

**Proposed AIIB Loan for the People's Republic of China
Liaoning Green Smart Public Transport Demonstration Project**

Environmental and Social Impact Assessment /Environmental and Social Management Plan

**Liaoning Urban & Rural Construction and Renewal
Project Management Company Ltd.**

Panjin Passenger Transport and Public Transport Group Co., Ltd.

Fuxin Huyue Urban Public Transport Co., Ltd.

Huludao Urban Public Transport Co., Ltd.

Yingkou Transport Group Co., Ltd.

Jinzhou Public Transport Co., Ltd.

Shenyang University

July 2021

Abbreviations and Definitions

A Abbreviations

1. Bus Company

The owners of this project are: Jinzhou Public Transport Co., Ltd., Panjin Passenger Transport and Public Transport Group Co., Ltd., Huludao Urban Public Transport Co., Ltd., Yingkou Transport Group Co., Ltd., Fuxin Huyue Urban Public Transport Co., Ltd. These owners are referred to as: "Bus Company".

2. Subproject office

The project management office established by the bus company is referred to as "subproject office" for short.

3. **AIIB** Asian Infrastructure Investment Bank

4. **LUCRPMC** Liaoning Urban & Rural Construction and Renewal Project Management Company Ltd.

5. **ESMP** Environmental and Social Management Plan

6. **ESP** Environmental and Social Policy

7. **ESSs** Environmental and Social Standards

8. **ESIA** Environmental and Social Impact Assessment

B Definitions

1.Pre-mitigationrisk: Before mitigation measures are taken, the risk of negative environmental and social impacts is defined as the pre-mitigation risk.

2. Residual risk: after the corresponding countermeasures as well as the emergency plan are implemented in place, the remaining risk is the residual risk.

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Executive Summary

A. Project Introduction

With rapid economic growth and urbanization, the total number of privately owned automobiles in Liaoning province has increased greatly in recent years. This causes traffic congestion in cities, pollutes local environment and deteriorates air quality. There is an urgent need to upgrade the public transport system and attract passengers to use more public transport in Liaoning.

The project includes procurement of electric buses, installation of charging system (charging piles or charging stations), the intelligent public transportation system, and public transportation service centers in Fuxin and Panjin. The objectives are to improve the efficiency of the public transportation system and, alleviate urban congestion, reduce the exhaust gas emission, and improve the urban environment.

The total investment of this project is 1,435.57 million CNY, including the loan amount of 150 million U.S. dollars from AIIB and domestic supporting facilities of 430.57 million CNY.

B. Environmental and social benefits of the project

By replacing the conventional petroleum-fueled buses with electric vehicles, the project reduces vehicle exhaust emissions, promotes energy conservation and emission reduction in the transport sector, and helps to improve the local air quality and residents' health.

The project provides local residents with convenient, comfortable, safe and environmentally friendly travel services, and furthermore it supports an efficient social public service system, through reducing the time for public to commute for medical care, health, education, etc., and increasing the accessibility of medical, health, education and other public services, which will benefit to the employment, schooling, medical care and enjoyment of other social services for all public.

Through the construction of a smart public transportation system, the project establishes

a new generation of comprehensive transportation operation coordination system in which people, vehicles, roads and the environment are well integrated, which can effectively alleviate traffic congestion, improve existing traffic conditions, and urban traffic efficiency. It is helpful for promoting sustainable development of urban transportation system.

The project will improve the transportation infrastructure, and the investment environment in the project areas. It increases the probability of success in attracting investment, and promotes the economic development of the subprojects cities.

The project will increase employment opportunities for residents in the project areas, improve their living standards, and help to alleviate poverty. During the construction period of the project, some non-skilled jobs will be directly provided. The priority of job opportunities will be given to vulnerable groups such as the local poor and women. During the project operation period, more than 1,000 jobs will be provided. The project will indirectly promote the development of the local tourism industry, restaurants, travel agencies and other industries, increase the employment opportunities of local residents, especially vulnerable groups, increase their incomes and improve their quality of life.

C. Analysis of alternatives

Without project, the issues such as road congestion, insufficient number of public buses, old buses to be phased out, low operation efficiency, and significant vehicle exhaust emissions will remain the same. It can be concluded that the without project scenario will not bring positive impacts on the development of urban public transport, the comfort, convenience and safety of citizens' travel, the urban environment, and the development of smart public transport systems. In general, this project has positive socio-economic benefits in terms of increasing public transportation proportion, slowing down the growth rate of private car ownership, and reducing the pollutant emissions.

During the preparation of the project, the technical, economic, social and environmental factors were taken into consideration. Various plans were considered, and the construction plan was finally determined. The plan includes the types of public transportation vehicles, the installation and arrangement of charging piles, and the construction methods of Fuxin and Panjin public transportation service centers.

D. Potential environmental and social impacts and mitigation measures

The Project will reduce fossil fuel consumption and increase energy efficiency of public transport. The project implementation site is not an ecologically sensitive area, and there are no national key protected animals and plants within the affected area. There are no cultural resources such as historical buildings, religions, etc. within 200 meters of each project implementation point. The project implementation area is not an area where ethnic minorities gather. The project has no land acquisition and resettlement. The project will not affect any environmentally sensitive or culturally protected areas, and will not affect the stability of the local ecosystem.

The environmental and social impacts during the construction of the project mainly include noise and dust pollution caused by earth excavation, plinth increase, construction machinery and transportation, wastewater and solid waste, and the impacts on traffic. The environmental and social impacts during the project construction period are temporary and limited to the Project areas. The environmental and social impacts during the operation of the project mainly include wastewater and solid waste. (1) Wastewater from washing buses, sewage and solid waste from service centers operation and maintenance; (2) Solid waste and e-waste from retired buses and replaced batteries; (3) Socio-economic benefits. These impacts will be resolved through mitigation measures formulated in the environmental and social management plan(ESMP) and adequate implementation management during construction. Environmental and social protection clauses will be included in the project construction contract to ensure that the contractor will comply with AIIB's Environmental and Social Framework (ESF).

E. Information disclosure and public consultation

In accordance with the relevant domestic policies and regulations on public participation and the requirements of the AIIB's ESF, the project information has been disclosed and disseminated through the Internet, on-site questionnaire surveys, and public consultations. Local residents, vulnerable groups (women, the disabled, the elderly, low-income households) and related stakeholders in the project affected areas participated in the public consultations.

The project has received strong supports from the public with many constructive suggestions. One of the most common suggestions is to process the project as soon as possible, in order to improve the urban environment and public transport convenience.

F. Grievance Redress Mechanism

In line with the requirements of the AIIB, the project-level grievance redress mechanism has been proposed to collect and address the concerns and complaints of the project affected people and workers. This mechanism will be established during the preparation and implementation phase of the project. The complaint channel will also be accessible to all the public, including vulnerable groups (women, the elderly, the disabled, the poor) through telephones, letters, emails and other social medias.

Full-time staff has been allocated in sub-projects offices to collect public opinions, including complaints. The telephone number and email address of the sub-projects office have been disseminated at the time of project information disclosure to ensure smooth complaints channels.

Project Affected People who believe they have been or are likely to be adversely affected by AIIB's failure to implement the ESF in this Project, can submit their submissions to the AIIB in line with Banks' Policy on AIIB Project-affected People's Mechanism (PPM).

G. Environmental and Social Management Plan and Institutional Arrangement

The project formulated an ESMP in accordance with the requirements of the AIIB's ESF. It includes all stages from pre-construction, construction and operation. The ESMP will be included in the construction contract and during all phases, the project implementing agency, Liaoning Urban & Rural Construction and Renewal Project Management Company (LUCRPMC) will ensure the successful implementation of ESMP and the environmental and social monitoring plan.

Through regular environmental and social monitoring and supervision, that project implementation will be reviewed regularly to comply with domestic environmental and social laws and AIIB's ESF.

H. Conclusion

The pre-mitigation impacts assessment of the project is as follows: (1) Ecological environmental impact is minimal; (2) Project construction risk is moderate; (3) Project operation risk is moderate; (4) Reputational risk is minimal. After implementing avoidance and mitigation measures, the predicted residual risk level is relatively negligible. Through the effective implementation of the project's ESMP, the environmental and social impacts and risks of the project are within an acceptable range, and the project benefits far outweigh the negative impacts.

1 Introduction

1.1 Project Overview

Through the procurement of electric buses, the installation of charging supporting facilities, like charging piles or charging station, construction of intelligent public transport system and public transport service centers, the project will improve the urban traffic system, the operation efficiency of public transport system, urban air quality, and the urban environment, and reduce the urban congestion. By replacing the petroleum-fueled buses with e-buses, to reduce fossil fuel consumption and carbon dioxide emissions, the project will contribute to energy-saving and environmental protection, as well as promote the sustainably economic development of the subprojects cities.

Table 1-1 Project Components

No.	Basic information of the project		
	Sub-Project name	Description	Number
1	Jinzhou Green Smart Public Transport Demonstration Project	Procurement of electric buses	273
		Smart public transportation system and related transportation software (Including smart Bus Parking and Station equipment)	—
		On board intelligent equipment	273
		Charging pile	12
2	Yingkou Green Smart Public Transport Demonstration Project	Procurement of electric buses	203
		Equipment in Dispatching command center	1
		Intelligent public transportation software	4
		Vehicle intelligent terminal and passenger flow statistic instrument	504
		Charging pile	110

Table 1-1 Project Components

(cont.)

No.	Basic information of the project		
	Project name	Project content	Number
3	Fuxin Green Smart Public Transport Demonstration Project	Procurement of electric buses	238
		Equipment in dispatching command center	1
		Intelligent public transportation software	6
		On board intelligent equipment	1,923
		Charging pile	50
		Construction of comprehensive public transport service center	1
4	Panjin Green Smart Public Transport Demonstration Project	Procurement of electric buses	294
		Equipment in dispatching command center	1
		Intelligent public transportation software	11
		On board intelligent equipment	1,454
		Charging pile	132
		Construction of comprehensive public transport service center	1
5	Huludao Green Smart Public Transport Demonstration Project	Procurement of electric buses	277
		Equipment in dispatching command center	1
		Intelligent public transportation software	6
		On board intelligent equipment	1,897
		Charging pile	48

1.2 Need for the Project

With the urbanization, the current public transportation cannot accommodate the traffic demand. The implementation of the project is to meet the following requirements:

(1) From the Urban Management Authorities

To realize the information and intelligence of urban traffic planning, industry supervision and traffic management, management departments need to build an advanced comprehensive monitoring, collaborative emergency command and dispatch system, which strengthens the seamless connection between government decision-making system and industry information system to timely forecast, analyze and monitor the industrial production and operation data, and coordinate the early warning and forecast in the operation process.

(2) From the Bus Companies

In order to provide better urban public transport service, the bus companies need advanced transportation information system to enormously improve enterprise efficiency, as well as need to improve external information service and public service level.

(3) From the Traffic Demand

Public needs to be provided with relevant services, such as bus operation status, public transport route and real-time status, and parking information etc. Therefore, it is necessary to build service-oriented transport system, to benefit the public.

(4) From the Urbanization

Relying on the internet of things, cloud computing and other intelligent transportation technologies, the project improves the public transport information system, transforms the traditional traffic management mode, and changes the traffic management mode to meet the demands of urbanization.

(5) From the Public Transport Capacity

The number of the buses is insufficient to meet the traffic demands of residents in the subprojects cities. Through this round procurement of e-buses, the needs of urban public transport can be met.

① Yingkou

It is estimated that by 2025, on a normal working day (Monday to Friday, not during holidays), there will be an average of 227,500 bus riders, meaning a total of 517 buses will be needed in the downtown area of Yingkou.

