil in area of the Project are mainly yellow brown soil and paddy soil. Yellow brown soil is the quaternary clay yellow brown soil which is developed form the quaternary sediment and has deep soil layer. Its texture is medium loam-clay and the fertilization is slow in becoming effective with delayed effect. There is long history of its plantation and wide properties of being planted, which is the plantation base of grain, cotton and oil plants in all ages. The paddy soil is paddy with water conservation and it belongs to the field whose yellow brown soil is pelite generated from shale, slate, mica plate, sandstone, phyllite, green mud gallet and other rotten slope washes. The soil in plough player belongs to light soil-clay and the plough layer is in slight acidity-neutral. Field of yellow mud with adhesive texture has high organic content and fine water permeability. Root of plants is easy to plunge into deeply and it has high content of total potassium and rapidly available potassium and is lacking in total phosphorus and rapidly available phosphorus.

4.2Overview of social environment

Area of land and population

Total area of Anlu is 1,353 square kilometers and constructed area of central urban area is about18.98 square kilometers. Total population of the whole city is about 642,500 and permanent resident population in central urban area is about 172,200. In the whole city, there are 9 towns administered by the city, 2 offices and 1 economic and technological development zone. In area under administration, there are 20 nationalities such as Tujia Nationality, Hui Nationality, The Mongol Nationality, Zang Nationality, Uyghur Nationality, Miao Nationality, Yi Nationality, Zhuang Nationality, Bouyei Nationality, Korean Nationality, Manchu, Dong

Nationality, Yao Nationality and other minorities.

Overview of social economy

In recent 6 years, Anlu keeps a GDP speed increase above 13% and its GDP in 2013 is up to12 billion and 533 million yuan among which the secondary industry is the principal and there is relatively rapid development of the tertiary industry. In the secondary industry, it mainly includes grain and oil machinery, agricultural and sideline products, metal products, textile and so on among which the machinery industry of grain and oil takes up 1/3 of market share in the whole country and which is the key industry cluster in Hubei Province; agricultural and sideline products represented by Shendan are leading enterprise of agriculture industrialization in the whole country; metal products represented by ASD is creating the biggest manufacturing and processing base of cooking utensil in the whole country.

According to Report on the work of Anlu Government in 2014, the whole city is expected to realize 14.1 billion yuan gross regional production in the whole year in 2013 with 12% comparable increase; the fixed-asset investment of the whole society is 16.28 billion yuan, increased by 33%; the fiscal revenue is 1 billion and 1 million yuan, increased by 27.1%; the urban per capita disposable income is 19 thousand and 920 yuan, increased by 15%; the rural per capita net income is 9100 yuan, increased by 15%; the industrial income is in steady increase. It is expected that 4.6 billion yuan industrial added value above ordinary scale will be realized in the whole year, increased by 14%.The promotion of key enterprises, “three projects” such as the growth of small and medium-sized enterprises as well as the incubation of entrepreneurial enterprises will be greatly carried forward and there will be 20 enterprises above ordinary scale to be added and there will be 23 enterprises whose productive value to be more than 100 million yuan.

Industrial structure

Machinery industry of grain and oil in Anlu takes up 1/3 of market share in the whole country and it is listed in key industry cluster in Hubei Province. In agricultural and sideline products, Anlu Shendan Company is honored to be “king of eggs” in this industry and it is the leading enterprise of agriculture industrialization in the whole country. The industry of metal products forms a close-knit industry chain from manufacturing of raw materials to fine machining and deep processing and it is trying to create the biggest manufacturing and processing base of cooking utensil in the whole country.

In recent tears, Anlu has improved relationship with Yangtze River Delta and Pearl River Delta by attracting foreign business and investment. Hubei ASD Company is one Yangtze River Delta enterprise imported to Anlu and it mainly manufactures products of cooking utensils.

Town development

Anlu overall planning and Overall Urban Planning Outline (2013-2030) have been reviewed and approved by panel in Hubei Province. A batch special planning will be carried out successively. Overall planning editing and revision in towns and villages will be carried out comprehensively and 38 city construction projects will be implemented and 350 million yuan investment will be accomplished.

Investment in transportation infrastructure

In recent years, the construction and investment scale of transportation infrastructure in Anlu has been in a successively rising trend. Especially in 2013, widening northward of Taibai Avenue, dismantling and reconstruction of small turnplate, reconstruction of old town, core area construction of new district in the west of the river have been started and a batch of engineering construction has been carried forward, which has improved regional transportation service ability and accessibility of road network one step further. According to the plan, in 2014, Anlu will greatly promote construction of "five roads and one bridge" in new district in the south of the city and relevant supporting facilities as well as construction of new district in the west of the river and the construction scale of transportation infrastructure in urban area will realize great-leap-forward development.

Urban sewage treatment plant in Anlu

Urban sewage treatment plant in Anlu is located in the east of Fuhe River and south of urban area of Anlu and south of the Second Fuhe River Bridge with 110 Mu occupation of land and 60 thousand tons per day of sewage treatment as total designed planning. Before the end of 2008, complete construction of sewage plant and sewage pipe network with 30 thousand tons per day of sewage treatment in Phase I construction and put them in service to serve about 160 thousand people and the service area is 18 square kilometers. Planned total investment is 100 million yuan and the investment in Phase I is about 57.27 million yuan. According to the principle "enterprise participation and market operation dominated by the government", Anlu implements financing of enterprise, government supervision and selecting superior one in superior ones and confirms Guangdong Jianmin Qingzhong Environmental Protection and Technology Co., Ltd. as the financing and operation organization, realizing reform and innovation in investment scale of government in programs for public good.

Physical Cultural Resources

According to field investigation, it is found that there are two private tombs in Jinquan Village within scope of works. After consulting relevant departments, public's participation in investigation and other works, it is confirmed that there is no physical cultural resources specified in safety guarantee policies of other world banks. According to the investigation, the private tomb is a tomb of common resident not historical relics. It has no cultural and archaeological meaning and it is not physical cultural resource. Before project construction, the displacement of two private tombs is

arranged in inhabitant resettlement plan.

4.3 Present environment quantity condition

Ambient air

According to *Letter of Municipal Environmental Protection Agency concerning World Bank Loan Project of Management Office in Anlu and Integration Demonstration Project of World Bank Loan and Traffic in Wuhan City Circle-Evaluation and Execution Standard of Environmental Impact of Sub-project of Urban Transportation Infrastructure in Xiaogan Anlu* (see appendix), the ambient air of project area belongs to " category II region" and the grade-II standard of *Ambient Air Quality Standard* (GB3095-2012) shall be performed.

Monitoring result of status of atmospheric environment shows that within construction range of the Project, indicators of SO2, NO2, PM10 and CO can meet requirements of grade-II standard of *Ambient Air Quality Standard* (3095-2012). If PM2.6 is recorded into monitoring and evaluation range, the result will be different.

Surface water

According to collected relevant data and on-site detection and inspection, and in combination with Letter of Traffic Integration Demonstration Project of Wuhan City Circle Supported by World Bank Loan – Executive Standard for Environmental Impact Assessment of Urban Transport Infrastructure Subproject in Anlu Xiaogan from Anlu World Bank Loan Project Management Office of Anlu Environmental Protection Administration (see in appendix), relevant surface water body involved in the Project includes Anlu section of Fuhe (upstream of Jiefang Mountain is Type II water body and downstream is Type III water body) and Chaishanhe, Maohe, Qilihe and Huguohe (Type III water body).

According to collected monitoring data of existing situation of water environment, it can be analyzed that water environment quality of fracture surface of Yuxiuge of Fuhe is good with all monitoring indexes of water quality in conformity with standard limiting values for type III water body by Environmental Quality Standard for Surface Water (GB3838-2002). Fracture surface of Jiefang Mountain of Fuhe, excluding dissolved oxygen in conformity with standard limiting values for type II water body by Environmental Quality Standard for Surface Water (GB3838-2002), all the other monitoring indexes are overproof. This is mainly related with admittance of large quantity of domestic wastewater, industrial wastewater and agricultural non-point source pollution in Fuhe.

Acoustic environment

Roads to be rebuilt and extended in the Project and stations are located in urban area with high-level urbanization of surroundings and a number of monitoring points will be influenced by traffic noise and noise of social activities to a greater extend and some points fails to meet corresponding GB3096-2008 Environmental Quality Standard for Noise; development of planned site of roads to be newly constructed and high speed railway station and highway passenger transportation center is minor and unaffected from road and traffic noise, thus creating good acoustic environment quality and conform with Type II in GB3096-2008 Environmental Quality Standard for Noise.

Ecological environment

Construction area of the Project is located mainly within urban built-up area, and such area is human activities-centered with row upon row of high-rise buildings, shops and residences, forming urban structure-based artificial ecosystem. Plant resources in this area includes cultivated plants and wild plants and the former constitutes of tree species for walking tracks in cities and towns, tree species for commercial forest and crops while the latter constitutes of arbors, shrubs and herbage. Tree species for walking tracks in villages mainly includes camphor tree, metasequoia (artificially cultivated), osmanthus, and cedarwood and platanus hispanica, etc. Tree species for commercial forest mainly includes masson pine and crops constitute of oilseed rape and rice, etc.

There are no large-size wild animals within engineering scope and existing plants and animals mainly are species reserved and developed for satisfaction of human needs and are under human's control. Biodiversity is low.

Ecosystem within the evaluation scope is relatively stable and functionally complete. On account of effective management and energy supply from man power, such system can be maintained and developed stably and equipped with certain capacity of disturbance resistance.

4.4 Surrounding environment characteristics and environmental protection goal

Environmental protection goal of the Project is mainly the acoustic environment quality, surface water environment quality, ambient air quality and population health and environmental safety in the evaluation area. Main surrounding environment characteristics are as follows:

①A large number of houses, offices, commercial buildings and schools are distributed on both sides of roads;

②Roads in Hedong District is mainly surrounded by urban ecological environment, land for roads in Hexi District is dominated by mountains and ponds, not involved in special ecological sensitive area and important ecological sensitive area；

Auxiliary facilities for public transportation system include public transport hub reconstructed from original passenger station, new passenger transportation center and public transport hub, with main environment characteristics as follows:

①There are a large number of houses, commercial buildings around the reconstructed and new public transport hub and passenger transportation center in Hedong District, with a lot of sensitive points and there are fewer sensitive points around the new passenger transportation center and public transport hub in Hexi District;

②The project in Hedong District is mainly surrounded by urban ecological environment, project in Hexi District is mainly surrounded by mountains and ponds, not involved in special ecological sensitive area and important ecological sensitive area.

Main environmental protection goals for areas of influence of the Project are as follows:

①Ambient air and acoustic environment protection targets of the Project mainly are residences, offices, hospitals and schools and other buildings along the road or located at surroundings of station yard;

②Ecological environmental protection targets within evaluation scope of the Project are cultivated land, vegetation, wild animals and other objects along the line; evaluation scope of the Project does not involve with ecologically sensitive areas.

③Main water bodies spanned in bridge sheme of the Project are Maohe and Qilihe, and quality objective for these rivers are water quality standard for III-type water area in Environmental Quality Standards for Surface Water (GB3838-2002); Fuhe, rainwater receiving waterbody of the Project, is water source of Anlu and bridge section of the Project on Jiefang Avenue is loacted at the place about 850m away from downstream of taht water intake, out of range of level-II protection area of drinking water source.

④ Main goals for social environment protection along the project are as shown in Table 4.4-1.

Table4-4-1 Social Environmental Protection Goal within the Range of Evaluation

Protection goal	Location	Main influences
Both sides along the road and surrounding residents	Both sides along the road, residents around bus station	Routine travel and life quality

Residents affected by land demolition	Residents within the range of land acquisition, mainly including Lilong Village, Jinquan Village, Huguo Village, Zhaohe Village, Shitang Village, Xugang Village	Ensure no loss of residents' living quality due to land demolition for road and public transport hub and protect interests of the masses and maintain social stability

5 Analysis of environmental impact during construction period and pollution protective measures

5.1 Waste water

Impact on surrounding water environment during construction period of the Project mainly constitutes of impact of construction wastewater and domestic wastewater.

5.1.1 Construction wastewater

Construction site of the Project has no maintenance site and machines shall be uniformly repaired at professional maintenance station. Construction wastewater mainly includes wastewater from machinery and vehicle cleaning, wastewater from road maintenance and drainage water from construction site washing.

Daily drainage quantity of wastewater for washing machinery and vehicles involved in the Project is about 6t and such wastewater contains SS 1000-5000mg/L of pollutant concentration, including 25mg/L of petroleum pollutant. Partial existing roads of the Project have been constructed with rain and sewage pipe network. Wastewater for washing machinery and vehicles on these roads will be discharged into municipal sewage pipe network after treatment in oil-separating tank and neutralization sedimentation tank. Construction wastewater of other roads will be discharged into nearby water body when it reaches the standard level after treatment in oil-separating tank and neutralization sedimentation tank.

5.1.2 Domestic wastewater

During project construction period, constructors will produce a certain quantity of domestic wastewater. About 400 constructs will be there during construction peak period, and calculating water consumption as 120L/person per day and calculating emission factor of domestic wastewater as 0.85, maximum production of domestic wastewater is 41m^3/d, while concentration of specific pollutants in wastewater is: COD350mg/L, ammonia nitrogen 50mg/L. In combination with social environment characteristics along the line of the Project, both office-use houses and houses in living area will adopt temporary renting of surrounding existing houses and domestic wastewater so produced will be discharged through municipal pipes.

Considering that present stage is for feasibility study and that office-use houses and renting in living area remain undetermined, renting housing estate situated within the area and already established with sewage pipe network shall be taken into consideration when selecting office-use houses and living area in later period.

5.1.3 Impact on rivers and pollution prevention measures

Three wading bridges are involved in the Project (Maohe Bridge crossing Maohe on Taibai Road, **Bridge crossing Chaishanhe on Jiefang Road and** reconstruction project on Jinqiu Road crossing Maohe Bridge). To minimize the impact of bridge construction on water quality of **Chaishanhe** (construction of Maohe Bridge crossing Maohe on Taibai road is pavement reconstruction, having no influence on Maohe). According to analysis of analogical data, cofferdam construction will be adopted and increase of SS shall not exceed 50mg/l for areas out of the scope of 50m within lower course of construction area, having no pollution on water quality of water areas out of scope within 100m of lower course. Sediment cleared through excavation of pile foundation shall be delivered to earth spoil site nearby promptly for stacking in order to prevent second time pollution on water environment caused by its arbitrary inpouring into water body.

5.1.4 Wastewater pollution prevention measures during construction period

(1) Construction management and supervision shall be reinforced and inspection on construction machines shall be carried out regularly in order to prevent oil spills into municipal pipe network;

(2) Construction materials including pitch, oil and chemicals shall be prepared with canvas for temporary cover; necessary measures shall be taken to prevent mud and discrete construction materials from blocking existing municipal pipe network;

(3) Simply constructed water drainage facility shall be completed prior to filling and building of roadbed slope and carry out excavation of trapezoid drainage ditch outside slope angle of the roadbed;

(4) Water interception and drainage ditch shall be built around stock ground of construction site; sand basin and sand interception net shall also be established at the exit, making rainwater and mud containing sediment discharged into municipal pipe network through sedimentation treatment in grit basin;

(5) Oil removal and sedimentation facilities shall be established for treatment of construction wastewater; mud purifying tank shall be established to realize sedimentation of sludge after discharge into purifying tank and that supernatant liquid be utilized for watering on road surface of road section under construction and clearing of machines and vehicles with the rest discharged to municipal pipe network through sand interception net.

(6) Construction materials including pitch, oil and chemicals shall be stacked away from river

and water body;

(7) During the construction process, in order to reduce the impact of engineering construction on nearby traffic and residents, PVC project enclosure with the height of not less than 2.4m shall be set up around the areas which need to be rebuilt and extended.

(8) At road sections adjacent to river, waterproof cloth shall be adopted to cover surface of bare subgrade in the rainy season in case of road washout caused by rainfall runoff as well as reduce impact on river.

5.2 Exhaust gas

Important construction material-concrete required by proposed project is outsourcing commercial concrete and there is no concrete mixing station set in the construction area. Air pollution sources during construction period include earth-rock excavation and backfilling, demolition of existing buildings, loading and unloading of sands and soil and flying dust generated during transportation; asphalt fume generated from road surface pavement and exhaust gas discharged by construction machinery and transport vehicles powered by fuel.

5.2.1 Flying dust generated from earth-rock excavation and demolition of exiting buildings

In earlier stage of construction, site demolition and earth-rock excavation shall be conducted according to design requirements. These processes will damage the original earth surface and turn it into bare land. In the case of sunny day, surface water is evaporated, soil turns into dry and soft particles and then the earth surface becomes loose. When the wind is large, flying dust will be generated. A part of dust flies in the air and the other part of dust falls on nearby ground and building surface with wind. Influence of flying dust can continue 30min, thus it is the main factor to cause urban ambient air pollution.

Loose particles generated from earth-rock excavation and storage yard of sands and stones are pollution sources of flying dust; in the process of materials loading, unloading and transportation, secondary flying dust will proceed to affect ambient air quality of both sides of roads and roads. According to above factors analysis of ambient air quality, secondary flying dust generated in the process of transportation is related to degree of cleanliness of road surface and driving speed. Under the same degree of cleanliness of roads, higher driving speed will cause larger quantity of flying dust; under the same driving speed, more dirt retention on roads surface will cause larger quantity of flying dust.

If no any protective measures are taken, concentration of TSP at down wind of construction site is rapidly decreased when the distance is increase, and then the concentration is basically in stable value at the distance about 40m. When its scope of influence is evaluated according to class-II standards of Ambient Air Quality Standard (GB3095-2012) (standard for daily average concentration of TSP is 0.3mg/m3), the result is that it can meet the standard only at these places outside 50m.

Watering of construction site plays a very obvious role in restraining the generation of TSP at construction site. At place with distance about 35m to down wind, daily average concentration of TSP has been decreased below standard value. It shows that, suitable watering of construction site can ensure its degree of wetness and is beneficial to restrain the generation of flying dust at construction site, so as to effectively relieve the influence on surrounding environment.

5.2.2 Secondary flying dust generated in the process of loading, unloading and transportation of construction materials

Processes of loading, unloading and transportation of construction materials almost are basic parts during the period of construction. Most of raw and auxiliary materials and outsourcing soils are transported from the nearest place, thus improper protection in the process of transportation will generate flying dust, so as to affect ambient air quality of both sides of roads and roads. Flying dust generated from vehicles travel can be divided into wind-force flying dust and power-drive flying dust according to reasons of dusting. In which, wind-force flying dust is mainly generated from floating dust on exposed road surface under the conditions of dry weather and strong wind; power-drive flying dust is mainly generated by external force in the process of loading and unloading.

In order to decrease the influence of flying dust of construction site and vehicle transportation on surrounding environment, Development Organization, Design Organization and Construction Organization shall earnestly do well at protection of air pollution during construction period according to relevant provisions and requirements.

5.2.3 Exhaust gas generated from asphalt pavement

The project adopts commercial asphalt and asphalt fume during construction mainly comes from asphalt pavement curing. During pavement, asphalt shall be compacted by road roller and placed for 10min for natural cooling firstly. When temperature of asphalt mixture is cooled below

82℃, asphalt fume will be obviously decreased. When the asphalt is basically solidified, asphalt fume will be gone. In addition, spaces surrounding construction site are comparatively open and that air diffusing conditions are good, therefore influence of asphalt fume on surrounding ambient air is not great.

5.2.4 Tail gas of construction vehicle

Exhaust gas discharged by construction machinery and transportation vehicles powered by fuel oil will increase total emission of atmospheric pollutant of local ambient air. As relevant management departments have enhanced the management degree of motor vehicles exhaust gas and Construction Organization have strengthened maintenance management of construction machinery and equipment in recent years, exhaust gas discharged by construction machinery and vehicles will not pollute surrounding environment.

5.3 Noise

There are many construction machines to be put into use for construction of proposed project as well as many transport vehicles and the construction activity will have certain influence on acoustic environment of areas along the line of the Project.

5.3.1 Noise source

Main noise sources during road construction stage come from construction noise of construction machines and radiation noise of transport vehicles. These noises are temporary. However, construction period of the Project is long and there are many construction machineries while construction machineries are generally featured by high noise and irregularity. In combination with features of the Project, construction process is divided mainly into foundation construction, road construction and construction of transport, landscape and illumination works.

①Foundation construction: mainly including foundation treatment, foundation roadbed leveling, earthwork excavation and filling (including pipelines) and pavement compaction and other construction processes. These constructions come with a large number of material delivery vehicles arriving and leaving the construction site. Construction machinery of this stage mainly includes loaders, vibrating loaders, and earthmovers, land levelers, drilling machines, pile drivers and other construction machineries.

②Pavement construction: mainly including pitch paving on pavement or bridge floor. Construction machinery mainly includes large-scale pitch pavers.

③Construction of transport, landscape and illumination works: mainly to improve signs and marked lines on roads and to carry out road greening, road illumination construction; whereas it is unlikely to use large-scale construction machines during this stage and most of them are separately distributed, and some work is dominated by manual work, thus creating less noise impact.

Noise during construction period mainly comes from construction machines which produce most of the equipment noise along with vehicles for construction transportation, and the former mainly constitutes excavators, earthmovers, road rollers, agitators and loaders, etc.

5.3.2 Impact analysis

Emission Standard of Environment Noise for Boundary of Construction Site shall apply for noise during construction period (GB12523-2011).

According to analogy, when single machine operates, noise of all single machine such as earthmover, excavator and loader at 60m from sound source can be in conformity to standard as sound level no higher than 70dB(A) at boundary of construction site during day time. To achieve a sound level no higher than 55dB (A) as required for night time, construction equipment shall be 200m or more from sound source. Construction noise of crusher has the most sever impact, requiring a distance of 80m from sound source during day time and such distance should be greater than 300m from sound source to meet the requirement of 70dB(A) during day time and 55dB (A) during night time.

During actual construction process, diversified machines work together frequently and with mutual superposition of radiation from various noise sources, noise level would be higher with larger radiation scope. When 10 pieces of construction equipment operate within the site simultaneously, noise value at boundary of the site will increase by 10dB compared to such value when single construction equipment operates (A). On the one hand, mobility of construction machinery may cause distance from noise source close to boundary of construction site at some time frame; on the other hand, due to variation of mechanical equipment combination during each stage of building construction, the extent of impact by noise radiation can be different. The abovementioned situations ultimately result in the difficulty to meet requirements on limiting value *Emission Standard of Environment Noise for Boundary of Construction Site*.

Seen from field investigation, a number of sensitive spot spread intensively at both sides of the Project including residents, hospitals and schools. Daytime and nighttime construction will disturb normal life and rest for abovementioned dwelling sites, especially noise during nighttime will cause even greater interference which requires corresponding protective and management measures. As completion of the work, impact by construction noise will no longer exists and adverse impact on environment by construction noise is temporary and short-term.