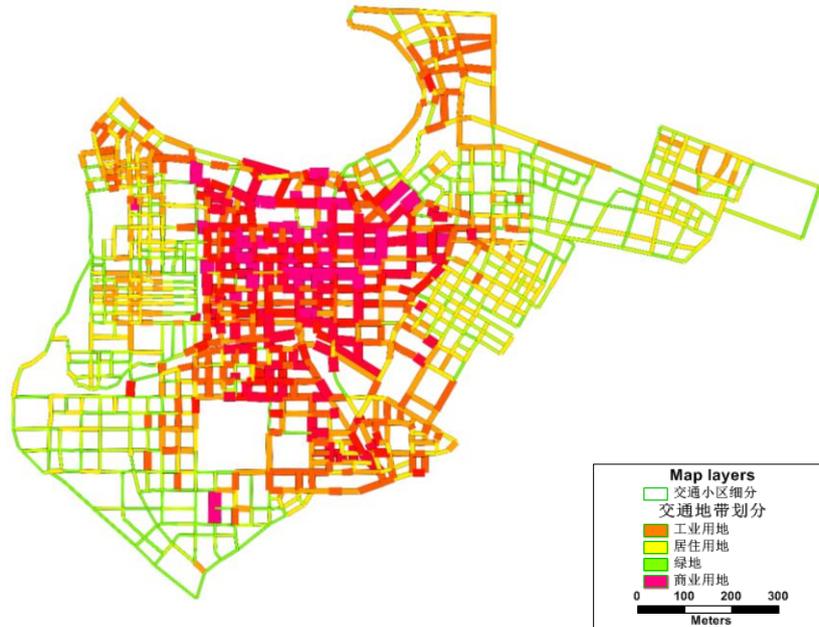


Figure 1-1 Yingkou bus travel demand chart

② Fuxin

It is estimated that by 2025, there will be an average of 276,300 bus riders, meaning a total of 658 buses will be required in the downtown area of Fuxin. The existing number of buses is 326, with a gap of 332 buses.

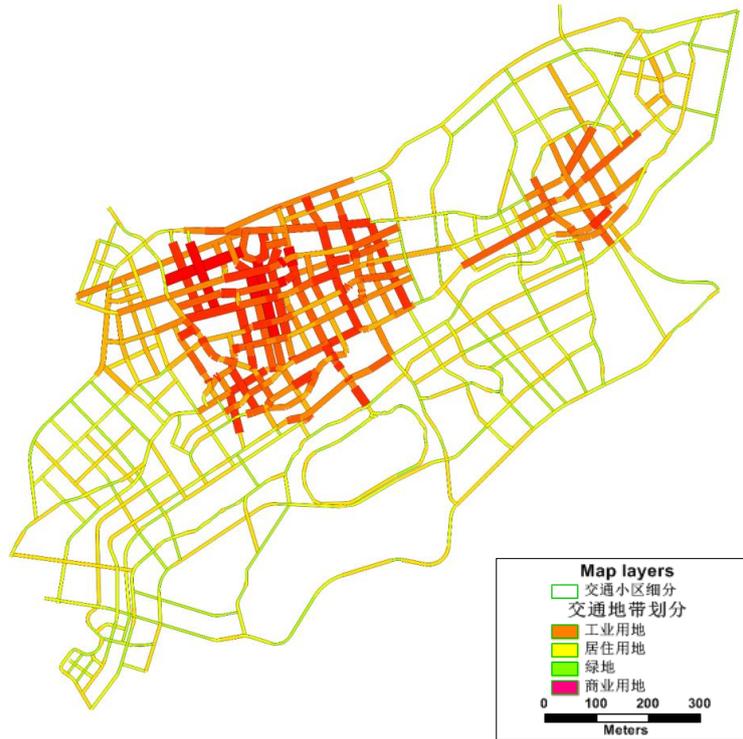


Figure 1-2 Fuxin bus travel demand chart

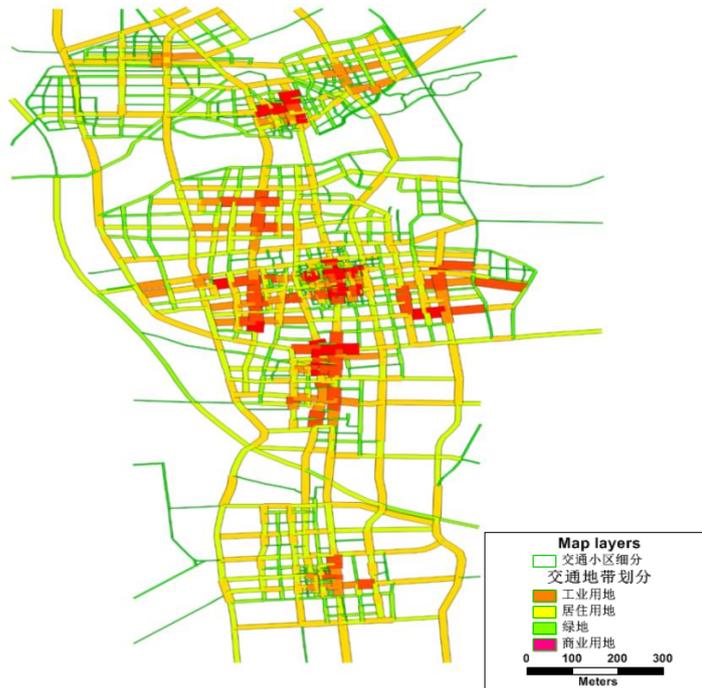


Figure 1-3 Panjin bus travel demand chart

③ Panjin

It is estimated that by 2025, there will be approximately 349,800 daily bus riders on a normal working day (Monday to Friday, and not during holidays), meaning a total of 777 buses

will be needed in Panjin downtown area. There is a gap of 137 buses per current data.

④ Huludao

It is estimated that by 2025, the number of average daily bus riders will be about 283,200.

A total of 637 buses will be required in Huludao downtown area, with a gap of 51 buses.

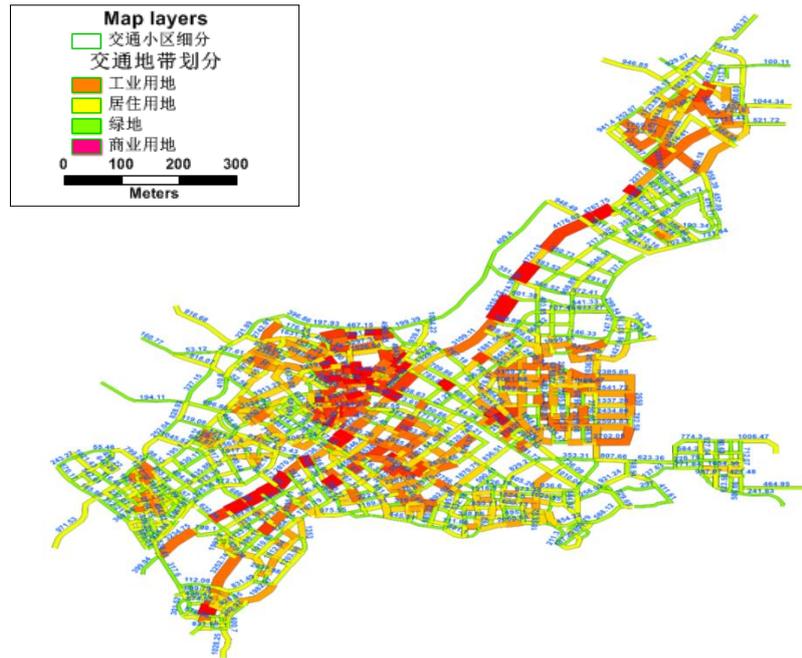


Figure 1-4 Huludao bus travel demand chart

Table 1-2 Forecasted demands of public transport in subprojects cities¹

City	Jinzhou	Panjin	Huludao	Fuxin	Yingkou
Demand					
Bus travel demand (10,000 person times / day)	29.13	34.98	28.32	27.63	22.75
Bus gap (set)	273	137	51	332	13

Note 1: Jinzhou City forecasts data in 2024 and other project cities forecasts data in 2025.

1.3 Project Area of Influence

Project Area of Influence includes the urban areas and some suburbs of Jinzhou City, Yingkou City, Fuxin City, Panjin City and Huludao City. For the public transport project, it covers a wide range and involves many stakeholders. From the perspective of benefit

sharing, it basically covers residents at all levels of social status in these five subprojects cities.

Table 1-3 Number of beneficiaries¹(10,000 people)

City	Urban population	Bus riders before the project	Female	Disabled	The elderly
Jinzhou	270.39	69.54	35.03	3.69	19.88
Yingkou	232.86	48.15	23.89	2.56	12.08
Fuxin	164.73	32.95	17.00	1.75	8.67
Panjin	138.97	35.02	17.56	1.86	7.93
Huludao	243.42	43.82	21.68	2.33	9.93
Total	1050.37	229.48	115.16	12.19	58.49

Note1: 1. Data provided by the bus company

2. Urban population data comes from "The Seventh National Census Bulletin of Liaoning Province" (Liaoning Province Seventh National Census Leading Group Office May 30, 2021)

3. Elderly people refer to 60 years old and above

The main investigation area of this project includes Panjin City, Jinzhou City, Huludao City, Yingkou City and Fuxin city. The survey objectives include public transport enterprises, residents around the supporting facilities and bus passengers.

1.4 ESIA Study

1.4.1 Objective, Scope and Timeline of ESIA Study

The purpose of environmental and social impact assessment is to assess the potential impacts and risks of the proposed project, evaluate the alternatives, as well as design appropriate measures of mitigation, management and monitoring to eliminate environmental and social negative impacts and enhance its positive benefits.

The scope of environmental and social assessment of the project is the project's influence

area and benefit area, namely main downtown areas in Jinzhou City, Panjin City, Huludao City, Fuxin City and Yingkou City.

The general personnel group samples of the survey, which are organized in the project involved areas, includes all residents who have the abilities to judge independently. Migrants are included in the scope of the investigation.

Study time: June 2019 - July 2021.

1.4.2 Study Area and Study Methodology

1.4.2.1 Study Area

The evaluation area of the project includes Jinzhou City, Panjin City, Huludao City, Fuxin city and Yingkou City.

1.4.2.2 Methodologies

(1) Literature Review

Consult and study the relevant literatures including the laws and regulations related to the project, the comprehensive evaluation of the development status of urban public transport system and the unilateral evaluation of its service level, economic benefits, environmental benefits and social benefits. As public transport is a major event related to people's livelihood and a hot topic reported by various media, this evaluation will fully use the Internet to collect materials related to the project.

CNKI and Wanfang databases were used to collect relevant literatures of the project affected areas, especially the statistical yearbook of their local economic and social conditions, including the 2019 statistical bulletin of Jinzhou City, the 2019 statistical bulletin of Fuxin City, the 2019 national economic and social development statistical bulletin of Yingkou City, the 2019 Statistical bulletin of social development, statistical

bulletin of national economy and social development of Panjin City, and the 2019 statistical bulletin of national economic and social development of Huludao City.

(2) Focus Group Discussions

FGDs were held in five cities (Jinzhou, Huludao, Panjin, Yingkou and Fuxin). The participants were various vulnerable groups (such as the disabled, the poor, the elderly, women, and other affected people, etc.). Through direct dialogue, the social assessment team collected information about local people's livelihoods and other aspects to understand their expectations, concerns, and suggestions.

(3) One-on-One Interview

Although the construction of the project in general brings socio-economic benefits, the impacts on individuals may vary. Therefore, to assess the social impacts of the project, besides the macro analysis, it is also necessary to assess the impacts on the individuals. In fact, whether the construction of a project has value and social benefits, it depends on the judgment of project stakeholders. Project planning and design should also be optimized from the perspective of stakeholders. Therefore, on the basis of the FGDs, some people who are greatly affected by the project are selected for in-depth one-on-one interviews to understand their various concerns and suggestions on the project.

(4) Field Surveys

The sites visited include bus companies, parking lots and dispatching rooms in Jinzhou, Huludao, Fuxin, Yingkou and Panjin, as well as multiple stops along different bus routes. The construction sites of comprehensive public transport service centers in Panjin and public transport service center to be reconstructed in Fuxin city were the focused areas of assessment. The stakeholders consulted mainly include the staff of bus companies, passengers, staff of the project management company, etc. The study contents include the satisfactory levels of public transport passengers to the service quality of public transport, the satisfaction levels of the public transport employees, a number of operation data of

public transport system and preferential policies.

1.4.2.3 Implementation Steps

Steps of Environmental and Social Assessment (see Figure 1-5)

The study team carried out the assessment according to the assessment plan which includes: collecting basic data of the project, collecting and checking survey information, literature review and preliminary assessment, field investigation, etc. After the completion of field surveys, the study team conducted a comprehensive analysis of the evidence, concluded the assessment, and drafted the ESIA report.