During transport process of construction materials and construction spoils of the Project, noise of transport vehicles will impact noise-sensitive points along the sides of transport roads. Construction materials to be transported mainly constitute commercial concrete, steels, timbers, etc.

As indicated by analogical test, sound level at places 7.5m, 10m and 30m from loading vehicles is 82-88dB(A), 79-85dB(A) and 72-78dB(A) respectively. When transport vehicles passing by, living areas within 50m of places along the line will be effected in a larger extent.

5.3.3 Pollution prevention measures

In combination with actual situation of the Project, the following countermeasures and suggestions are proposed addressing environmental impact of noise during construction period:

(1) During construction period, it is necessary to undergo supervision and inspection by city management department and take effective vibration-damping and noise-reducing measures in conformity to relevant requirements and disturbing the residents is prohibited;

(2) Sensitive points including residential area, hospitals and schools are intensively and evenly located at both sides of the road involved in the Project. Daytime and nighttime construction will disturb the normal life and rest of residents living at the abovementioned housing estates, especially nighttime noise will cause more severe disturbance, therefore, nighttime construction shall be prohibited along the whole line; provided construction technology does require nighttime construction, approval of Nighttime Construction Permit shall be handled according to relevant specifications; complaint telephone number for disturbance on residents by nighttime construction shall be published; application of strong noise engineering machines and equipment during night time is under time range as 7:00-12:00 and 14:00-22:00. For continuous construction due to special reasons, approval from Environmental Protection Department shall be obtained in advance.

(3) Try best to adopt low-noise machines; all construction machines and equipment for engineering construction shall undergo noise measurement under its normal working condition and

those exceeding national standard shall be forbidden from construction site. During construction process, equipment shall be maintained and protected frequently to avoid noise enhancement due to low equipment performance; machines with great noise such as electric generators and air compressors shall be located at remote places and away from acoustic environment-sensitive points such as residential area and shall be equipped with periodic maintenance. Operating instruction for such machines shall be strict and 2.4m fences shall be set around residential areas;

(4) Commercial concrete shall be adopted and concrete mixer is unnecessary in construction site;

(5) Construction vehicles shall be well organized and access to construction site for transporting vehicles shall be arranged at the side away from sensitive point; transporting vehicles shall slow down and avoid honking when passing by these sensitive points;

(6) Construction shall be ceased on special dates such as senior high school entrance examination and college entrance examination.

It is estimated that with adoption of the abovementioned measures, environmental impact of construction noise can be relieved and such impact will not be severe with avoidance of nighttime construction. However, due to certain special reasons, standard requirements in *Emission Standard of Environment Noise for Boundary of Construction Site* (GB12523-2011) remains difficult to be satisfied while development organization and construction organization shall reinforce operation management during the construction period and take advice and suggestions from nearby residents seriously as well as obtain understanding and support from them.

5.4 Solid waste

Solid waste during construction period of the Project mainly constitutes abandoned earthwork and household refuse of constructors.

5.4.1 Abandoned earthwork

Earthwork of the Project constitutes temporary earthwork and permanent earthwork. For the Project, during excavation and backfilling of water drainage works, there exists earthwork to be temporarily stacked, and earthwork of some rod line mobilization works requires to be temporarily stacked. The Project is designed with temporary earth stacking site along the road and establish such sites for all the areas where pipe network requires to be reconstructed and areas to be remolded as well as areas of rod line mobilization, and earthwork shall be stacked nearby at one side of

pipelines. As the work belongs to road and station yard works, excavation of earthwork exists along the whole line, construction organization shall, during actual construction process, optimize scheme of earth stacking site setting and enforce management on reduction of impact of temporary earth stacking during construction period on surroundings:

①During the construction process, in order to reduce the impact of engineering construction on nearby traffic and residents, PVC project enclosure with the height of not less than 2.4m shall be set up around the areas which need to be rebuilt and extended. Keep construction area within these enclosures clean, and assign specific persons to take charge of clean-keeping at the construction site to make sure watering and cleaning is promptly carried out to reduce dust-raise. Stacking earth and stacking materials shall not occupy areas surrounding the red line.

②Make reasonable planning for earth stacking site according to quantity of temporary earth stacking to reduce the number of temporary earth stacking site. Try best to locate earth stacking site in the center of the enclosure where there will be less vehicles and machines pass througth during construction period to reduce disturbance on earth stacking site caused by construction machines.

③Waterproof cloth shall be adopted to creat temprary cover on the mould surface according to the duration of such mould.

According to Report of Water and Soil Conservation Scheme and according to earthwork balance of the works, total excavation quantity of the work is 933,800 m³, and 684,200m³ backfilling and 186,400 out-borrowed earthwork and 436,100 m³ to be abandoned, of which 249,600 m³ to be abandoned permanently, mainly including road excavation surplus within land occupation area and boring mud of bridge pier foundation which can be delivered to temporary earth stacking site and then be utilized for backfilling of other surrounding projects in lack of earth; 186,500 to be abandoned temporarily, mainly including topsoil stripping earthwork which can be used for earthing and backfilling of green belt in later period.

5.4.2 Construction waste

All housing demolitions of the Project are demolitions within land used for the work; total area of buildings to be removed is 18214.33 square meters, producing 820 thousand m3 construction wastes. Construction wastes of the Project will undergo uniform organization and distribution by Urban Management Department for regional balance, while unavailable parts will be delivered to site designated by Urban Management Department for digestion and absorption.

5.4.3 Household waste of constructors

Maximum quantity of household wastes during construction period is approximately 0.4t/d when calculating household wastes of constructors as 1.0kg/person·d and taking the number of constructors during the peak as 400. Household wastes of constructors will be delivered to Environmental Sanitation Department for disposal after being collected and won't have evident influence on surrounding environment.

5.5 Ecological environment

5.1.1 Influences on animals

After field investigation, the category and quantity of wild animal resources within evaluation scope of the Project are not abundant for intensification of urban construction activities. It is found that there are no places for breeding and inhabitation of wild rare animals and other special sensitive spots and no distribution of local endemic species, therefore the engineering construction has little influence on terrestrial animals.

With construction of the Project, large number of constructors are put in and the distribution of small beasts with grinding tooth will expand and the density in area with frequent human economic activities will increase. The contact frequency with humans and living materials will be increased and thouse mouses as propagating source of natural epidemic disease may have threats on the health of local residents.

After the Project enters operation period, direct influence of construction period on wild animals will be eliminated graduallyand the influce on terrestrail animals is mainly noise pollution caused by vehicle operating, which has little influence on survival of animals and quantity of population within evaluation scope.

(2) Influences on plant resources

Landscape design philosophy of the Project is to create a "concise ecological pergola" and create beautiful and comfortable road traffic environment by combining planting design with large green quantity and environment around the site.

Green space system plays an important role in integrity and stability of urban ecological process. It can improve and strengthen anti-jamming capacity of ecological system and make structure of urban landscape more reasonable, stable, make energy flow more smooth and make

environment more quiet and elegant, thus reaching efficient and harmonious state. A certain restoration measure of plants is taken in the Project to reduce the influence on ecological structure and function within evaluation scope of engineering.

In dots, lines and faces consisting urban green space system and as framework of “line” and urban green space system, banding afforestation of road is critically significant. It can combine the urban green space as an entirety and make rationality of layout and effectiveness of afforestation directly influence rationality of urban green space system. Therefore, the Project shall strictly follow relevant requirements of planning in implementation process and make the most of road space in afforestation and make road space of engineering become a real green gallery under the premise of satisfying leading function of traffic.

According to design requirements, part of highway section in the Project shall have a road cross-section regulation and the main and subsidiary roads shall be separated among which the position of part of treelawn will be trasferred or be changed into subsidiary road and the project construction will have a certain influence on treelawn.

Acording to design requirements, road engineering will reduce external migration of nursery stock caused by road construction by taking maximum preservation of existing trees as the principle. At the same time, take preservation of existing conditions of border trees as the principal thing and for highway section with partial deficiency or damage, plant trees by referring to tree species and specifications along the line. Vegetaion along the line after reconstruction is similar to the current condition and it can highlight effects of landscape. The construction activities are mainly in existing scope of road and it will not have great influence on animals and plants resources along the line.

①Vehetation recovery principle

The road engineering reduces external migration of nursery stock caused by road construction by taking maximum preservation of existing trees as the principle. For the road engineering needs to meet traffic function and make the existing afforested arbor be migrated outside or chopped down, it is necessary to decide together with Party A and relevant administrative departments of garden through mutual negotiation. Based on principle of ecological environmental protection, every construction organization is required to choose trees and shrubs with fine growth conditions for existing trees that influence road construction and implement transplantation for reuse so as to

effectively reduce investment cost in afforestation and realize rapid reafforestation of newly-built roads.

②Tree species selection

For species of plants along the road, give priority to species of plant that grows in local place and have orbamental value. Plant trees in propert place and attention shall be paid to aspect changes of plants. Take unification of landcape of existing trees and principle of economy into consideration and confirm that main species for afforestation of this road are mainly the following varieties.

Main tree species: camphor, goldenrain tree and platanus orientails;

Backbone tree species: magnolia grandflora, gingko, clump osmanthus fragrans, moor besom, crape myrtle, red maple, prunus lannesiana, red authumnal leaves and so on;

Main shrubs and ground cover: fatsia japonica, aucuba japonica variegata, photinia serrulata, French viburrnum odoratissimum, ligustrum japonicum, gardenia with large leaves, golden-edged Chinese littleaf box, nandina domestica, floribunda Roses, ophiopogon japonicus, iris techtorum, Maynilad and so on.

5.4.3 Influences on land resources along the line

The road is constructed according to the method of “main line + subsidiary road” and the engineering is basically arranged along the existing road and part of highway section is being expanded and newly constructed. The Project can basically maintain original land use pattern along the line of engineering without intensifying tension degree of land resources in area along the line; at the same time, after forestation measures were taken in the engineering, green land area along the line can be added, which is helpful to beautify environment along the line and improve overall image of the city.

5.6 Water and soil loss

Operations during construction period are various, mainly including: land acquisition; earth and stone work of foundation; transportation of equipment, materials and earth and stones; track construction, housing construction, etc. These construction activities will cause disturbance on earth surface and bring vegetation deterioration, soil erosion with varying degrees and water and soil loss within work scope will be inevitable specifically during rainy season. During operation period, with implementation and completion of various protective engineering, water and soil loss will witness gradual deduction and surroundings will recover with some sections even better than original state.

5.7 Social impact

Access of construction vehicles and occupation of existing roads during construction period will bring short-term adverse impact on travel and living of residents along the road. Meanwhile, material transporting vehicles coming in quantity may also lead to traffic jam of some road sections, and dust-raise produced by construction vehicles will reduce living quality of residents nearby while construction noise will influence their rest; discharge of sewage, household refuse and production waste from construction camp and construction site will impact water quality of river along the line; level of civilization of constructors may also bring influence on daily life of local residents. Such influence is showed mainly in residential area and road sections near the line.

Occupation of existing roads caused by construction activities such as coming and going of construction vehicles and transportation of construction materials may result in traffic block, brining disadvantages for residents living along the line to travel; according to on-site inspection, there are residents, schools, offices and organizations along both sides of construction road and construction of this road will have certain influences on travels of residents nearby; engineering removal and land acquisition change land use function, causing certain influence on resident's life, traffic, social economy and infrastructure; material stacking at construction site of the Project and excavation of construction site will make the city look messy and affecting urban landscape. Activities such as excavation during construction process of the Project may bring inconvenience for travel of nearby residents; most construction contents of road involved in the Project are located at urban area of Anlu and along the road most buildings are stores. As enclosure management is adopted during construction period, operation of shops along the road may be affected.

5.8 Impacts of land requisition and demolition

According to *Action Plan of Resettlement of Affected Residents* by World Bank Loan, impacts of land requisition and demolition are as follows:

Range of affected area: 3 organizations of township level are involved in the land requisition and demolition, namely Tangdi Town, sub-district office of Fucheng and Municipal Economic Development Zone of Anlu City, involving 9 villages and 1 community in total.

Impact of demolition: 18214.33 ㎡ buildings are to be demolished in total. 49 families are involved in private family demolition with 6566.33 ㎡ buildings and 204 people affected. 13 enterprises and shops are involved with 11648 ㎡ buildings.

Impact of land occupation: 620.95 Mus land (41.40 hectares) are under requisition for the Project in total. 260.18 Mus (17.35 hectares) state land. 360.77 Mus (24.05 hectares) collectively-owned land and 9 villages are involved in requisition of collectively-owned land.

For land requisition and demolition arrangement and supplementary recovering measures, it is proposed in *Action Plan of Resettlement of Affected Residents* that arrangement for affected population and recovering should be carried out simultaneously from two aspects, namely production arrangement and recovering. Production arrangement and recovering, mainly indicates recovering of house demolition and supporting facility of livelihood, mainly including:

(1) Provide monetary indemnity or house resettling for demolished houses, guarantee that a residential quality and environment no lower than the level before the demolition.

(2) Provide all kinds of necessary domestic installation and supporting services with convenient access for the affected population in new residential environment,

Production arrangement and recovering: mainly indicate employment arrangement for labor force and reconstruction and recovering of labor production facilities, including:

(1) Make reasonable compensation for the land and guarantee that affected population will not lose income source due to land requisition.

(2) Provide assistance in production and employment of labor force of affected population, ensuring that long-term livelihood of affected population is not affected by land requisition of the Project.

(3) Guarantee that affected enterprises can restore production and business at original site or new site, and stop-loss caused by the demolition can be reasonably compensated.

5.9 Accumulative impact

Construction period of the Project is 60 months. As time span of the construction period is large and that the Project adopts spot and section construction avoiding simultaneous construction at multiple construction sites, mutual influence among different sub-projects of the Project is rather small and there is no accumulative influence within the Project during construction period, and the condition that may generate accumulative impact of construction period mainly is recent large-scale infrastructure construction engineering of Anlu City. According to investigation, the infrastructure construction engineering of Anlu City of large scale to be started in recent years is “Five Roads and One Bridge” engineering which has been incorporated in construction plan while specific

construction plan remains unreleased.

Provided “Five Roads and One Bridge” engineering and the Project carry out simultaneous construction in space and time, accumulative impact may be generated at common affected area of construction site, such as cumulated influence in respect of construction noise, dust flying, waste slag and traffic organization. Therefore, Construction Management Department shall make prompt coordination for construction plan of the Project and “Five Roads and One Bridge” engineering and take preventive measures in advance as well as make reasonable arrangement on construction time and construction period for different construction spots and sections, avoiding enormous accumulative impact.

6. Environmental impact analysis and pollution control measures during operation period

Impacts during operation period after completion of the Project are mainly divided into impacts due to roads and impacts resulting from public transportation transfer hub (including passenger traffic center station).

6.1 Wastewater

(1) Wastewater in stations

Waste water generated in stations of the Project mainly includes: staff's office and domestic wastewater and passengers' domestic wastewater, etc. catering wastewater will go to septic-tank with other domestic wastewater after being handled in oil separator. They will be discharged into sewage pipe. They will be handled in sewage treatment plant and will be discharged into Fuhe River after reaching emission standard.

According to above-mentioned analysis, the biggest passenger flow rate in the 6 stations (construction scheme and construction scale for some stations are still undecided) constructed in the Project is about 2200 person/d (small size public transport hub in railway station). Maximum water consumption for single station is about 31m^3/d, drainage coefficient is 0.85 and output of domestic wastewater is about 26.4m^3/d.

In terms of the 6 stations to be established in the Project, 5 stations other than highway passenger transportation center and public transportation transfer hub of high speed rail station have already been equipped with sewage pipe network. Domestic sewage can be handled in Anlu Urban Sewage Treatment Plant. According to project construction and development plan, highway passenger transportation center and public transportation transfer hub of high speed rail station will be constructed in 2019 and will be finished in 2020. If sewage pipe network is constructed at that place at that time, sewage from highway passenger transportation center and public transportation transfer hub of high speed rail station will be treated in the sewage treatment plant. If the sewage pipe network is not constructed, construction organization shall construct sewage treatment facility on its own, treat domestic sewage and discharge it after primary standard of *Integrated Wastewater Discharge Standard* (GB8978-1996) is reached. To sum up, wastewater in stations will not bring great influence on water body environment.

(2) Pavement runoff

Road of the Project will not generate wastewater and wastewater is mainly rainwater. Initial rainwater contains much pollutant. It will take 30 minutes from formation of surface runoff to rainfall during initial stage of rain according to related document literature. Concentration of suspended solids (SS) and oils in rainwater is high and it will decrease along duration of rainfall half an hour later. Decrease speed of biochemical oxygen demand (BOD_5) in rainwater along duration of rainfall is slower than the former and that of pH value is relatively stable. Obviously, road surface is washed out basically after 40 minutes of rainfall. In terms of initial rainwater pollutant on road, SS is about 221mg/l, COD is about 107mg/l, BOD is about 20mg/l and petroleum is about 7 mg/l according to related actual measurement and document literature about road rainwater of Hubei. Road surface runoff takes a small proportion of ground runoff volume and it is scattered along whole line. When road rainwater is transported in surface water channel or rainwater pipe network, suspended solids and silt in the water will be attenuated, sedimented or degraded and pollutant concentration in the water will be reduced. Influence on receiving water of rainwater is relatively small.

But gasoline may be leaked and engine oil may pollute road when motor maintenance condition is poor, motor is in failure and accident happens. Rainwater will flow into water area nearby along with road edge, which will result in petroleum and COD pollution. Traffic management measures shall be taken to prevent similar accidents.

6.2 Exhaust gas

(1) Ambient air pollution during road operation period mainly comes from flowing dust pollution from automobile and vehicle tail gas pollution (main pollutant discharge factors are CO and NO_2). The assessment predicts motor vehicle exhaust gas during road operation period. Prediction results show that, after annual average, daily average and hour average of CO and NO_2 during project operation period in predicted year are added with background value, the result still can reach requirement of related standards. Its impact on air environment quality alone the line is small.

(2) Main exhaust gas of public transportation transfer hub (including passenger traffic center station) during operation period is vehicle exhaust. According to prediction, vehicle exhaust ground level concentration can meet limiting value for second level of Ambient Air Quality Standard. HC

and NO_2 is lower than “unorganized monitoring point” concentration limits specified in Table 2 of GB16297-1996 Integrated Emission Standard of Air Pollutants.

6.3 Noise

Prediction shows that road traffic noise during project operation period will exceed standard to a certain degree. Sensitive points on both sides of the road shall be removed promptly. If removal fails, sound proof window with hollow glass shall be installed, which can control noises on sensitive points within the scope specified by the government. The assessment advises that development and construction along the line shall take road noise protection distance into consideration fully. In terms of sensitive points such as school, hospital and residence, design shall be optimized and land and land utilization shall be adjusted to reduce impact of traffic noise on environmental sensitive points.

Noises of public transportation transfer hub (including passenger traffic center station) during operation period are mainly traffic noise, equipment noise and social life noise. Traffic noise comes from public transportation vehicles and main transport roads. Equipment noise comes from air conditioner, cooling tower and equipment maintenance in the station. Social life noise comes from parking lot and station hall. Noise near public transit hub and passenger traffic center station will exceed standard to a certain degree.

6.4 Solid waste

Solid wastes during road operation period are mainly carriers of transport vehicles, stowage scattered from traffic accident vehicles and passengers’ litters etc. Environmental sanitation department shall strengthen management and clean.

Passenger stations of the Project are not equipped with vehicle maintenance and washing functions. Solid wastes generated in public transportation and passenger stations are mainly domestic garbage from staffs and passengers. In terms of the domestic garbage, environmental sanitation department shall arrange special environmental sanitation personnel to clean the road regularly, collect and handle garbage on the road.

Final emission load of the Project is zero. It has no huge influence on outside environment.

6.5 Ecological impact

Construction vehicles and stock ground will have adverse effects on parts of city appearance and landscape environment. But the impact is transient and it will vanish after completion of the

project. Greening proportion will be improved in reconstructed road and greening will be distributed reasonably after completion of the Project. This can protect the pavement, reduce water and soil loss, reduce traffic dust and traffic noise and improve road microclimate. Apart from these comprehensive environmental benefits, it can improve landscape environment along the road and beauty the road further.

6.6 Social impact

Construction of the Project is municipal construction with public welfare, which will bring positive interests for the society and economy. Construction of the Project provides convenient traffic condition and complete public facilities for residents and organizations along the line. It can also improve regional investment environment, improve city image and it has significant meaning for driving continuous, healthy and quick development of surrounding economy.

6.7 Environmental risk accident

Risks after operation of construction project mainly come from vehicles carrying dangerous goods. Vehicles carrying various inflammable, explosive goods, toxicant, corrosive and radioactive substance may have the risks of leakage, fire and explosion.

Safety check and road management for vehicles carrying dangerous goods and chemicals shall be enhanced during road operation period. Detailed accident emergency plan shall be specified to prevent diffusion of pollution and dangerous goods.

7. Public participation and informaiton disclosure

7.1 Public investigation principle, method and content

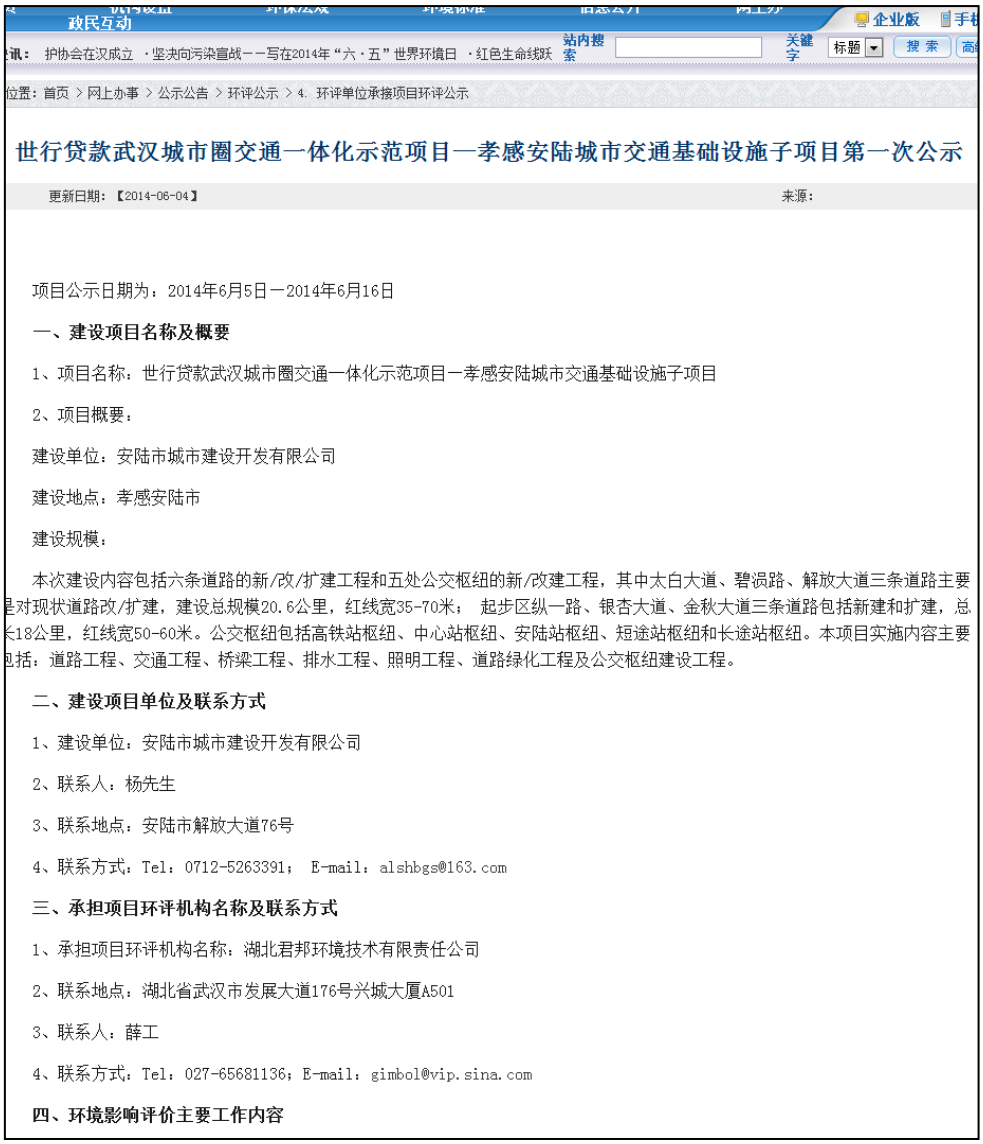
The public being engaged in investigation follows the principle of publicity, equality, wide range and convenience and strives to achieve scientific, objective, fair and comprehensive standard. The environment assessment will go through two rounds of public consultation activities through forum, network survey and questionnaire survey according to the requirement of the *Public involvement's Interim Procedures of EIA*. Specific is as follows:

1) First round of public consultation

(1) Network survey

The Company issued first publicity of project basic information on Hubei Environmental Protection Bureau website (http://www.hbepb.gov.cn) and issued environmental assessment outline of the Project on China Anlu Government Affairs Public website (http://www.anlu.gov.cn) in June 5, 2014. Screenshot of publicity is as follows:

Fig.7-1 Publicity Screenshot of EIA Outline on Website of Government Affairs Gazette in China Anlu



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讯： 护协会在汉成立 ·坚决向污染宣战——写在2014年“六·五”世界环境日 ·红色生命线跃 站内搜索 关键字 标题 搜索 高级

位置：首页 > 网上办事 > 公示公告 > 环评公示 > 4. 环评单位承接项目环评公示

世行贷款武汉城市圈交通一体化示范项目—孝感安陆城市交通基础设施子项目第一次公示

更新日期：【2014-06-04】 来源：

项目公示日期为：2014年6月5日—2014年6月16日

一、建设项目名称及概要

1、项目名称：世行贷款武汉城市圈交通一体化示范项目—孝感安陆城市交通基础设施子项目

2、项目概要：

建设单位：安陆市城市建设开发有限公司

建设地点：孝感安陆市

建设规模：

本次建设内容包括六条道路的新/改/扩建工程和五处公交枢纽的新/改建工程，其中太白大道、碧涡路、解放大道三条道路主要是对现状道路改/扩建，建设总规模20.6公里，红线宽35-70米； 起步区纵一路、银杏大道、金秋大道三条道路包括新建和扩建，总长18公里，红线宽50-60米。公交枢纽包括高铁站枢纽、中心站枢纽、安陆站枢纽、短途站枢纽和长途站枢纽。本项目实施内容主要包括：道路工程、交通工程、桥梁工程、排水工程、照明工程、道路绿化工程及公交枢纽建设工程。

二、建设项目单位及联系方式

1、建设单位：安陆市城市建设开发有限公司

2、联系人：杨先生

3、联系地点：安陆市解放大道76号

4、联系方式：Tel：0712-5263391； E-mail：alshbgs@163.com

三、承担项目环评机构名称及联系方式

1、承担项目环评机构名称：湖北君邦环境技术有限责任公司

2、联系地点：湖北省武汉市发展大道176号兴城大厦A501

3、联系人：薛工

4、联系方式：Tel：027-65681136；E-mail：gimbol@vip.sina.com

四、环境影响评价主要工作内容

Fig.7-2 First EIA Information Publicity’s Screenshot on Website of Hubei Environmental Protection Bureau

(2) First public participation hearing

Anlu Yun’an Assets Management Co., Ltd. held the first public participation hearing in Anlu City on October 23, 2014. See Fig.7-2-3 for pictures of the meeting.

Time: 9 o’clock in the morning on October 23, 2014 (Thursday).

Address: the fifth floor of Development and Reform Bureau in Anlu City.

Contents of public consultation: EIA *Terms of Reference* of the Project.

Moderator: Wen Jiawei, Deputy Director of World Bank’s Representative Offices in Anlu City

Participants: they are mainly resident representatives who may be influenced by construction and who are around construction road and stations, representatives of public institutions (45 people in all), including:

①EIA Organizations, Project Office of World Bank in Anlu, Development Organizations and so on;

②Representatives of Public Institutions: Government Office of Anlu, Anlu Health Inspection Bureau, Municipal Government of Anlu, Anlu Civil Affairs Bureau, Anlu Supervision Center, Anlu Science and Technology Bureau, Anlu Public Security Bureau, Secondary Vocational and Technical School in Anlu, Anlu Pu Ai Hospital, economic development zone in Anlu, No. 2 Middle School in Anlu, Roads and Traffic Authority in Anlu, Anlu Internal Revenue Commission, No. 1 Middle School in Anlu and organization representatives.

③Resident representatives: administration committee of the development zone in Anlu, Fucheng Office, Nancheng Office, Yandian Town, Tangdi Town, principal of environmental protection in branch of Hexi New District and Jiahe Community, Fudong Community, Shili Primary School, Shili Middle School, Zhoujiaxin Village, Kaixuan City, Shangri-La City Garden, Jinqiu Imperial Garden, Shui'an Xingcheng Building, Xugang Community, Shitang Community, Shimiao Community, Zhaohe Village, Lvjiafan, Huguo Village, Lilong Village, Jinquan Village, Yuanlin Garden, De'an Garden, Shuanglongqiao Homeland, Fengda International City, Linyu Fortant, Taihe Villa, Luojia Village, Taihe Paradise, Jinjia Yard, Delin Garden, Jinbang Well-known City, Jingang Garden, An'er Homeland, Haocheng Garden, Sili Community, Zhongyi Community and other resident representatives.

Process of conference:

a. The moderator introduces tropics for discussion and main participants of conference;

b. Representatives of EIA organizations introduce main construction content and key points of EIA of the Project;

c. In discussion stage of conference, representatives of different fields present at the conference will put forward their doubts, opinions and suggestions as regards to questions of the Project's construction content, scope and implementation time. Each representative of relevant government departments, Project Department of all levels and owners will give on-site explanation for the questions proposed by representatives of all fields. EIA Organization will assist in answering questions with technical contents.

d. The moderator makes a conclusion of the conference.

Conference content:

Representatives present in the meeting thoroughly understood the content and implementation

time of the Project and thought that the advantages of the Project are greater than disadvantages as a whole. The Project can improve city image of Anlu as well as living standard of residents, and it is safer for residents' traveling after the traffic flow is divided. Personnel in the meeting also advised to establish underground passage at Bixia Road and platform bridges in the exits of three schools (No. 1 Middle School in Anlu, No.2 Middle School in Anlu, High Vocational and Technical School in Anlu) on Taibai Road.

After the detailed introduction to the public, the Owner explained that the establishment of overpass had been considered in earlier-stage plan, but the current plan was to establish traffic light and designate pedestrian crossings on the students-concentrated roads. Because the establishment of overpass only makes pedestrian to avoid vehicles, but the purpose of reducing vehicles' speed cannot be obtained. The optimization of road traffic aims at the harmony between traffic and pedestrian. Improve current traffic safety facilities on roads, and make urban vehicles strictly follow traffic rules. Meanwhile, owners also demonstrated that suggestions on the consultative meeting would be further discussed with the Design Department.

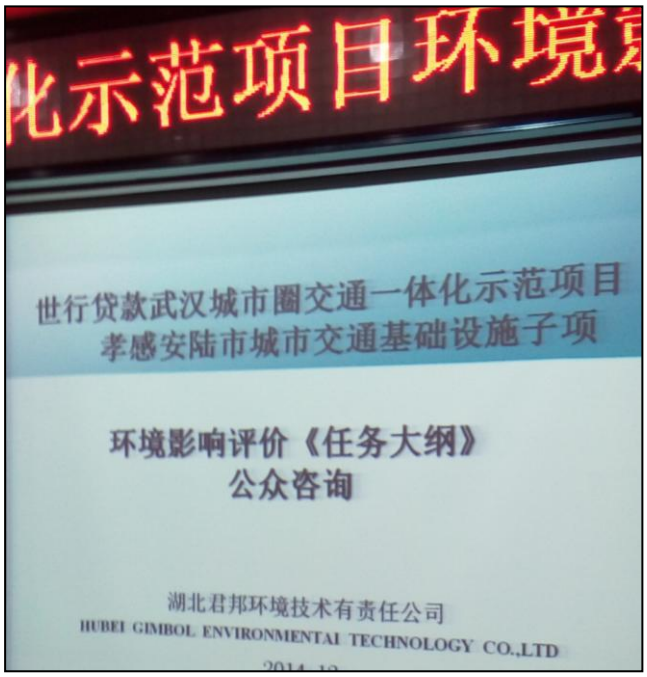

Fig.7-3 The Hearing Attended by the Public pictures of Xiaogan Anlu Urban Transportation Infrastructure Subitem

2) Second round of public consultation

(1) Network survey

The Company issued abridged edition publicity of project environmental assessment on Hubei Environmental Protection Bureau website (http://www.hbepb.gov.cn) and China Anlu Government Affair Public website (http://www.anlu.gov.cn) respectively on December 25, 2014.

The screenshots of publicity are as follows:

Fig.7-4 Publicity Screenshot of EIA Abridged Edition on Website of Hubei Environmental Protection Bureau

Fig.7-5 Publicity Screenshot of EIA Abridged Edition on Website of Government Affairs Gazette in Anlu, China

The Company issued complete edition publicity of project environmental assessment and project management plan publicity on China Anlu Government Affair Public website (http://www.anlu.gov.cn) on March 19, 2015. Screenshot of publicity is as follows:

Fig.7-6 EIA Complete Edition and Environmental Management Plan Publicity Screenshot on China Anlu Government Affair Public Website

(2) Second public participation hearing

Anlu Yun'an Assets Management Co., Ltd. held the second public participation hearing in Anlu City on December 23, 2014. See Fig.7-7 for pictures of the conference.

Fig.7-7 The Hearing Attended by the Public pictures of Xiaogan Anlu Urban Transportation Infrastructure Subitem

Time: 9 o'clock in the morning on December 23, 2014 (Tuesday).

Address: the fifth floor of Development and Reform Bureau in Anlu City.

Contents of public consultation: abridged edition of EIA of the Project and plan draft of environmental management.

Moderator: Wen Jiawei, Deputy Director of World Bank in Anlu City.