(1) Collection of Project basic data

The data of this assessment should include three types:

The first type: systems, policies and regulations, for example, plans and policies formulated by departments or sectors, development plans of local governments, etc.

The second type: project documents and related reports.

The project feasibility study report, supplementary information of Fuxin Huyue urban public transport feasibility study project, Panjin supplementary information list, registration forms of environmental impact from project construction (Huludao, Fuxin, Yingkou).

The third type: the economic, environmental and public transport status of the subprojects cities.

The above data are collected through the survey information sheet, some project management documents provided by the management department, and the Internet.

(2) Literature Review and Preliminary Assessment

The data should be comprehensively and carefully studied, and the important information should be carefully reviewed. To clarify uncertainties, discussions and communications with the project management company were conducted.

(3) FGDs, Field Surveys and One-on-One interviews

Through FGDs, Field Surveys and One-on-One interviews, the problems and supplementary information were verified. Especially the opinions and suggestions of the residents in the project area were collected.

(4) Comprehensive analysis and assessment to draw conclusion

On the basis of literature review, FGDs and field surveys, the project is comprehensively assessed by relevant methodologies, and the conclusion of assessment was formed.

(5) Draft ESIA report

After discussion within the expert group, the conclusion was formed. Afterwards, the ESIA report was prepared. The draft has been fully consulted with relevant departments to include their opinions and suggestions in order to avoid major omissions.

(6) Feedback from project management company

The findings were shared with the project management company to reflect their opinions.

(7) Complete the ESIA report

After incorporating the feedbacks from the project management company, the final report was submitted.

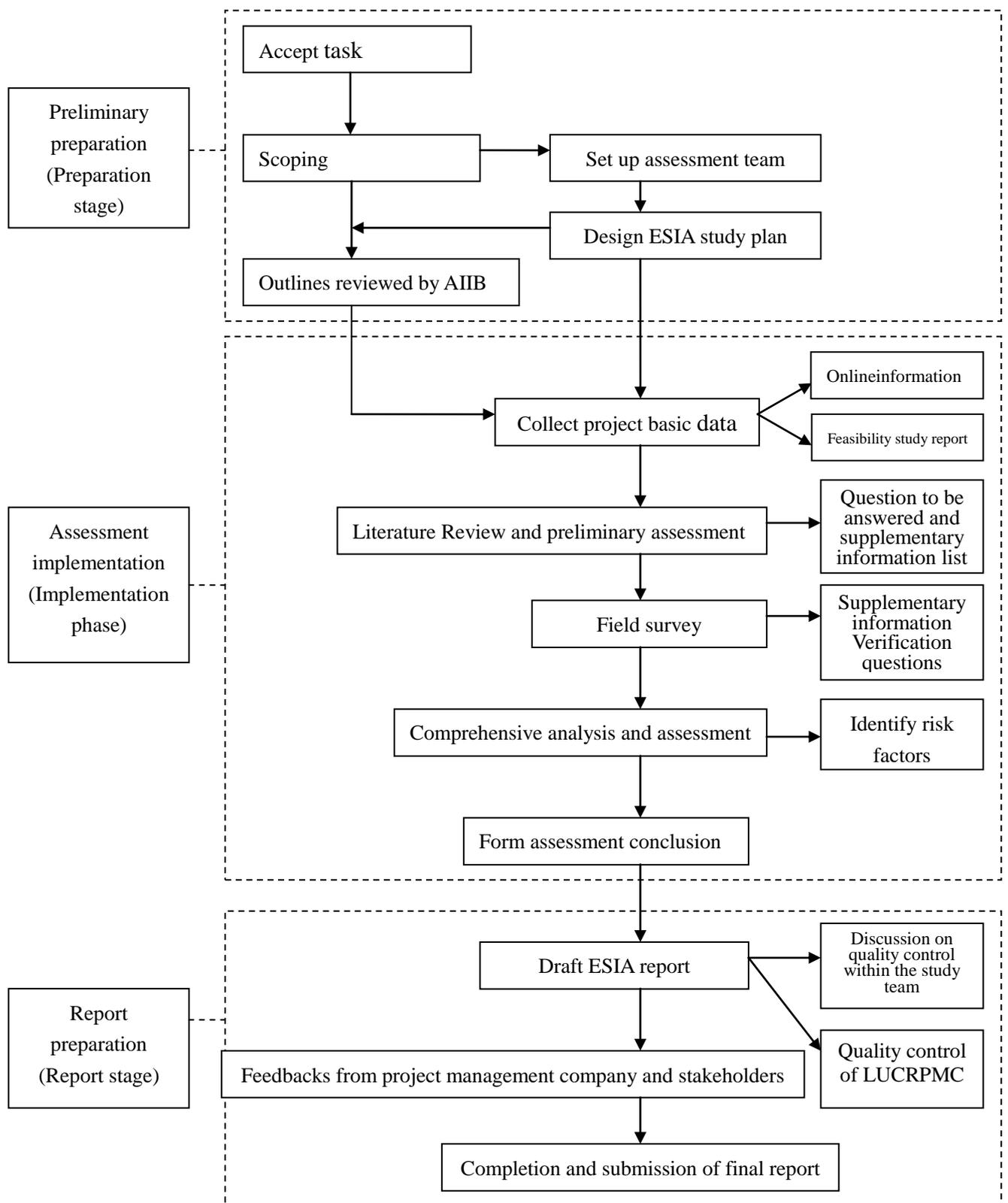


Figure 1-5 Working process of environmental and social assessment

1.4.3 Structure of ESIA Report

The report consists of ten parts:

The first part is “Project Introduction”. In this section, it describes the background, objectives, scope of the project, methodologies of ESIA study, study area, study timeline, and structure of the report.

The second part is "Review of policy and Regulatory Framework". In this section, it discusses the Project’s legal obligations under national law applicable to the Project, and AIIB’s ESF.

The third part is “Project Description”. In this section, it discusses the project background, project components, construction objectives, construction methods, associated and existing facilities.

The fourth part is "Baseline of Environmental and Social Conditions". In this part, it mainly introduces the relevant geographical, environmental, ecological and socio-economic conditions in the project areas.

The fifth part is "Analysis of Alternatives". In this part, it discusses the bus procurement scheme and no project scenario, analyzes the rationale of the charging pile installation scheme, analyzes the rationale of the bus service centers location scheme (Panjin, Fuxin), and discusses the benefits from the project.

The sixth part is "Potential Environmental and Social Impacts and Mitigation Measures". This section predicts and evaluates the possible positive and negative impacts of the project on the environment and Society (including on vulnerable groups and gender issues), and discusses measures to avoid, reduce, mitigate and compensate the negative impacts.

The seventh part is "Stakeholder Consultation and Information Disclosure". In this part, it

introduces the methods of information disclosure and stakeholder participation, as well as collects and summarizes the opinions and suggestions of stakeholders

The eighth part is "Grievance Redress Mechanism". This section describes the grievance redress channels(both informal and formal), and sets out the time frame and mechanisms for resolving complaints about environmental and social performance, as well as complaints from workers.

The ninth part is "Environmental and Social Management Plan". This section discusses a series of mitigation and management measures that will be taken in the process of project implementation to avoid, reduce, mitigate or compensate adverse environmental and social impacts. It also introduces the relevant institutional arrangement, capacity development and training plan to successfully implement the environmental and social management plan. It introduces the time and methods of information disclosure and consultation, as well as the requirements of environmental, social monitoring and reporting.

The tenth part is "Conclusion". This section provides the conclusions drawn from the assessment and provides recommendations.

2 Review of Policy and Regulatory Frameworks

2.1 Summary of Legislation/Policies and their Applicability for Proposed Project

2.1.1 Summary of Legislation/Policies

(1) Carry out prevention and control of vehicle exhaust pollution. Strengthen the elimination of yellow label vehicles. We will promote clean energy and new energy vehicles, increase the proportion of clean energy and new energy vehicles in public vehicles, increase the use of clean energy or new energy vehicles in urban public transport, and strengthen urban traffic management. Optimize urban functions and layout, promote intelligent transportation management, implement public transport priority strategy, and increase the proportion of public transport trips. In 2017, the proportion of urban public transport in motorized travel has reached 49%; by 2020, the proportion of urban public transport in motorized travel will reach 60%. (Notice of Liaoning Provincial People's Government on printing and distributing the action plan of pollution prevention and ecological construction and protection (2017-2020) (Issued by Liaoning Provincial People's Government [2017] No. 22))

(2) Carry out prevention and control of vehicle exhaust pollution. Remote sensing and other technical means are applied to supervise and detect the running vehicles. Clean energy should be used in urban public transportation and taxis, and the layout and construction of supporting facilities such as gas stations and charging piles should be improved. We will implement the policy of encouraging the elimination of yellow marked vehicles, ban the use of yellow marked vehicles in urban core areas, and basically eliminate yellow marked vehicles throughout the province in the mid-term of the 13th- five- year plan. (Environmental protection 13thFive-Year plan of Liaoning Province (Issued by the general office of Liaoning Provincial People's Government [2016] No.76))

(3) Actively promote low-carbon transportation. Give priority to the development of urban public transport, and constantly improve the service capacity and level of urban public transport. We will spare no effort to promote the "oil to gas" reform in urban passenger transport industry, and encourage the use of energy-saving, clean energy and new energy transport vehicles. Strictly implement the fuel consumption limit standard of heavy commercial vehicles to prevent high fuel consumption vehicles from entering the road transport market. By 2020, there will be 92000 clean energy and new energy vehicles in the road transportation industry of the whole province, and the motorized travel share rate of public transport in provincial cities shall not be less than 55%. (Notice of Liaoning Provincial People's Government on printing and distributing the work plan for greenhouse gas emission control during the 13th Five- Year Plan period (Issued by Liaoning Provincial People's Government [2017] No.3))

(4) Accelerate the construction of smart city. Promote the Internet of things, cloud computing, big data and other new generation of information technology. Focus on the development of smart transportation, smart community, smart medicine, smart tourism and other systems, to achieve a high degree of integration of urban management and application of information technologies. (The 13th Five-Year plan for revitalizing northeast China, National Development and Reform Commission, November 2016, Chapter 8, section 4)

(5) Build Huludao Jinzhou Panjin Yingkou Dalian Dandong coastal tourism destination. (13th Five-Year plan for revitalizing northeast China (National Development and Reform Commission, November 2016, Chapter 4, section 4, column 10))

(6) Liaoning Province has become one of the first batch of 13 pilot areas of transportation power construction. (outline of building a strong transportation country (issued by the Central Committee of the Communist Party of China and the State Council in September 2019), and the Ministry of transport issued the notice of the Ministry of transport on carrying out the pilot work of building a transportation power (Planning letter of the Ministry of Transport [2019] No. 859))

(7) Take municipalities directly under the central government, provincial capitals, cities with public transport and cities with a population of more than 1 million as objects to carry out the campaign for green travel creation, advocating a simple, moderate, green and low-carbon lifestyle, guiding the public to choose public transportation, walking and cycling, and other Green Travel to reduce the total traffic volume of cars and improve the overall level of green travel in the cities. The proportion of green travel in the above-mentioned cities has reached more than 70%, and the satisfaction rate of green travel service is not less than 80%. The proportion of new energy and clean energy buses in all buses should not be less than 60%, and the proportion of new energy and clean energy buses in other regions should not be less than 50%. The proportion of new energy vehicles and clean energy vehicles in newly added and updated buses and trams shall not be less than 80%. The proportion of air-conditioned buses and barrier free buses has increased steadily, and vehicles with high energy consumption and high emission will be eliminated according to law. (Action plan for green travel creation (National Development and Reform Commission [2019] No. 1696))

(8) Adhering to the new concept of development, we will continue to take actions to prevent and control air pollution, focusing on areas such as the Beijing-Tianjin-Hebei region and its surrounding areas, the Yangtze River Delta Economic Zone, and the Fen-wei plain (hereinafter referred to as key areas) , making comprehensive use of economic, legal, technological and necessary administrative means, and we will vigorously adjust and optimize the industrial structure, energy structure, transportation structure and land-use structure, strengthen regional joint prevention and control, and vigorously control pollution in autumn and winter. We will win the battle to protect the blue sky by making overall plans, making systematic plans and implementing precise policies, and achieving win-win results in terms of environmental, economic and social benefits.(Notice of the State Council on Printing and distributing the three-year action plan for winning the battle to defend the blue sky (no. 22[2018] of the State Council)