Participants: they are mainly resident representatives who may be influenced by construction and who are around construction road and stations, representatives of public institutions (48 people in all), including:

①EIA Organization, Project Office of World Bank in Anlu, Development Organizations and so on;

②Representatives of Public Institutions: Government Office of Anlu, Anlu Health Inspection Bureau, Municipal Government of Anlu, Anlu Civil Affairs Bureau, Anlu Supervision Center, Anlu Science and Technology Bureau, Anlu Public Security Bureau, Secondary Vocational and Technical School in Anlu, Anlu Pu Ai Hospital, economic development zone in Anlu, No. 2 Middle School in

Anlu, Roads and Traffic Authority in Anlu, Anlu Internal Revenue Commission, No. 1 Middle School in Anlu and organization representatives.

③Resident representatives: administration committee of the development zone in Anlu, Fucheng Office, Nancheng Office, Yandian Town, Tangdi Town, principal of environmental protection in branch of Hexi New District and Jiahe Community, Fudong Community, Shili Primary School, Shili Middle School, Zhoujiaxin Village, Kaixuan City, Shangri-La City Garden, Jinqiu Imperial Garden, Shui'an Xingcheng Building, Xugang Community, Shitang Community, Shimiao Community, Zhaohe Village, Lvjiafan, Huguo Village, Lilong Village, Jinquan Village, Yuanlin Garden, De'an Garden, Shuanglongqiao Homeland, Fengda International City, Linyu Fortant, Taihe Villa, Luojia Village, Taihe Paradise, Jinjia Yard, Delin Garden, Jinbang Well-known City, Jingang Garden, An'er Homeland, Haocheng Garden, Sili Community, Zhongyi Community and other resident representatives.

Process of conference:

a. The moderator introduces purpose, process as well as main participants of conference;

b. Representatives of EIA organizations introduce main environmental impacts and improvement measures of the Project;

c. In discussion stage of conference, representatives of different fields present at the conference will put forward their opinions, doubts or suggestions as regards to environmental impacts caused by project construction. Each representative of relevant government departments, Project Department of all levels and the employer in location of project construction will put forward their suggestions and doubts which will be solved on site. EIA organization will assist in answering questions with technical contents.

d. The moderator makes a conclusion of the conference.

Conference content:

After representatives present at the conference hear EIA organization's analysis of environmental impacts in construction and operation period of the Project as well as introduction to environmental protection measures, all representatives show their acceptable attitudes toward environmental impacts generated from the Project and support construction of the Project. But they also put forward some opinions including "reconstruction engineering of road shall ensure smoothness of water, gas, electricity and network", "safety of places around school and point with dense residents shall be ensured during the construction period". "Try to avoid construction period

in time quantum of entrance examination for secondary school and college entrance examination", "how to ensure profits of residents and organizations involved in demolishing" and so on.

The employer gives reply to above-mentioned questions: the road will pay attention to protection of municipal supporting facilities at two sides of the road in design and construction; in construction period, construction mark and protective screening will be set outside construction range and other measures will be made to reduce influences of construction on sensitive points around to the greatest extent; in sections around the school, avoid construction during entrance examination for secondary school and college entrance examination; Resettlement Plan of Inhabitants is being prepared in the Project and reasonable arrangement and compensation will be made for organizations and residents involved in demolishing.

3) Issue questionnaire participated by the public

The Project goes through urban center and many people are under direct influence and there are many people around the line and the environment condition is complex and sensitive. After this abridged edition is announced, based on the principle of publicity, equality, wide range and convenience and overall consideration of region, occupation, background of specialized knowledge, ability of expression, degree of being influenced and other factors, technical staff have asked for public opinions by means of random questionnaire survey, interview of special organizations and concentrated survey along the line from December 23, 2014 to January 13, 2015.

In particular, aimed at the fact that the public and groups of residential area around the road to be constructed, school, hospital, official organizations and others may be under direct or indirect influence of pollution source of the Project, general situation of engineering to be constructed, engineering construction, influence degree and range on environment after engineering construction and commissioning, as well as main adverse effects and positive effects are introduced to local public to have an in-depth knowledge of the public's knowledge of meaning of engineering construction and their attitudes and suggestions in environmental impact. Main content of public participation survey is as follows:

The public understand degree towards proposed project;

The public satisfaction condition of local present environment quality condition and the major environmental problem existed in local area;

The environmental problem on proposed project concerned by the public;

The beneficial function made by the public for the Project construction;

The support degree of the public towards proposed project;

The specific opinions and suggestions of the public about proposed project.

7.2 Public involvement survey results

After network publicity of the Project, the Representative Office of the World Bank in Anlu received many consultative calls. Except a part of calls for contacting business, the main content of those calls is concerning whether construction of the Project will affect daily life and transportation. Workers in the Representative Office of World Bank replied the question patiently, and they told the consultants that the Project is proceeded in special time divisions and appointed sections of roads, which will fundamentally not affect normal transportation and traveling.

Questionnaire survey of the second round of public consultation provide 75 questionnaire forms and 60 forms are received actually.

The basic composition of respondent staff is shown in Table 7-2.

Table 7- Respondent Staff Composition List

Items	Investigation information	Number of people (people)	percentage%
Gender	Male	45	75
	Female	15	25
Standard of culture	Senior high school, technical secondary school and above	49	82
	Lower than Senior high school and technical secondary school	6	10
	Untold	5	8
Age	Above 30	42	70
	30 and less than 30	18	30

The research result is shown in Table 7-2.

Table 7-2 Investigation Statistics Result Table of Public Involvement

No.	Question	Option	Selection people (people)	Percentage（%）
1	Do you know Traffic Integration Demonstration Project of Wuhan City Circle Supported by World Bank Loan Urban Transport Infrastructure Subproject in Anlu, Xiaogan?	Yes, I know	37	62
		Know little	21	35
		No, I don’t know	2	3
2	Do you satisfied with current residence or work place?	Very satisfied	1	2
		Satisfied	45	75
		Not satisfied	14	24
3	What do you think is the major impact on you made by current transportation?	Vehicle exhaust	38	63
		Noise	42	70
		Ecological	34	57

		influence		
		Others	6	10
4	What do you think is the biggest impact on you or your most concerned environmental problem during the Project construction period?	Vehicle exhaust	38	63
		Noise	50	83
		Land demolition	36	60
		Ecological influence	42	70
		Others	3	5
5	What do you think is the biggest impact on you or your most concerned environmental problem during the Project operation period?	Vehicle exhaust	38	63
		Noise	41	68
		Ecological influence	27	45
		Others	4	7
6	What kind of resolve way do you want to get if the Project construction brings about impact on your living environment?	Request the management reaches standards	52	87
		Economic compensation	12	2
		Remove	1	2
		Doesn't matter	2	3
7	What do you think is the function of the Project towards local place?	Improve transportation condition	50	83
		Promote the economic development	44	73
		Improve the standard of living	38	63
		No big effect	0	0
8	Do you agree that the Project be constructed locally?	Agree	50	83
		Acceptable	10	17
		Disapprove	0	0

7.3 Collection of public's participation inquiry opinion

(1) Personal opinion survey

The questionnaire survey provides 75 questionnaires for the public and recycles 60 actually so the recovery rate is 80% which shows those publics are very concern about the construction of the Project and they are willing to publish their opinions by this opportunity. The survey results combined written form and oral form shows that 83% of the investigators agree the Project and 17% are acceptable with the establishment of the Project. The central collection of the opinions and

suggestions of the investigators are as follows:

①Short-term construction environmental problem is accepted, and the Project is of great help for local construction and development and residents' traveling after the completion. Relevant organizations shall supervise the Project, and the time limit for the Project is not allowed to be delayed or even put aside;

②The construction shall avoid the period of senior high school entrance examination and college entrance examination as far as possible. Environmental Protection Administration shall enhance supervision of construction's effect on examinees;

③Increase greening rate, and ensure that the planned routes and stations won't be changed in 50 years after the completion;

④Take it into overall consideration that traffic integration's effect on convenience and safety problem of students' going to school, and night construction shall be reduced at the same time;

⑤Scientific planning and safety construction are required. We hope that regulators and constructors can be carefully for the good Project and do well in the Project;

⑥In the period of road pipe network reconstruction, normal operation of power supply, water supply, gas supply, Internet and others shall be ensured. Guarantee smooth traffic in construction roads as far as possible;

⑦Do well in environmental influence treatment measures in the early stage, middle stage and later stage of construction strictly in accordance with requirements in EIA report, and make great efforts in management and implementation. Reduce the effect of emission of exhaust gas and waste water and solid waste to the lowest degree;

⑧Construction vehicles and machines shall decrease the chance to pass through residential area as far as possible and reduce noise pollution and it shall also promptly clear up garbage produced during construction period;

⑨Well balance interests and appeals of each party.

(2)Group opinion survey

The EIA handed out 12 questionnaires to surrounding communities, schools, hospitals, Organs and other groups and received 12 questionnaires in practical. Corresponding relations of respondents and sensitive protected objects are as follows in Table 7-3.

Table 7-3 Corresponding Relation Table of Respondents and Sensitive Protected Objects of the Project

No.	Name of communities	The covered sensitive protected object
1	Jiefang Community Residents Committee	Lvjiafan, De'an Garden, Shuanglongqiao Homeland etc.
2	Zhaohe Community Residents Committee	Zhaohe Village, Zhaojia River, Lijia Taizi, etc.
3	Fudong Community Residents Committee	Jingang Garden, etc.
4	Jintai Community Residents Committee	Taihe Villa, Taihe Paradise, Luojia Village, Jinjia Yard, etc.
5	Xiaotai Community Residents Committee	Delin Garden, Jinbang Well-known City, etc.
6	Huguo Community Residents Committee	Huguo Village, Yuanlin Garden, etc.
7	Shili Community Residents Committee	Shili Village, Yangpeng Settlement, etc.
8	Fuhe Community Residents Committee	Jiahe Community, Fuhe Community, Zijin Garden, etc.
9	Nancheng Sub-district office	Sili Village, Caomiao Village, Zhongyi Community, etc.
10	Chuyue Community Residents Committee	Zhoujiaxin Village, Kaixuan City, Fengda International City, etc.
11	Chengdong Community Residents Committee	Jinqiu Imperial Garden, Shui'an Xingcheng Building, Shangri-La City Garden, Linyu Fortant, etc.
12	Tangdi Town People's Government	Lilong Village, Jinquan Village

The surveyed organizations were all in favor of the Project and made request verbally that noise, raised dust shall be controlled in construction period, moreover, residents' safe traveling and civilized construction shall also be guaranteed, and the Project's effect on surrounding environment shall be reduced to the greatest extent.

(3) Internet survey

There is no feedback in the period of survey.

7.4 Adoptions of typical public opinions

Although the majority of respondents favored construction of the Project, they were still concerned about environmental problems caused by the Project's construction. To dispel their worries about the Project's construction, aiming at these problems, adoptions of public opinion by the Constructor can be seen in Table 7-4.