(9) By the end of 2020, all the buses will be replaced with new energy vehicles in the

built-up areas of the municipalities directly under the central government, provincial capital cities and cities separately listed in the plan. Then we will vigorously eliminate old vehicles. In key areas, the means of economic compensation, restricted use and strict supervision of over-standard emissions are adopted. The special rectification of excessive emissions of diesel trucks is the starting point. The access system of fuel consumption limit for road transport vehicles is strictly implemented. The elimination and renewal of diesel trucks operating at national level III and below are vigorously promoted, and the old gas vehicles adopting lean combustion technology and "oil to gas" are accelerated. By the end of 2020, more than 1 million medium and heavy duty diesel trucks operating at national level 3 and below will be eliminated in Beijing, Tianjin, Hebei and surrounding areas. (Implementation Opinions of the Ministry of transport on Comprehensively Strengthening ecological environment protection and firmly fighting the battle of pollution prevention and control (Issued by the Ministry of Transport [2018] No. 81))

(10) Focusing on the overall goal of speeding up the construction of a transportation power driven by technological innovation, taking digitalization, networking and intellectualization as the main line, and promoting the efficiency, function expansion and kinetic energy increase of transportation, the digital transformation and intelligent upgrading of transportation infrastructure will be promoted, and a convenient, efficient, green and intensive, intelligent, safe and reliable new infrastructure will be built in transportation field. (Guidance of the Ministry of transport on promoting the construction of new infrastructure in the field of transportation (Issued by the Ministry of Transport [2020] No. 75))

(11) This pandemic enlightens us that human beings need a self-revolution to accelerate the development of a green way of life. We need to build ecological civilization and beautiful earth. Human beings can no longer ignore the warnings of nature over and over again. We cannot follow the old way by which we take too much from nature but never give things back. "The Paris Agreement" is a milestone in the history of climate

governance and guides us to live a low-carbon life. We need to take actions to protect the earth, the human's homeland. All parties should work together to take steps. China will make a greater contribution to environmental protection, and adopt more effective policies and measures to achieve carbon peak by 2030, and strive to achieve carbon neutrality by 2060. All countries should establish a new development concept of innovation and coordination, seizing the historic opportunity for a new round of scientific and technological revolution, promoting the "green recovery" of the world economy after the pandemic, and making every effort to keep sustainable development. (People's Republic of China President Xi Jinping's speech at the general debate on the seventy-fifth United Nations General Assembly) (September 22, 2020, Beijing)

2.1.2 Applicability of National and Local Policies to the Proposed Project

The state vigorously promotes the application of new energy vehicles and the construction of charging infrastructure, which provides a policy basis for the procurement of e-buses and the development of charging infrastructure construction. Guidance Opinions of the general office of the State Council on accelerating the construction of charging infrastructure (Issued by the general office of the State Council [2015] No. 73), development guide for electric vehicle charging infrastructure (2015-2020), Circular of the Ministry of Housing and Urban Rural Development on strengthening the planning and construction of urban electric vehicle charging facilities (Ministry of Housing and Urban Rural Development [2015] No. 199) On further improving the financial supplement for the promotion and application of new energy vehicles A series of documents, such as the notice of sticking policies (Ministry of Finance [2019] No. 138), are fully applicable to the demonstration project of green and intelligent public transportation in Liaoning Province loaned by AIIB.

2.2 Applicable National Legislative Framework

2.2.1 Environmental Protection Laws, Policies and Plans of China

The project submitted the application report and financial review report to the National Development and Reform Commission and the Ministry of Finance in September 2019. On January 5, 2021, received the approval documents from the National Development and Reform Commission and the Ministry of Finance. The implementation of the project abides by the planning of the project city and relevant industrial policies. The goal of the project is consistent with social development in the project city. The construction of the project will be carried out in strict accordance with the requirements of relevant policies and regulations. All sub-projects have completed environmental impact filing and registration. Please refer to Annex 2 for relevant approval procedures. The following are the legal requirements for the project.

- (1) Environmental protection law of the People's Republic of China (April 2014)
- (2) Law of the People's Republic of China on Environmental Impact Assessment (December 2018)
- (3) Law of the People's Republic of China on prevention and control of water pollution (revised in 2017)
- (4) Law of the People's Republic of China on the prevention and control of air pollution (October 2018)
- (5) Law of the People's Republic of China on prevention and control of environmental noise pollution (December 2018)
- (6) Law of the People's Republic of China on the prevention and control of environmental pollution by solid waste (revised in April 29, 2020)

- (7) Water and soil conservation law of the People's Republic of China (2011)
- (8) Land administration law of the People's Republic of China (Revised on August 26, 2019)
- (9) Energy conservation law of the People's Republic of China (October 2018)
- (10) Green travel creation action plan (National Development and Reform Commission [2019] No. 1696)
- (12) Notice on Further Strengthening the management of environmental impact assessment and preventing environmental risks (State Environmental Protection Administration [2012] No. 77)
- (13) Management notice on strengthening risk prevention and strict environmental protection (State Environmental Protection Administration [2012] No. 98)
- (14) Notice on printing and distributing the management measures for emergency plans and records of environmental emergencies in enterprises and institutions (for Trial Implementation) (State Environmental Protection Administration [2015] No. 4)
- (15) Notice of the State Council on printing and distributing the action plan for prevention and control of air pollution (Issued by the State Council [2013] No. 37)
- (16) Notice of the State Council on printing and distributing the action plan for prevention and control of water pollution (Issued by the State Council [2015] No. 17)
- (17) Implementation opinions of the Ministry of transport on "comprehensively strengthening ecological environment protection and firmly fighting the battle of pollution prevention and control" (Ministry of transport [2018] No. 81)
- (18) "List of Classified Management of Environmental Impact Assessment of Construction Projects (2021 Edition)"

(19) Notice of the people's Government of Liaoning Province on printing and distributing the action plan for pollution prevention and ecological construction and protection (2017-2020) (Issued by Liaoning Provincial People's Government [2017] No. 22)

(20) Environmental protection 13th Five -Year plan of Liaoning Province (Issued by the general office of Liaoning Provincial People's Government [2016] No.76)

(21) Notice of Liaoning Provincial People's Government on printing and distributing the work plan for greenhouse gas emission control during the 13th Five- Year Plan period (Issued by Liaoning Provincial People's Government [2017] No.3)

(22) Notice of Yingkou Municipal People's Government on printing and distributing the three-year action plan for winning the blue sky Defense War (2018-2020) (Issued by Yingkou Municipal Government [2019] No.6)

2.2.2 Policies and Plans for the Development of China's Energy and Transport Sectors

(1) Notice of the State Council on printing and distributing the development plan of modern comprehensive transportation system during the 13th Five- Year Plan period (Issued by the State Council [2017] No. 11)

(2) Guiding opinions of the State Council on giving priority to the development of public transport in cities (Issued by the State Council [2012] No. 64)

(3) Notice of the State Council on printing and distributing the development plan of energy saving and new energy automobile industry (2012-2020) (Issued by the State Council [2012] No.22)

(4) Guidance Opinions of the general office of the State Council on accelerating the promotion and application of new energy vehicles (Issued by the general office of the State Council [2014] No. 35)(5) Opinions of the State Council on promoting the innovative development of cloud computing and cultivating a new ecology of

information industry (Issued by the State Council [2015] No.5)

(6) Notice on financial support policies for promotion and application of new energy vehicles in 2016-2020 (Ministry of Finance [2015] No. 134)

(7) Guiding opinions of the general office of the State Council on accelerating the construction of charging infrastructure for electric vehicles (Issued by the general office of the State Council [2015] No. 73)

(8) Notice on improving the price subsidy policy for refined oil products of urban buses and accelerating the promotion and application of new energy vehicles (Ministry of Finance [2015] No. 159)

(9) Notice on further improving the financial subsidy policy for the promotion and application of new energy vehicles (Ministry of Finance [2019] No. 138)

(10) Notice on supporting the promotion and application of new energy buses (Ministry of Finance [2019] No. 213)

(11) Notice on printing and distributing the implementation plan for promoting the updating and upgrading of key consumer goods and smooth resource recycling (2019-2020) (National Development and Reform Commission [2019] No. 967)

(12) Notice on printing and distributing the development guide for electric vehicle charging infrastructure (2015-2020) (National Development and Reform Commission [2015] No. 1454)

(13) Notice on Issuing the implementation plan of promoting the "Internet plus" convenient transportation for the development of intelligent transportation (National Development and Reform Commission [2016] No. 1681)

(14) Notice on incentive policies for charging infrastructure of new energy vehicles during the 13th five year plan and strengthening the promotion and application of new energy vehicles (Ministry of Housing and Urban Rural Development [2015] No. 199)

(15) Notice on issues related to the development of national public transport city construction demonstration project (Issued by the Ministry of Transport [2011] No. 635)

(16) Notice of the general office of the Ministry of transport on launching the second batch of demonstration projects of intelligent application of urban public transport (Issued by the Ministry of Transport [2013] No. 335)

(17) Implementation opinions of the Ministry of transport on implementing the guiding opinions of the State Council on giving priority to the development of public transport in cities (Issued by the Ministry of Transport [2013] No. 368)

(18) Notice of the general office of the Ministry of transport on printing and distributing the construction guidelines of urban public transport intelligent application demonstration project (Issued by the Ministry of Transport [2014] No. 105)

(19) Notice of the general office of the Ministry of transport on further accelerating the construction of demonstration projects for intelligent application of urban public transport (Issued by the Ministry of Transport [2015] No. 88)

(20) Notice of the Ministry of transport on printing and distributing the 13th Five -Year plan development outline of urban public transport (Issued by the Ministry of Transport [2016] No. 126)

(21) Notice of the Ministry of transport on publishing the list of the first batch of cities to comprehensively promote the construction of transit city during the 13th Five Year Plan period (Issued by the Ministry of Transport [2017] No. 597)

(22) Notice of the Ministry of transport on printing and distributing the outline of digital transportation development plan (Issued by the Ministry of Transport [2019] No. 89)

(23) Notice of the State Council on printing and distributing the action outline for promoting the development of big data (Issued by the State Council [2015] No. 50)

(24) The State Council's Guiding Opinions on actively promoting the "Internet plus" action (Issued by the State Council [2015] No. 40)

(25) The 13th Five-Year plan for revitalizing northeast China (National Development and Reform Commission, November 2016)

(26) Implementation opinions of Liaoning Provincial People's Government on giving priority to the development of public transport in cities (Issued by Liaoning Provincial People's Government [2014] No.6)

(27) Notice of the general office of Liaoning Provincial People's Government on printing and distributing the implementation plan for accelerating the development of new energy vehicles in Liaoning Province (Issued by the general office of Liaoning Provincial People's Government [2016] No. 139)

(28) Notice of Liaoning Provincial People's Government on printing and distributing the comprehensive transportation development plan of Liaoning Province during the 13th Five- Year Plan period (Issued by Liaoning Provincial People's Government [2017] No. 49)

(29) Notice of the general office of Jinzhou Municipal People's Government on printing and distributing the work division scheme for implementing the 13th five year plan for Northeast Revitalization in Jinzhou City (Issued by Jinzhou Municipal Government [2017] No. 42)

(30) Notice of Jinzhou Municipal People's Government on printing and distributing the three-year action plan for winning the blue sky Defense War (2018-2020) (Issued by Jinzhou Municipal Government [2018] No. 33)

(31) Notice of Jinzhou Municipal People's Government on printing and distributing the master plan of Jinzhou smart city construction (2017-2022) (Issued by Jinzhou Municipal Government [2017] No. 62)

- (32) Transportation planning for the 13th Five-Year plan of Jinzhou City
- (33) Special planning for public transport development in Jinzhou City
- (34) Urban master plan of Huludao City (2015-2030)
- (35) Huludao City Comprehensive Transportation System Planning (2017-2030)
- (36) Outline of the 13th five year plan for national economic and social development of Huludao City
- (37) Huludao tourism development master plan (2006-2020)
- (38) Panjin urban master plan (2011-2020)
- (39) Outline of the 13th Five -Year plan for Panjin's national economic and social development
- (40) Panjin road traffic management planning
- (41) Panjin comprehensive transportation system planning (2011-2030)
- (42) Panjin integrated passenger and public transport planning
- (43) Implementation plan of Panjin public transport city construction (2017-2020)
- (44) Evaluation opinions on the green public transport demonstration project of Panjin City, Liaoning Province - project proposal;
- (45) Fuxin urban master plan (2000-2020) (revised in 2017)
- (46) Fuxin urban comprehensive transportation system planning (2012-2020)
- (47) Outline of the 13th Five -Year plan for Fuxin's national economic and social development

- (48) Special planning of Fuxin public transport development planning
- (49) Yingkou City Master Plan (2011-2030) (revised in 2018)
- (50) Outline of the 13th Five-Year plan for the national economic and social development of Yingkou City;
- (51) The 13th five year plan of Yingkou transportation development
- (52) Urban comprehensive transportation planning of Yingkou City (2012-2030)
- (53) Yingkou City public transport development goals (2019-2025)
- (54) Notice on printing and distributing the implementation plan for the promotion and application of new energy buses in Yingkou City in 2020-2024 ([2019] No. 204)

2.2.3 Social Related Laws, Policies and Plans of China

2.2.3.1 Major Social Laws and Policies

The social policy system of the project affected areas is composed of laws, regulations and policies both at the national level and the local level. The main laws, regulations and policies include:

- (1) Constitution of the People's Republic of China, 2004;
- (2) Law of the People's Republic of China on the protection of women's rights and interests, 2005;
- (3) Special provisions on labor protection of female employees, 2012;
- (4) Notice of the general office of the national development and Reform Commission on printing and distributing the chapter of social stability risk analysis and the outline of preparation of evaluation report for major fixed assets investment projects (Trial Implementation) (National Development and Reform Commission, November [2013] No. 428)

(5) Notice of Liaoning Provincial Development and Reform Commission on printing and distributing management measures for social stability risk assessment of fixed assets investment projects in Liaoning Province (Liaoning Provincial Development and Reform Commission [2015] No. 897)

(6) Law of the People's Republic of China on prevention and control of occupational diseases (December 2018)

(7) Labor law of the People's Republic of China (December 2018)

2.2.3.2 Summary of women's rights and interests protection policy

The implementation of equality between men and women is the basic state policy of the country. The constitution of China stipulates that "Women of the People's Republic of China enjoy equal rights with men in all aspects of political, economic, cultural, social and family life".

The basic principle of equality between men and women was established in the marriage laws of 1950, 1980 and the amendments to the marriage law of 2001. The law of the People's Republic of China on the protection of women's rights and interests, which was passed in 1992 and revised in 2005, clearly stipulates that women enjoy the same rights as men in all aspects of family and social life.

Moreover, the state has fully realized that women, as mothers, not only undertake the function of social production, but also the function of population reproduction. They have special physiological needs and special rights and interests demands. The state's laws have also formulated provisions for the protection of women's exclusive and special rights.

(1) Women enjoy equal rights with men in political, economic, cultural, social and family life. (Article 2 of the law of the People's Republic of China on the protection of women's rights and interests)

(2) When employing staff and workers, no unit shall refuse to employ women on the ground of gender, or raise the employment standards for women, except for the types of work or posts that are not suitable for women. (Article 23 of the law of the People's Republic of China on the protection of women's rights and interests)

(3) Men and women get equal pay for equal work. Women enjoy equal rights with men in terms of welfare treatment. (Article 24 of the law of the People's Republic of China on the protection of women's rights and interests)

(4) All units shall, in accordance with the characteristics of women, protect the safety and health of women at work and assign work in accordance with the law, and shall not arrange work unsuitable for women. (Article 26 of the law of the People's Republic of China on the protection of women's rights and interests)

(5) Women shall enjoy equal rights with their spouses to occupy, use and dispose of the common property in accordance with the law, and shall not be affected by the income status of both parties. (Article 47 of the law of the People's Republic of China on the protection of women's rights and interests)

(6) The employing unit shall not lower the wages of female employees or dismiss them because of their pregnancy, childbirth or lactation, or terminate their labor or employment contracts with them. (Article 5 of special provisions on labor protection of female employees)

(7) If a female employee is unable to adapt to the original work during pregnancy, the employer shall reduce the amount of labor or arrange other suitable labor according to the certificate of the medical institution. For female employees who are pregnant for more than seven months, the employing unit shall not extend the working hours or arrange night shift work, and shall arrange a certain rest time during the working hours. Pregnant female workers in the labor time for prenatal examination, the time required is included in the labor time. (Article 9 of special provisions on labor protection of female

employees)

2.3 Applicable AIIB ESP and ESSs

After fully understanding the environmental and social policy of AIIB, the appropriate policies for this project are as follows:

(1) Environmental and Social Policy. This includes mandatory environmental and social requirements for each project.

(2) Environmental and Social Standards.

ESS1: Environmental and Social Assessment and Management;

(3) Environmental and Social Exclusion List.

AIIB will not knowingly fund projects involving activities or projects listed in the list (exclusion list). This project is the construction of smart public transportation, which does not involve any item in the environmental and social exclusion list of AIIB.

3 Project Description

3.1 Background and locations

3.1.1 Background

Chinese president Xi Jinping said at the September 2020 General Assembly Conference that China would uphold the concept of building a Community of Shared future for Mankind and continue to make extremely hard and bitter efforts to fully honor its obligation and adopt more effective policies and measures to achieve the goal set by “Paris Agreement”. The CO₂ emission will reach its peak by 2030, and the carbon neutrality will be achieved by 2060. We will make greater efforts and contributions to our goal. China’s move will have a positive impact on tackling the climate change, and this emission reduction commitment has aroused worldwide attention and enthusiasm.

As our country’s urbanization process continues to accelerate and the scale of cities continues to expand, the urban transportation system has become more and more complex. Especially in some large and medium-sized cities, more and more private cars occupy urban roads and urban traffic often suffers from traffic jams.

People's Daily once launched a discussion on “How do we travel tomorrow”. As a result, the first way that the public put forward is to hope that buses can become the main means of urban transportation. This is because buses have more advantages than other means of travel. They have the advantages of speed, convenience, safety, concentration, high efficiency, low road occupation rate and low energy consumption. At the same time, a large number of people transfer to buses which becomes the best way to effectively solve urban traffic congestion. Therefore, even in developed countries with a high share of private cars, they have successively proposed the restoration and further development of urban public transportation and they have made some success. For example, the number of people using public transport during commuting hours in New York, the United States,

has exceeded the number of people using private cars; the travel ratio of public transport in Paris, France has reached 56%-60% in the morning and evening rush hours, even as high as 85%.

In the “National Civilized Cities Evaluation System” (2011 edition), the index standards for public transportation vehicles (standard size) per 10,000 people are stipulated. Among them, provincial capital/sub-provincial cities require an index value greater than 12 for the optimal category A, while prefecture and county level A require an indicator value greater than 8. “The Implementation Opinions of the Ministry of Transport on the Implementation of the “Guiding Opinions of the State Council on the Priority of Urban Public Transport Development”” (Ministry of Transport [2013] No. 368), it is stipulated that a city with a population of 1 to 3 million in the urban area shall have a public transport vehicle ownership of more than 16 units for 10,000 people by 2020. For cities with a population of less than 1 million in the urban area, refer to the above indicators and local realities to determine urban public transportation development goals.

As an important area adjacent to the Beijing-Tianjin-Hebei province, Liaoning Province held a video and telephone conference on “Promoting the Liaoning Coastal Economic Belt, Shenyang Economic Zone, and breaking through the Three Major Regional Development Strategies in Northwest Liaoning” on November 13, 2017. The meeting emphasized that Liaoning Province should be deeply integrated into the Beijing-Tianjin-Hebei coordinated development strategy, especially the cities in the coastal economic belt of Liaoning should be “deeply integrated” in infrastructure. The urban public transportation system is an important part of urban infrastructure and urban public services, and plays a very important role in the coordinated development of Liaoning Province and the Beijing-Tianjin-Hebei region.

In February 2019, the General Office of the People’s Government of Liaoning Province issued the “Notice of the General Office of the People’s Government of Liaoning Province on Printing and Distributing the Three-Year Action Plan (2018-2020) for Promoting Transport Structure Adjustment in Liaoning” (Liaoning Government Office

[2019] No. 6),the notice proposes to “accelerate the promotion and application of new energy and clean energy vehicles, including the construction of gas stations, charging stations, and public charging piles into the scope of urban infrastructure planning and construction, and increase support for land and funds. It has formulated and promulgated a policy to facilitate the passage of new energy urban distribution vehicles to improve vehicle passage conditions.

On July 24, 2020, the Ministry of Transport and the National Development and Reform Commission issued the “Action Plan for Creating Green Travel”, pointing out that the proportion of new energy and clean energy buses in key areas such as Beijing-Tianjin-Hebei and surrounding areas should not be less than 60%.of all buses.

The “Implementation Opinions of the People's Government of Liaoning Province on Prioritizing the Development of Public Transport in Cities” stated that the ownership rate of urban buses with a population of less than 1 million in the urban area is above 14 standard units. The purpose of this demonstration project is to increase the number of public transportation vehicles (standard type) per 10,000 people through the procurement of e-buses, thereby enhancing the level of urban public transportation development. With reference to the target value of the public transportation city creation project in similar cities across the country, this demonstration project aims to achieve 12 public transportation vehicles per 10,000 people, and calculates the number of procuring pure electric buses. By 2020, the proportion of new energy buses among the newly added and replaced buses in each city will increase to more than 30% year by year, among which Shenyang and Dalian will increase to more than 35% year by year.

In recent years, although the level of urban public transportation in our province has made considerable progress, there are still some problems, especially in some small and medium-sized cities (including project cities). The problems are particularly prominent. The main problems are:

(1) Poor bus conditions, high fuel consumption, high noise, serious pollution.

(2) The ride is uncomfortable, and the sense of safety is poor.

(3) There is a phenomenon of over use of buses, damaged and old facilities in the bus.

(4) The number of public transportation vehicles per 10,000 people does not meet the standard.

These problems are one of the factors restricting urban development.

Through the construction of this project, not only the above problems existing in the public transportation of the project city can be solved, but also it has the following functions:

(1) It can enhance the promotion and application of new energy buses in Liaoning Province, reduce the use of fuel buses and carbon dioxide emissions, and achieve obvious energy-saving and environmental protection benefits. It has a very obvious effect on improving the atmospheric environment in Liaoning Province and even the Beijing-Tianjin-Hebei region.

(2) The project improves the travel environment of urban public transportation, helps to establish the idea of public transportation priority among urban residents, guides the public to use public transportation to travel, and reduces urban congestion.

(3) The development of the industrialization of electric buses also provides development opportunities for the development of key parts and components industry of electric vehicles, battery and material industries, and the rational use of power resources, and promotes the sustainable development of the national economy.

(4) Smart public transport management system can enhance the efficiency of public transport, provide better services, and attract more passengers to use public transport in the Project cities.

3.1.2 Locations

The location of project implementation is shown in figure 3-1.

Jinzhou City is located in the southwest of Liaoning Province, at the east end of the "Liaoxi Corridor", bordering the Bohai Sea in the south and Songling Mountains in the north. It is adjacent to the "Liaozhongnan" Industrial Zone in the east, the Bohai Sea in the south, the "Beijing-Tianjin-Tang" industrial zone in the west, and the north connects Neimenggu, Heilongjiang, and Jilin province. It is the intersection of the Bohai Rim Economic Circle and the Northeast Asian Economic Circle.



Figure 3-1 The geographic location of the project in Liaoning

Yingkou City is located in the northwest of the Liaodong Peninsula. It is the second largest port city in the Northeast of China and the famous coastal city. It is located in the center of the Liaodong Peninsula, on the east coast of the Bohai Sea and at the mouth of the Daliao River.

Fuxin City is located in the northwestern part of Liaoning, in the hinterland between the Liaodong Bay and the Xiliaohe on the southern edge of the Horqin Sandy Land. Fuxin City borders Shenyang, Jinzhou, Chaoyang, and Tongliao.