Table 7-4 Public Opinions and Adoptions Table

No.	Opinions and suggestions	Explanation of adoptions

1	Relevant organizations are advised to supervise the Project; the time limit of the Project shall not be delayed or even put aside.	Strict management and supervision system of the Project has been installed to ensure that the Project can progress in accordance with time limit and quality standard.
2	Construction shall avoid the period of senior high school entrance examination and college entrance examination as far as possible. Take it into overall consideration that traffic integration's effect on convenience and safety problem of students' going to school, and night construction shall be reduced at the same time	Avoid duration of senior high school entrance examination and college entrance examination, and rationally arrange construction time. Avoid night construction as far as possible. If the work shall be done at night, announcement shall be put up to inform surrounding residents and organizations after acquiring permission of construction.
3	Environmental Protection Administration shall enhance supervision.	The Construction Organization will entrust qualified Supervision Organization to monitor water, gas, noise and waste in construction period and operation period on a regular basis, which shall be supervised by Environmental Protection Administration.
4	Increase greening rate, and ensure that the planned routes and stations won't be changed in 50 years after the completion.	Plant osmanthus fragrans, loropetalum chinense, Hybrida Vicary Privet in central lane separator green belt, pittosporum tobira in lane separator green belt on two sides, and cinnamomum camphora on avenue. Increase greening rate on the basis of safeguarding transportation safety; Plan of the Project accords with *Anlu Urban Master Planning* (2013-2030).
5	In the period of road pipe network reconstruction, normal operation of power supply, water supply, gas supply, Internet and others shall be ensured. Guarantee smooth traffic in construction roads as far as possible.	On the basis of ensuring normal water, gas, electricity and network in the transformation road, conduct semi-closed construction, and guarantee smooth traffic in the section of road.
6	Do well in environmental influence treatment measures in the early stage, middle stage and later stage of construction strictly in accordance with requirements in EIA report, and make great efforts in management and implementation. Reduce the effect of emission of exhaust gas and waste water and solid waste to the lowest degree	The implementation conditions of the Project's measures in EIA are supervised by environmental supervision organization to guarantee the smallest effect on surrounding environment of the Project.
7	Construction vehicles and machines shall decrease the chance to pass through residential area as far as possible and reduce noise pollution and it shall also promptly clear up garbage produced during construction period	Routes of construction vehicles will be rationally planned in construction period. Reduce the effect on residential areas as far as possible, and enhance management. Forbid to whistle around densely populated place, school and hospital. Entrust Muck Management Department to promptly dispose and clear up solid waste produced in construction period.
8	Well balance interests and appeals of each party.	Special management organizations will be established in the construction period of the Project.

7.4 Conclusion of public involvement

As the survey demonstrates, the majority of respondents understand and favor the Project. In their opinion, the Project will bring positive effect to social economy, but rational environmental safeguarding procedures and work of traffic dispersion shall be taken by Construction Organization in construction period. Meanwhile, they are still concerned about the effect of noise and dust may

caused by the Project in construction and operation period.

EIA thinks that Construction Organization shall further strengthen environmental pollution control measures in construction period as well as work of traffic dispersion. On the premise that measures adopted in EIA and relevant requirements are effectively implemented, the Project's effect on surrounding environment can be controlled within the scope that the nation allows, and the worsening of surrounding living environment won't be caused. In this way, environmental effects that the public were once worried about all can be alleviated or eliminated, and the public can stand construction of the Project.

Moreover, Construction Organization shall further enhance communication with the public, and publicize the Project, enterprise conditions, enterprise administrators as well as commitment for environmental protection through news media, bulletin board and other methods, which can make the public understand content of the Project and give play to better environmental and social benefit.

7.5 Continuous public participation plan

(1) Pay a return visit and survey each environmental sensitive point randomly in each quarter in 3 years after construction period and operation period. Hold a public participation on-site survey meeting in places where environmental sensitive points are concentrated every year.

(2) Assess public's satisfaction degree according to quarter survey and annual survey results. Analyze related opinions and improve environmental mitigation measures when necessary.

7.6 Dispute complaint channel

(1) Set up and composition of complaint organization

In order to protect influenced people's legitimate rights, a complaint mechanism will be established to provide a convenient, transparent, fair and effective complaint channel for the influence people. So, environmental impact complaint acceptance leading group of the project is established. Group lead is related personnel of Anlu Environmental Protection Bureau and group members come from Project Office, Anlu Environment Monitoring Station, EIA organizations, construction supervising organization and Employer organization etc. Environmental impact complaint acceptance leading group will set up Complaint Acceptance Office in Anlu Environmental Protection Bureau. Complaint acceptance points are also set up in Employer

organization and construction supervising office. Complaint Acceptance Office will collect daily complaint and put forward handling suggestion after negotiating with related responsible organizations.

(2) Complaint process

Complaint acceptance leading group and office will accept complaint within one week after commencement of the Project. Special line for complaint and complaint mailbox are opened at the same time. Detailed complaint process is as follows:

When the influenced people think his rights are infringed in terms of any aspect of environmental protection, he can complain in written or oral form in Complaint Acceptance Office set up by Employer organization. The Employer shall negotiate with the complainant within one week according to the condition and shall record and collect complaint and handling condition in detail and shall report it to complaint acceptance leading group regularly.

When negotiation fails, the complainant can complain in written or oral form in Complaint Acceptance Office of Environmental Protection Bureau. Complaint Acceptance Office member shall record and collect it in detail. It shall submit handling suggestion within two weeks after negotiating with related responsible organization.

If complainant is not satisfied with suggestions of Complaint Acceptance Office, he can complain to Anlu Environmental Protection Bureau in written form within one week after receiving handling suggestion. Environmental Protection Bureau shall make handling suggestion within three weeks.

If complainant is still not satisfied with suggestions of Environmental Protection Bureau, he can file a suit in local People's Court after receiving handling suggestion according to the *Civil Procedural Law of People's Republic of China*.

8.Environmental management and monitoring plan

To protect environment along the line of the Project and ensure that each harmful environmental influence of the Project can be effectively controlled and alleviated, the Project shall conduct strict and scientific track management in the whole process of implementation and carry out environmental management and environmental monitoring.

8.1 Environmental management

Due to big difference of environmental management content in construction period and operation period of the Project, and working period of them differs from each other, as a result, independent organization shall be set. Being responsible for different stages shall be adopted to conduct environmental management of planned project. Related management organization usually covers supervision and enforcement agency and monitoring agency. The plan is used for organizing and implementing environmental effects mitigation measures mentioned in the report. Moreover, the plan appoints the responsible party and maps out operation scheme and monitoring project.

The main purpose of achieving environmental protection management is to: make the construction and operation of the Project conform to synchronized planning, synchronized development and synchronized implementation, namely “three synchronized principles” of national economic construction and environmental construction, which provides basis for environmental protection approval and completion acceptance of the Project; reduce the harmful effect on environment brought by the Project to the lowest degree through implementation of environmental management plan, and make environmental benefit and social benefit of the project get harmonious development.

The composition of environmental protection agency and supervision agency during various parts of project construction and operation is shown in Fig. 8-1.

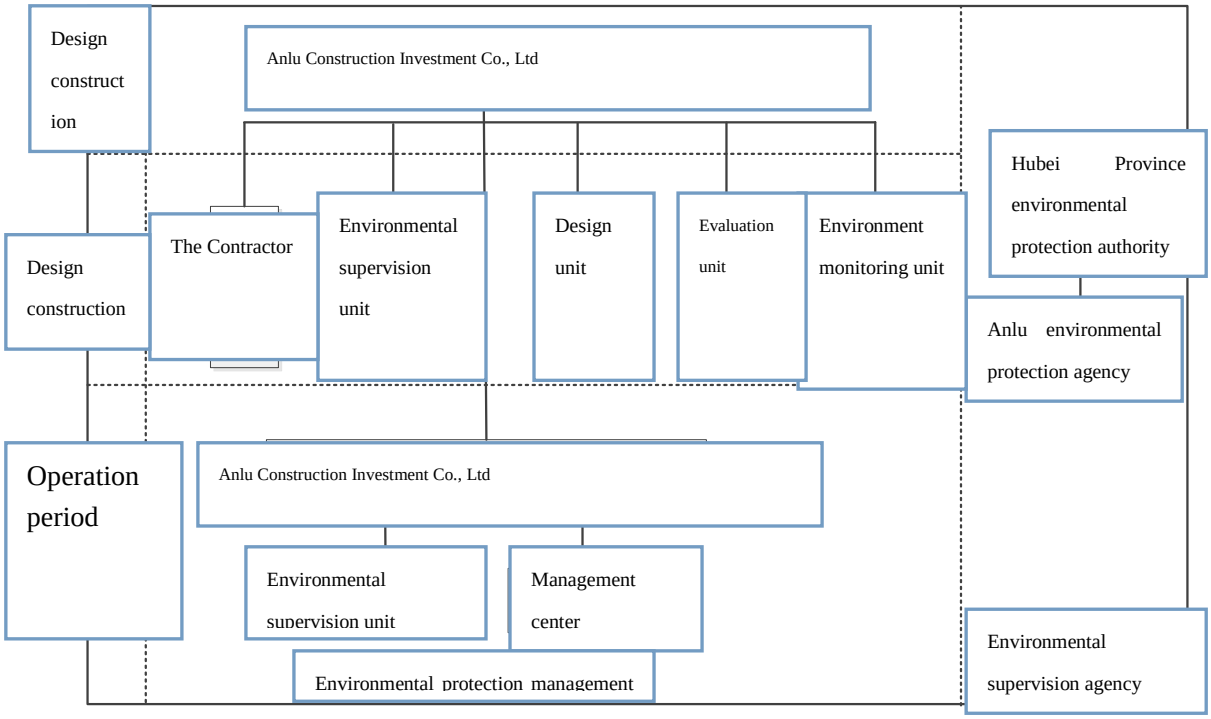

Fig. 8-1 Structure Scheme of Mechanism and Environmental Protection

Competent department of the Project Anlu Leading Group of World Bank Loan Project, executing organization Anlu Construction and Development Investment Co., Ltd. and Anlu Yun'an Assets Management Co., Ltd., construction organization and supervision organization shall establish environment management department separately and shall be equipped with corresponding special management and equipment for environmental management. Anlu Environmental Protection Bureau will undertake environmental management supervision task and Anlu Environmental Monitoring Station will cooperate with environmental monitoring work of each period actively.

The environmental management schedule during the conduction procedure of proposing road project is shown in Table 8-1.

Table 8-1 Project Environmental Management Plan

Stages	Implementation aspects	Measures	Implementing organization	Responsible organization	Supervisory organization

Construction period	Noise pollution Prevention	①Arrange construction time reasonably. If the work has to be constructed at night, the construction permit is needed and the signs should be posted; ②Try to adopt low-noise machine and forbidden the machine that over the limit of country to construct; ③The machine with stronger noise should be placed far away from environmental sensitive spot such as residential area and adopted scheduled maintenance. Establish strict operation instruction and set rail of 2.4 meters around residential area； ④Use commercial concrete and do not set concrete mixer in construction plant; ⑤Well complete the organization work of construction vehicle. The transport vehicles should slow down and do not honk when via sensitive spot; ⑥The construction should stopped in special dates such as senior high school entrance examination, College entrance examination and so on.	Contractor	Anlu Construction Investment Co., Ltd, Anlu urban and rural construction bureau, Anlu transport department, Anlu public security	Hubei Province Environmental protection Authority

	Air pollution prevention	①There should be specially-assigned persons who are responsible for cleaning work in the construction site. They should water, clean and reduce raise dust; ②Before the destruction of existing building, the place should be watered and sprayed to control spreading dust. Vertical transportation equipment or exile slot should be set up when dismantle building. The demolishing is forbidden to be thrown at high-altitude or be put down in a mass area and the violent construction work is forbidden. ③The spray special vehicle should be used to spray when dismantle existing building. The dusty shall be controlled when spray. The demolition work should be stopped when suffers over four wind; ④The muck should be cleared in time. The muck that cannot be cleared in time and needs pile up should be adopted coverage or solidifying measure. ⑤Closed wall should be established around the flowing dust pollution materials such as dinas in construction site and be covered by dense screen or other cover material; ⑥Strictly implement mock clear qualification management. The vehicles that work on construction mock transportation must be established closed stamp equipment or they cannot work on construction mock transport operation; ⑦Specially-assigned person should be equipped to take charge in construction work zone and achieve scientific management and civilized construction. During the period of foundation construction, try to adopt measures to advance progress of works and outward transport earth-rock to appointed place in time and shorten hazard period of pile; ⑧Layout construction plant reasonably and do not set the stock ground and earth-rock temporary pile up place at sensitive spot. Meanwhile, adjust vehicle transport route of project construction and do not pass through residential area.		traffic police brigade	

	Water pollution prevention	①Reinforce construction management and supervision work in construction and construction facilities should be checked in time; ②Construction materials such as pitch, oil plants, chemicals and soon should not be piled up around municipal pipe and should be equipped with canvas for temporary cover; ③Build simple drainage facilities before the filling of roadbed slope and excavate trapezoid drainage ditch in the outside of terrace slope angle; ④Interception drainage ditch should be established around construction stock ground. Establish grit chamber and silt fence at exit. Make sedimentation treatment of rainwater with sediment and mud and discharge into municipal wastewater pipe network; ⑤Oil removal and sediment facilities should be established to dispose construction wastewater. Establish mud purification pool and put sludge into clarifier-tank to subside. Supernatant liquor is used for water spray, the cleaning of machine and vehicles and so on. Discharge the rest part to municipal pipe; ⑥Construction such as pitch, oil plants and chemicals should be piled far from lakes; ⑦During the period of construction, the PVC engineering wall that not lowered than 2.4 meters should be established around rebuild and extension area at first to reduce the effect of road passage and residents caused by construction. ⑧In the road segment that near lake, the exposed roadbed surface should be covered by waterproof cloth in rainy season to prevent the rainfall runoff washout road and reduce the influence to lake.			