Panjin City is located in the southwest of Liaoning Province, adjacent to the Bohai Sea Liaodong Bay in the south, and adjacent to Yingkou, Anshan, Shenyang, Fuxin and Jinzhou in the northwest.

Huludao borders Jinzhou to the east, Shanhaiguan to the west, and Liaodong Bay to the south. It forms the Bohai Rim Economic Circle with cities such as Dalian, Yingkou, Panjin, Jinzhou, Qinhuangdao, Tangshan, and Tianjin city.

3.2 Construction Objectives

The construction objectives are to improve the urban transportation system, alleviate urban congestion, improve urban air quality, optimize urban environment, improve people's quality of life, promote the harmonious development of regional economy, society and environment and achieve sustainable economic and social development ultimately.

The specific objectives are as follows:

- (1) Through the construction of supporting facilities for charging, the charging demand of pure electric buses is guaranteed and the efficiency of vehicle usage is improved.
- (2) Promote the development of urban smart transportation.
- (3) Improve the operating efficiency of the public transport system.
- (4) Solve the problem of insufficient bus capacity.
- (5) Reduce environmental pollution through the use of pure electric buses.

(6) Solve the public transportation issues that are most concerned by the general public.

(7) Improve the level of public transport services and increase the attractiveness of public transport modes through the improvement of public transport facilities.

(8) Provide a reference model for the development of green smart public transport in similar cities in my country.

3.3 Construction Period

Construction period of this project: January 2022-December2024.

3.4 Project Components and Cost

The construction content of this project is mainly to use loans from the Asian Infrastructure Investment Bank and domestic supporting funds to procure pure electric buses, smart public transport systems, and build supporting facilities for charging. At the same time, Fuxin and Panjin will build bus service centers respectively. The project content is shown in Table 3-1.

The total investment of this project is 1,43557 million CNY, see Table 3-2.

Table 3-1 Project Components

No.	Basic information of the project			
	Sub-Project name	Description	Number	Project construction content
1	Jinzhou Green Smart Public Transport Demonstration Project	Procurement of electric buses	273	10 7-meter e-buses, 20 11-meter e-buses,4 18-meter e-buses,243 10.5-meter e-buses
		Smart public transportation system and related transportation software	—	Comprehensively upgrade the intelligent system, procure273 sets of on-board video passenger flow statistics terminals, 273 on-board coin machines and other intelligent equipment.
		On board intelligent equipment	273	
		Construction of charging station	1	Beishan Charging Station is located at the south of East Jinyi Road, Songpo Road, Beishanli, Linghe District, Jinzhou City, with an area of 33,494 square meters.It will be estimated that 12 sets of charging piles, 1 pile of double chargers, and 24 100KW chargers.

Table 3-1 Project Components

(cont.1)

No.	Basic information of the project			
	Sub-Project name	Description	Number	Project construction content
2	Yingkou Green Smart Public Transport Demonstration Project	Procurement of electric buses	203	208.5-meter e-buses, 153 10.5-meter e-buses, 30 12-meter e-buses
		Equipment in Dispatching command center	1	—
		Intelligent public transportation software	2	2 smart public transportation systems will be procured and deployed (including: on-board terminal system, public transportation intelligent dispatch cloud platform, public transportation enterprise resource management system (ERP), financial and human resources OA system platform, public transportation station integrated management platform and real-time analysis system of big data about passenger flow).
		Vehicle intelligent terminal and passenger flow statistic instrument	504	504 sets of on-board passenger flow statistics will be procured to install on all existing and planned buses.
		Charging pile	110	110 special fast charging piles for electric buses were procured and installed in the Bus Company, passenger station, logistics company, and bus wash.

Table 3-1 Project Components

(cont.2)

No.	Basic information of the project			
	Sub-Project name	Description	Number	Project construction content
3	Fuxin Green Smart Public Transport Demonstration Project	Procurement of electric buses	238	30 8-meter e-buses, 98 10.5-meter e-buses, 110 11-meter e-buses
		Equipment in dispatching command center	1	One bus dispatch center will be intelligently upgraded and constructed; it will be located in the newly-built office building of the bus passenger terminal station on the east side of Fuxin High-speed Railway Station
		Intelligent public transportation software	6	Six major public transportation intelligent software will be procured and deployed, including intelligent dispatch platform, passenger flow analysis and network optimization simulation platform, new energy management platform, enterprise integrated management platform, travel service platform, and operation decision analysis platform
		On board intelligent equipment	1,934	Subproject will procure and install 1934 sets of intelligent vehicle-mounted bus equipment, including: 642 sets of intelligent vehicle-mounted integrated terminals, 642 sets of safety auxiliary driving equipment, 540 sets of passenger flow statistics equipment and 110 sets of rear LED advertising screens
		Charging pile	50	50 special charging piles for buses will be installed. Charging pile equipment will be installed. Power installation and laying works (transformers, cables and other equipment) and infrastructure projects (rainproof shed facilities and civil works) will be carried on.
		Construction of comprehensive public transport service center	1	The 18,500 square-meter public transportation comprehensive parking lot at No. 7 Jiefang Street, Xihe District, Fuxin City will be renovated. At the same time, a new E-buses depot will be built, focusing on vehicle maintenance, and vehicle testing equipment, with a total construction area of 2,954m ² (834 square meters of auxiliary production area and 1,760 square meters of maintenance factory).

Table 3-1 Project Components

(cont.3)

No.	Basic information of the project			
	Sub-Project name	Description	Number	Project construction content
4	Panjin Green Smart Public Transport Demonstration Project	Procurement of electric buses	294	40 6.5-meter e-buses, 153 8-meter e-buses, 51 10.5-meter e-buses, 10 11-meter e-buses, 40 12-meter e-buses.
		Equipment in dispatching command center	2	The existing bus dispatching monitoring center and computer room will be transformed into information and intelligence.
		Intelligent public transportation software	1	Three information platforms (industry information management platform, enterprise application service platform, public travel application service platform) will be procured and deployed
		On board intelligent equipment	1,454	Procure and install 1,454 sets of vehicle-mounted intelligent supporting equipment, including 296 sets of passenger flow collection terminals, 386 sets of integrated IC card, 386 sets of active safety equipment and 386 sets of electronic mirrors.
		Charging pile	132	132 sets of special charging piles for electric buses will be procured with supporting funds raised by the enterprise. It will be installed in Aidun Parking Lot, Tianmu Parking Lot, Shuangtaizi Railway Station Parking Lot and Liaodong Bay Intercity Bus Integrated Service Center parking lot.
		Construction of comprehensive public transport service center	1	The Liaodong Bay Intercity Public Transport Comprehensive Service Center will be located to the west of the intersection of Xianghai Avenue and Liuyang Road, with a land area of 25,497 square meters and a construction area of 5,910 square meters (including 1 comprehensive building, 1 maintenance workshop, and 1 washing workshop).

Table 3-1 Project Components

(cont.4)

No.	Basic information of the project			
	Sub-Project name	Description	Number	Project construction content
5	Huludao Green Smart Public Transport Demonstration Project	Procurement of electric buses	277	30 8-meter e-buses, 147 10.5-meter e-buses, 100 11-meter e-buses
		Equipment in dispatching command center	1	The equipment will be installed in the bus dispatch center which will be intelligently upgraded and constructed.
		Intelligent public transportation software	6	Six major public transportation intelligent software will be procured and deployed, including intelligent dispatching platform, passenger flow analysis and line network optimization simulation platform, new energy management platform, enterprise integrated management platform, travel service platform, operation decision analysis platform.
		On board intelligent equipment	1,897	There will be 1,897 sets of bus smart equipment to be procured and installed, including: 720 sets of intelligent vehicle integrated terminals, 450 sets of safety auxiliary driving equipment, 450 sets of passenger flow statistics equipment and 277 sets of rear LED advertising screens.
		Charging pile	48	48 sets of special charging piles for buses with a total capacity of 7560KVA will be procured. The charging piles will be distributed in 6 charging stations: Huludao Dongcheng No.1 Charging Station, Huludao Dongcheng No.2 Charging Station, Huludao Bus Company No.1 Charging Station, Huludao Bus Company No.2 Charging Station, Huludao Passenger Transport Company Charging Station and Longgang District Charging Station

**Table 3-2 The total investment and capital composition of the Liaoning Green and Smart Public Transport Demonstration Project loaned by the AIIB
(March 2021)**

No.	Project name	Investment				Source of counterpart funds	Financial guarantees and repayment commitments
		Total investment	AIIBloan		Counterpart funds		
		Ten thousand CNY	Ten thousand U.S. dollars	Equivalent to RMB ten thousand CNY	Ten thousand CNY		
1	Jinzhou	29,657	31	20,770	8,887	Self-raised by Jinzhou Public Transport Co., Ltd.	Financial guarantee, repayment by the enterprise, has issued a letter of repayment commitment
2	Yingkou	29,672	31	20,770	8,902	Yingkou Transportation Group Co., Ltd. self-raised funds	Financial guarantee, repayment by the enterprise, has issued a letter of repayment commitment
3	Fuxin	23,928	25	16,750	7,178	Fuxin Huyue Urban Public Transport Co., Ltd. self-raised funds	Financial guarantee, repayment by the enterprise, has issued a letter of repayment commitment
4	Panjin	35,414	37	24,790	10,624	Panjin Public Transport Co., Ltd. self-raised funds	Financial guarantee, repayment by the enterprise, has issued a letter of repayment commitment
5	Huludao	24,886	26	17,420	7,465	Self-raised funds by Huludao Urban Public Transport Co., Ltd.	Financial guarantee, repayment by the enterprise, has issued a letter of repayment commitment
	Total	143,557	150	100,500	43,057		

3.4.1 Jinzhou Green Smart Public Transport Demonstration Project

(1) Build a smart public transport system

Comprehensively upgrade the intelligent system, procure 273 sets of on-board video passenger flow statistics terminals, 273 on-board video equipment, on-board coin machines, and sets of outdoor gun cameras.



Figure 3-2 Jinzhou City Bus Dispatching Command Center

(2) Procurement of e-buses

Use the AIIB loan to procure 273 clean, environmentally friendly and energy-saving electric buses. 206 newly purchased BEBs will be used to replace existing buses and 67 will be used for new bus routes.

(3) Public transportation supporting facilities will be built.

The project will build 1 charging stations, namely Beishan charging station, Nanshan charging station, and bus charging station of West Railway Station.

Beishan Charging Station is located at the south of East Jinyi Road, Songpo Road, Beishanli, Linghe District, Jinzhou City, with an area of 33,494 square meters. Each parking space is calculated according to the standard 3.5m×12m parking space. It will be estimated that 1 set of 10KV switching station, 4 sets of 630KVA box change, 4 sets of 600KW group control, 12 sets of charging piles, 1 pile of double chargers, and 24 100KW chargers. The specific floor plan is shown in Figure 3-4.

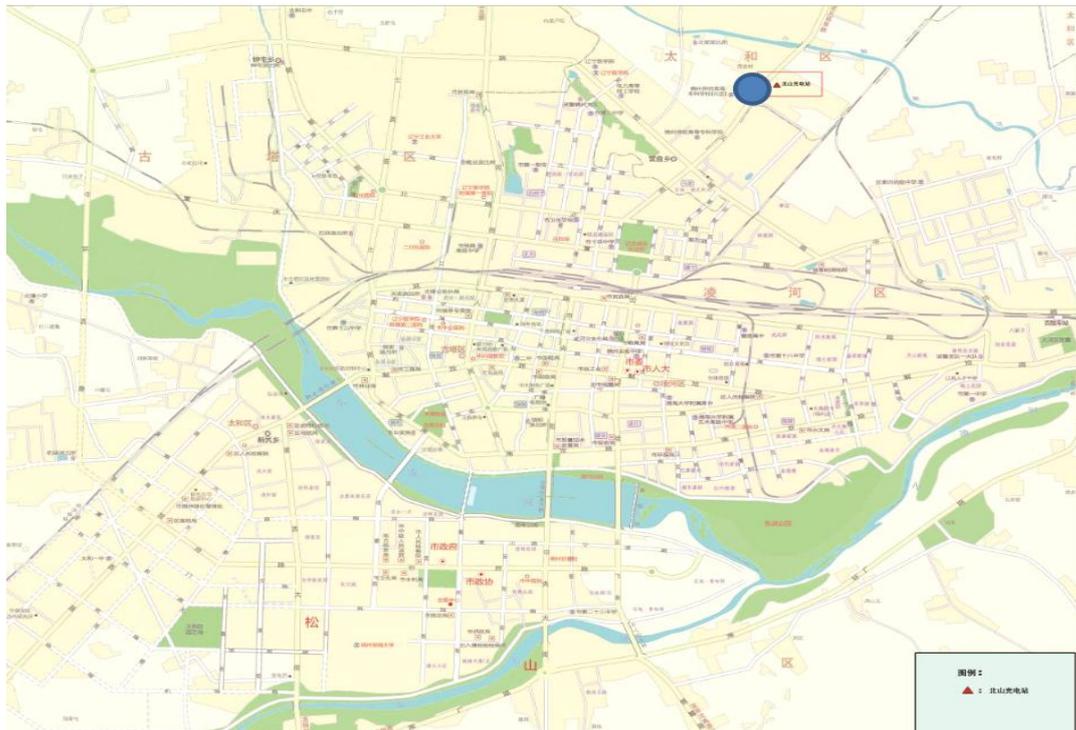
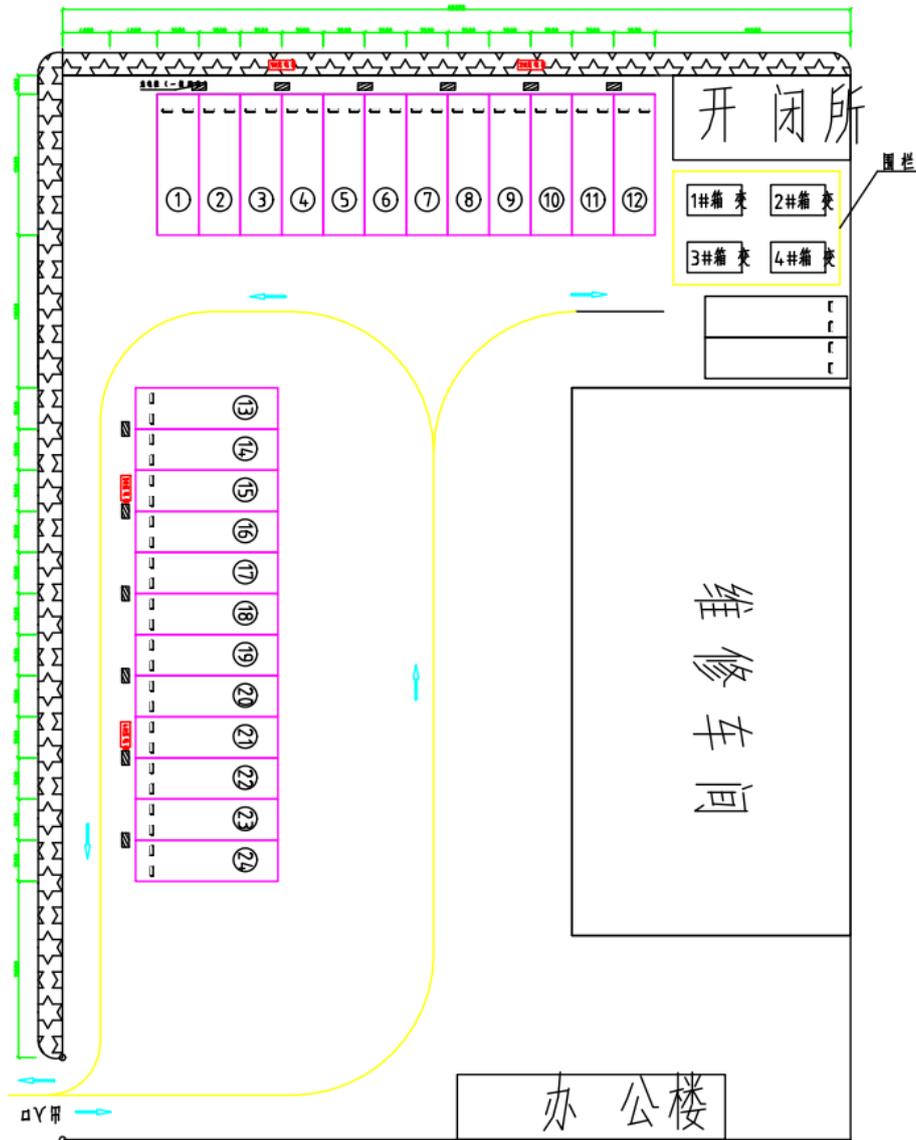


Figure 3-3 Location Map of Jinzhou Beishan Charging Station



**Note: Charging pile size-width 700mm * depth 240mm * height 1800mm;
Charging cabinet size-width 2230mm * depth 800mm * height 1980mm**

Figure 3-4 Layout of Jinzhou Beishan Charging Station

The main facilities and equipment of the charging station include power supply and distribution facilities, charging equipment, monitoring and communication systems, civil engineering and other parts.

① Power supply and distribution facilities

Power supply and distribution facilities include high-voltage substation equipment,

low-voltage substation equipment, power distribution equipment, high-voltage cables and 10KV power access projects and box-type substation basic projects.

Obvious safety warning signs and marks should be installed outside the box of the box-type substation, such as the national grid sign, live hazard, telephone for repair, etc. The safety mark shall meet the requirements of national standards, and the state grid mark shall conform to the requirements of the state grid mark application manual.

The ground terminals of all equipment in the cabinet are suitable for connection. The box body and the metal frame of the ring network cabinet are equipped with grounding terminals, and all grounding terminals are connected to a dedicated grounding conductor through a grounding wire. The grounding connection wire is copper and its cross-section is compatible with the short-circuit current that may flow. In addition, a dedicated grounding conductor is set, and a fixed grounding terminal is set on the conductor to facilitate connection with the grounding grid. The ground terminal inside the box should be installed with an obvious grounding mark.

The transformer capacity of this project is 630kVA. In order to ensure safety, a solid isolation door and locking device are installed around the transformer. Important instructions such as warning information (high voltage hazard, etc.) and transformer-related operation information are installed on the isolation door. Temperature measurement devices and fan devices are installed in the transformer room to ensure that the transformer can start the fan to reduce the temperature of the transformer room and ensure the normal operation of the transformer when reaching a certain temperature.

The main components of the box-type substation, such as circuit breakers, low-voltage compensation cabinets, and anti-harmonic power compensation capacitors, comply with the BROG-MK series product standards, and comply with

relevant national standards and grid requirements. The low-voltage power distribution cabinet in the box substation should be passivated to improve the "three-proof" performance, and the protection level can reach IP35. The cabinet is equipped with grounding terminals, and all grounding terminals are connected to a dedicated grounding conductor through a grounding wire. The grounding connection wire is copper, and its cross-section is compatible with the short-circuit current that may flow. The connection should ensure reliable grounding and obvious Grounding mark.

Each box substation is equipped with a low-voltage compensation cabinet with automatic switching function. The low-voltage compensation cabinet meets the requirements of the country and the power grid.

②Charging equipment

In order to improve the efficiency of charging operation, the newly-built charging equipment of this project should adopt more advanced and stable products, which can realize intelligent scheduling of power units and realize multiple charging strategies combining fast and slow charging to meet different types and models and the charging demand of electric vehicles. It has the remote dispatch function, which can use low electricity and low-cost electricity to reduce the charging cost; through multiple vehicles connected to the charging system at the same time. The intelligent dispatching system replaces the manual dispatching charging, reducing operating costs.

③The other parts

For the electric bus charging station, the fire-fighting facilities should be equipped with fire extinguishers according to the light hazard level according to the requirements of GB50966-2014 "Code for Design of Electric Vehicle Charging Stations". According to GB50140 "Code for Design of Fire Extinguishers for Buildings", electric vehicle charging stations belong to Class E fire sites, and their

maximum protection distance and minimum configuration criteria for single fire extinguishers should not be lower than those for Class A fires. The specific requirements are as follows:

Table 3-3 Maximum protection distance of fire extinguisher

Levels of danger	Portable fire extinguisher (m)	Trolley fire extinguisher(m)
Low risk level	25	50

Table 3-4 Standard for minimum configuration of single fire extinguisher

Levels of danger	Minimum configuration fire extinguishing level for single fire extinguisher	Maximum protection area of each unit fire extinguishing level (m ² A)
Low risk level	1A	100

In addition to the above configuration, the charging station also needs to be equipped with equipment such as canopies, barriers, ground locks, and soundproof screens.

The total investment of the Jinzhou project is estimated at 296.57 million CNY.

3.4.2 Yingkou Green Smart Public Transport Demonstration Project

(1) Build a smart public transport system

The smart public transportation systems will be procured and deployed (including: on-board terminal system, public transportation intelligent dispatch cloud platform, public transportation enterprise resource management system (ERP), public transportation station integrated management platform and real-time analysis system of big data about passenger flow).

(2) Buy green and energy-saving buses

A total of 203 clean, environmentally friendly and energy-saving electric buses will be procured with loans from the Asian Infrastructure Investment Bank, including 20 8.5-meter electric buses, 153 10.5-meter pure electric buses, and 30 12-meter pure electric buses to replace the existing 169 CNG and 34 LNG old vehicles, and finally make the proportion of green energy electric vehicles in Yingkou City reach 74.4%.



Figure 3-5 Yingkou Bus Dispatching Command Center

(3) Supporting public transportation facilities will be built and supporting equipment will be procured.

① 504 sets of on-board passenger flow statistics will be procured to install on all existing and planned buses. The system uses image recognition technology to scan passengers passing under the sensor in real time. Based on high-speed DSP devices and computer vision algorithms, the system calculates two-way passenger flow and the accuracy of it is above 95%.

② According to actual needs and future construction, 110 special fast charging piles for electric buses were procured and installed in the Bus Company, passenger station,

logistics company, and bus wash. The specific layout is shown in Figures 3-7 to 3-10.

The total investment of the Yingkou project is 296.72 million CNY.



Figure 3-6 Distribution of charging pile installation locations in Yingkou



Figure 3-7 Layout of the charging station of Yingkou Bus Company

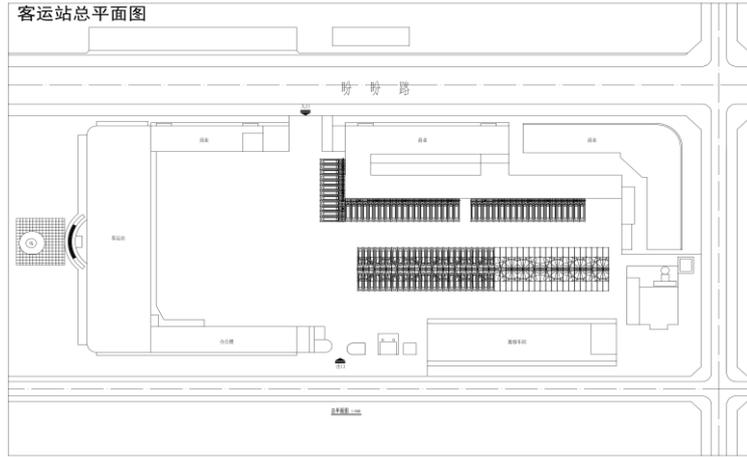


Figure 3-8 Layout of the charging station of Yingkou Passenger



Figure 3-9 Layout of the charging station of Yingkou Logistics Company

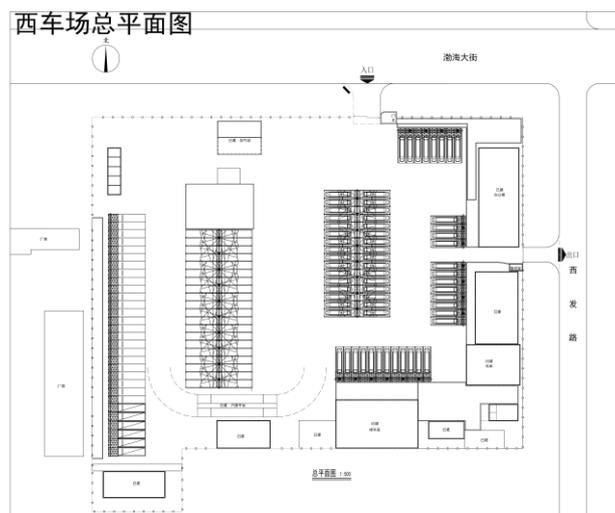


Figure 3-10 Layout drawing of charging station in Yingkou West Depot

3.4.3 Fuxin Green Smart Public Transport Demonstration Project

(1) Smart public transportation system will be installed

① One bus dispatch center will be intelligently upgraded and constructed; it will be located in the newly-built office building of the bus passenger terminal station on the east side of Fuxin High-speed Railway Station (see Figure 3-11).