	Solid waste pollution prevention	①Establish PVC engineering wall not lower than 2 meters around the area that needs rebuilding and extension at first. Keep construction area in the wall clean. Arrange specially-assigned person to take charge of clean-keeping work in construction site and they should water and clean in time and reduce raise dust. The mound and windrow should not embezzle area outside red line. ②According to temporary mound quantity, plan mound field reasonably and reduce the quantity of temporary mound field. Try to arrange mound area in the middle of wall. Reduce the destabilization of construction machine to mound field in the area that do not often passed by vehicles and machine ③Directly adopt waterproof cloth to temporary cover mound surface because of short mound time. ④The project abandon earthwork mainly includes the brick slag quantity of demolished house, constructive waste of road break, boring mud of passenger foot-bridge, road, the rest mud of drainage project excavation and so on. The Project discards are organized and deployed in unity by city management department to be used for area balance. The area that cannot be used should be transported to the area appointed by city management department to be later managed. ⑤Household refuse should be disposed by environmental sanitation department at regular intervals after separate collection.			
	Water and soil conservation	It should be carried out according to soil and water conservation measures of Water conservation scheme report which mainly includes engineering measures (land leveling, the elimination of hardened layer), vegetation measure (broadcast trifolium repens seed) and provisional measures (build drainage ditch, grit chamber, block, cogongrass covering and so on).			
Operation period	Noise pollution prevention	①Formulate relevant traffic noise administrative provisions combining regional characteristic; ②Establish low noise pavement along the line;	Anlu transportation department	Anlu transportation department	
	Air pollution prevention	①The motor vehicles that discharge excessive exhaust pollutants are not allowed to go through; ②Reinforce the detection and maintenance of motor vehicle; ③Keep pavement clean, water in time and reduce dust particle in the pavement; ④Use vegetation to purify air; ⑤Increase environmental management intensity. Road administration department sets up organization of environmental management. Entrust environmental protection department to conduct environmental air monitoring regularly on the monitoring point specified by evaluation.			
	Measures to prevent accidents risk	①The safety check of dangerous chemicals transportation vehicles and road management should be intensified; ②It should be brought into local emergency accidents management system and accident equipments and facilities should be equipped.			

	Environmental monitoring	Conducted by national environmental monitoring technique specification.		Qualified monitoring station	

Main objects of environment capacity building are environment management and environment supervision. Training for them is one of the technical supports of the Project. In order to ensure success and effective implementation of environmental management plan, training on environmental management plan and other related knowledge, skill shall be made for personnel of related parties such as Employer of the Project, development organization, operation organization, Contractor, Engineering Supervision and local Project office. Different training shall be made for different posts.

8.2 Environment monitoring plan

Environment of the Project mainly includes influence of construction and operation on the two sides of road and the purpose is to ensure the implementation of all environmental protection measures and suggestions included in Environment Impact Report, and to control the environment impact caused by engineering construction within the scope specified by the state laws, regulations and standards.

The monitoring of environmental noise is concentrated on foundation construction of road pavement, and that of air quality monitoring is concentrated on earthwork section; and the monitoring of solid waste runs through the whole construction. The monitoring points for atmosphere and noise can be set up on sensitive points along road according to the actual circumstances such as transportation route during construction. The monitoring point for solid waste can be set up in areas such as topsoil stacking place, temporary mound place.

The environment monitoring contents and requirements in construction period must be made clear in construction contract by the Development Organization, and the implementation shall be organized by the Construction Organization during construction. The environment monitoring shall be completed by the entrusted qualified organization, and all the monitoring records shall be kept for record and serve as one type of materials of environmental protection acceptance after completion of the construction project.

Monitoring during the operation mainly includes the influence of traffic noise and vehicle exhaust beside the road.

See Table 8-3 for environment monitoring plan during construction period.

Table 8-3 Environment Monitoring Plan Table During Construction Period

Monitoring items	Monitoring position	Monitoring frequency		Monitoring duration	Implementation organization	Supervision organization
TSP	Place in and out of the construction site	Once during construction period at sensitive points		For successive twelve hours every time	Qualified monitoring organization entrusted by the Employer	Anlu Environmental Protection Bureau
L_{Aeq}	Sensitive point along the engineering	Once every quarter	One day	Once in the daytime and once at night		
COD, BOD_5, SS	Wastewater point for flush of vehicles	Twice during construction period	/	Two days per time		
Solid waste	Near the topsoil accumulated field and temporary soil accumulated field					

Environmental noise monitoring mainly focuses on fundamental construction on road pavement and air quality monitoring mainly focuses on the earthwork stage; the solid waste monitoring runs through the whole construction stage. The monitoring position can be selected according to actual circumstance during construction period such as transportation route, and the monitoring positions for air and noise are mainly along the sensitive points. The monitoring

position of solid waste can be in the scope of topsoil accumulated field, temporary soil accumulated field, etc. The Development Organization must clarify the environmental contents and requirements during construction period in the construction contract the implementation of which will be organized by the Construction Organization. The environment monitoring shall be completed by the entrusted organization with the corresponding qualification. All the monitoring report shall be filed and serve as one of materials for environment protection acceptance after completion of the construction project.

See Table 8-4 for environment monitoring plan during operation.

Table 8-4 Environment Monitoring Plan During Operation

Monitoring elements	Stage	Monitoring position	Testing parameter	Monitoring frequency	Implementation organization	Supervision organization
Environmental noise	Operation period	Sensitive points in the periphery of road	Equivalent sound level A	Monitor according to monitoring plan proposed by the Environment Acceptance Organization, and accept according to suggestion of the Acceptance Approval Department	The entrusted qualified monitoring organization	Hubei Environmental Protection Department
Air quality	Operation period	Sensitive points in the periphery of road	NO_2, CO			

In the first year after the Project is put into operation following its completion, the Road Management Department must entrust the environment monitoring to the organization with

corresponding qualification and all the monitoring reports shall be filed for record.

8.3 Environment supervision

As an important supplementary means for environment impact assessment of the construction project and “Three Simultaneities” acceptance supervision, environment supervision can realize the shift of environment management of the Environmental protection Administration Authority from management after the event to management through the whole process, from administrative supervision and management to administrative supervision and management combined with supervision and management of the third party which plays a positive role in strengthening management of the whole process, and lifting effectiveness and completeness of the environment impact assessment.

Environment supervision shall be included in the engineering supervision and management system and the status of environment supervision can’t be weakened. In supervision, the relations of the Employer, the Construction Organization, the Engineering Supervision Organization, the Environment Supervision Organization, the Environment Monitoring Organization and the government competent administrative departments of environment shall be straightened out and coordinated to create favorable conditions for environment supervision.

Subject to characteristics of the Project, the Supervision Organization shall formulate normalized supervision system conforming to the actual circumstance of the Project to ensure that the supervision is well under way.

The scope of environment supervision is the location of the Project and the affected area of the Project, including road, construction site of temporary engineering, temporary mound (slag) ground and the local existing road undertaking a large quantity of engineering transportation. The supervision contents include all aspects of environmental protection such as ecological protection, water and soil conservation, greening, pollutant prevention, social environmental protection.

The environment supervision in construction period shall be conducted by the organization with engineering supervision qualification and trained on environmental protection which is entrusted by the Development Organization (Anlu Construction Investment Co., Ltd.) through supervising the implementation of environmental protection measures in design documents. To ensure implementation of the supervision plan, the Development Organization shall sign the Environment Supervision Contract in the construction period with the Supervision Organization

before commencement of construction.

8.4 Investment estimate in environment protection

The total investment for the Project is estimated to be 1.1013655 billion yuan. The investment in environment protection includes expenses of environment protection facilities, equipment, environment monitoring during construction period, etc. According to countermeasures proposed in the report for environment protection, the one-time investment in environment protection of the Project is initially estimated to be 45.89 million yuan accounting 4.2% of the total investment. See Table 8-5 for investment in environment protection.

Table 8-5 Investment Estimate in Environment Protection Measures

No.	Environment protection measures		Unit	Quantity	Total price (ten thousand yuan)	Remark
Part I Environment Monitoring					/	/
1	Environment monitoring during construction period		Item	1	10	The construction period is sixty months
2	Environment monitoring during completion acceptance		Item	1	10	/
Part II Environment Protection Measures					/	/
1	Ecological protection measures	Ecological restoration and conservation of water and soil	Item	1	1870	Data source is water and soil conservation plan
2	Water pollution prevention	Build temporary septic tank, and the industrial wastewater shall be treated	/	/	30	Reduce influence imposed on the surrounding water

		through oil removal and desilter. Temporary abandoned slag field, drainage ditch of treatment field, pipeline and covering instrument				environment
3	Atmospheric environment pollution prevention	Water the place near sensitive points to environment, construction site and construction road.		1	10	The sensitive points shall not be affected by dust pollution (renting sprinkler)
4	Noise pollution prevention	Set noise reduction facilities such as temporary sound insulation board during construction period	Item	1	50	Involved investment in water protection
		Noise control during operation / Low-noise pavement	m^2		1650	Build low-noise pavement along the whole line
5	Solid waste collection	Construction waste treatment during construction	Item	1	20	/
6	Health protection expense of constructors		Item	1	10	Disease prevention and safety prevention

7	Reserve environment protection fund	Item	1	100	
Part III Environmental Management					
1	Training of environmental management personnel	Item	1	70	/
Part IV Independent Expense					
I	Environmental management expense	Item	1	192	
II	Environmental engineering design expense	Item	1	240	
III	Environmental supervision expense	Item	1	15	
IV	Engineering quality supervision expense	Item	1	12	
				300	
				4589	

The operation expense of environment protection facilities in the first three years is involved in loan of World Bank, and the operation expense in later period is involved in expense for operation of the Company. The operation expense of environment protection facilities in the report is 900 thousand yuan in total in three years. See Table 8-6 for details.

Table 8-6 Annual Operation Expense of Environment Protection Expense

No.	Items	Expense (ten thousand yuan)	Remark
1	Environment monitoring expense during operation period	8	
2	Energy consumption	2	

	of equipment		
3	Maintenance, upgrading of environment facilities	15	Sewage treatment facility, solid waste collection system, etc.
4	Wages, service fees of facility maintenance personnel	5	
Subtotal		30	
Total during operation period		90	Three years