Figure 3-11 Fuxin Bus Command Intelligent System and Equipment Installation Location

② Subproject will procure and install 1923 sets of intelligent vehicle-mounted bus equipment, including: 642 sets of intelligent vehicle-mounted integrated terminals, 642 sets of safety auxiliary driving equipment, 540 sets of passenger flow statistics equipment and 99 sets of rear LED advertising screens.

③ Six major public transportation intelligent software will be procured and deployed, including intelligent dispatch platform, passenger flow analysis and network optimization simulation platform, new energy management platform, enterprise integrated management platform, travel service platform, and operation decision analysis platform.

(2) Procurement of E-buses

The AIIB loan will be used to procure 238 clean, environmentally friendly and energy-saving electric buses, including 30 8-meter pure electric buses, 98 10.5-meter pure electric buses, and 110 11-meter pure electric buses. Mainly used:

① The new 60 pure electric buses will replace the existing diesel-fueled buses.

② 68 electric buses will be used in the newly opened 7 bus lines. The newly opened bus lines are all on existing roads. The bus stops will be completed before the end of 2022. The construction land of these bus stops is state-owned land, the current state is clean land, and there are no buildings on the land. There is no land acquisition and house demolition for the construction of this project.

③ 110 electric buses will be used in customized bus routes and tourist bus routes.

(3) Public transportation supporting facilities will be built

50 special charging piles for buses will be installed, with 150 chargers. Charging pile equipment will be installed. Power installation and laying works (transformers, cables and other equipment) and infrastructure projects (rainproof shed facilities and civil works) will be carried on.

(4) Construction of Fuxin City Public Transportation Comprehensive Parking Lot Renovation and E-buses Depot

The 18,500 square-meter public transportation comprehensive parking lot at No. 7 Jiefang Street, Xihe District, Fuxin City will be renovated. At the same time, a new E-buses depot will be built, focusing on vehicle maintenance, and vehicle testing equipment, with a total construction area of 2,594m² (834 square meters of auxiliary production area and 1,760 square meters of maintenance factory), with 100 bus parking spaces. The plane layout is shown in figure 3-13.

The total investment of the Fuxin project is 239.28 million CNY.



Figure 3-12 Distribution map of Fuxin charging pile installation locations
(5 in the main urban area, 1 in Xinqiu District)

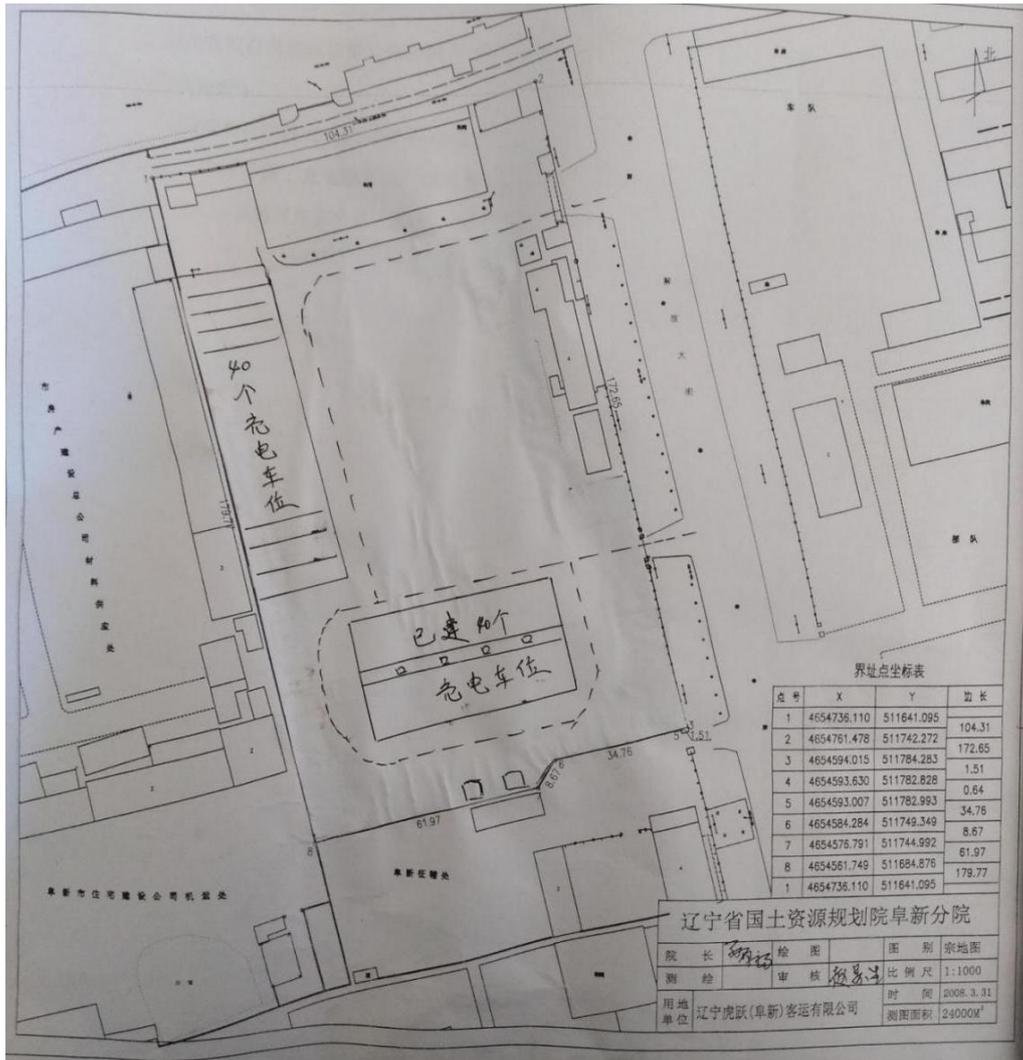


Figure 3-13 Fuxin City Public Transportation Comprehensive Parking Lot Renovation and E-buses Depot Layout Plan

3.4.4 Panjin Green Smart Public Transport Demonstration Project

(1) Build a smart public transport system

① The existing 1 bus dispatching monitoring center and computer room will be transformed into information and intelligence.

② Three information platforms (industry information management platform, enterprise application service platform, public travel application service platform) and 11 smart subsystem modules will be procured and deployed, including:

Industry information management platform (including 5 subsystems): comprehensive operation detection and early warning system; public transportation emergency response system; industry management system; industry analysis system; mobile traffic calendar system; public transportation comprehensive model system.

Enterprise application service platform (including 5 subsystems): passenger flow analysis and intelligent scheduling system; new energy vehicle charging management system; active safety early warning management platform system; ERP enterprise resource management platform system; big data analysis and decision-making system; intelligent cash register system.

Public travel application service platform (including 1 system): Public travel APP system

③Procure and install 1454 sets of vehicle-mounted intelligent supporting equipment, including

296 sets of passenger flow collection terminals;

386 sets of integrated IC card;

386sets of active safety equipment;

386 sets of electronic mirrors.



Figure 3-14 Panjin dispatch center equipment and system installation location

(2) Buy green and energy-saving buses

A total of 294 clean, environmentally friendly and energy-saving electric buses will be procured with loans from the AIIB, of which, 40 6.5-meter e-buses, 153 8-meter e-buses, 51 10.5-meter e-buses, 10 11-meter e-buses, 40 12-meter e-buses.

195 newly purchased BEBs will be used to replace existing buses and 99 will be used for new bus routes.

(3) Procure supporting charging equipment for buses

132 sets of special charging piles for electric buses will be procured with supporting funds raised by the enterprise. It will be installed in the parking lot of Shuangtaizi Railway Station, Liaodong Bay Intercity Bus Comprehensive Service Center, City Long-distance Passenger Transport Company, Liuli River, under the overpass, and in the parking lot of Dawa Passenger Transport Station. The specific installation positions are shown in Figures 3-16 to 3-20.

盘锦市充电桩建设示意图

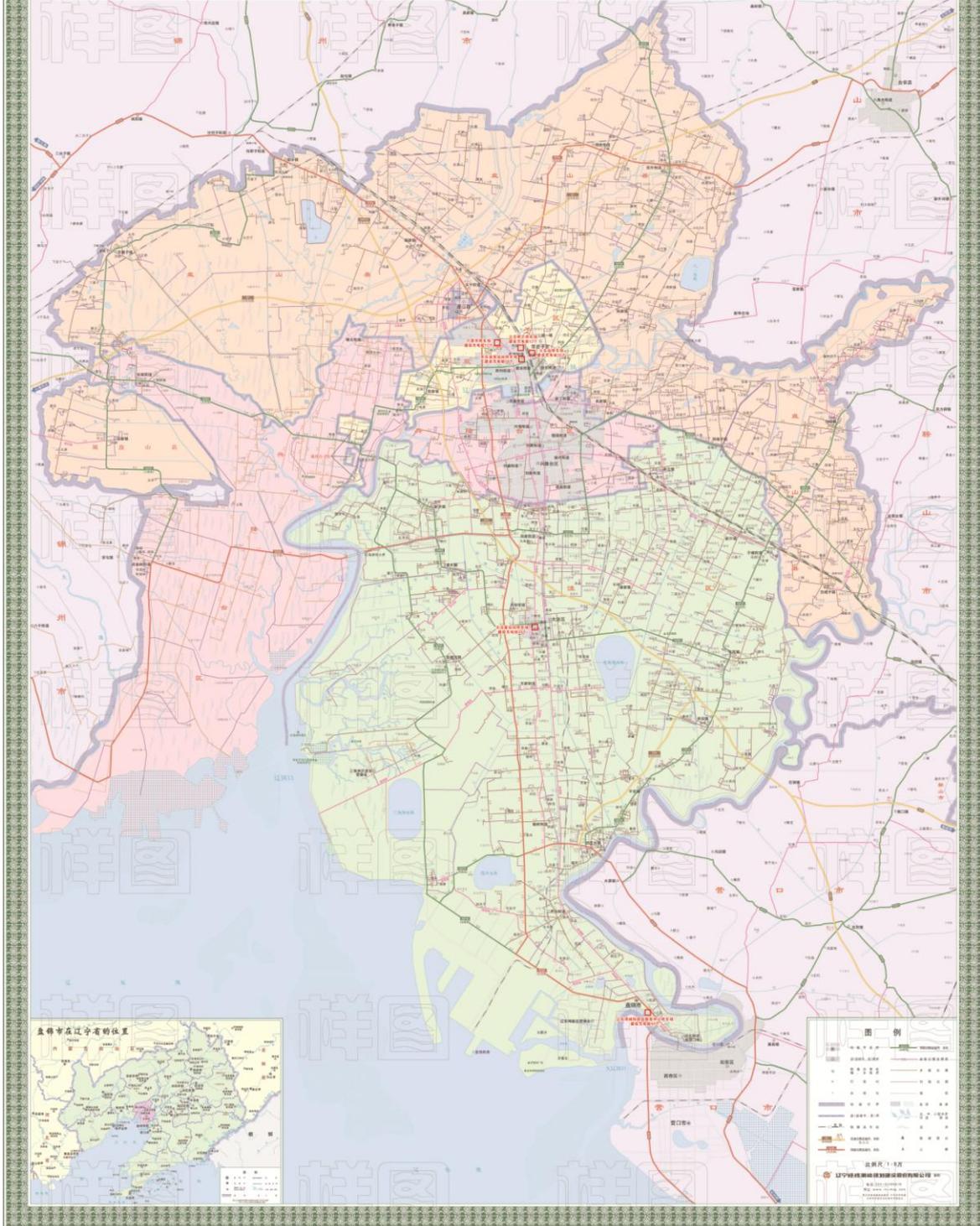


Figure 3-15 Distribution of installation locations of Panjin charging piles

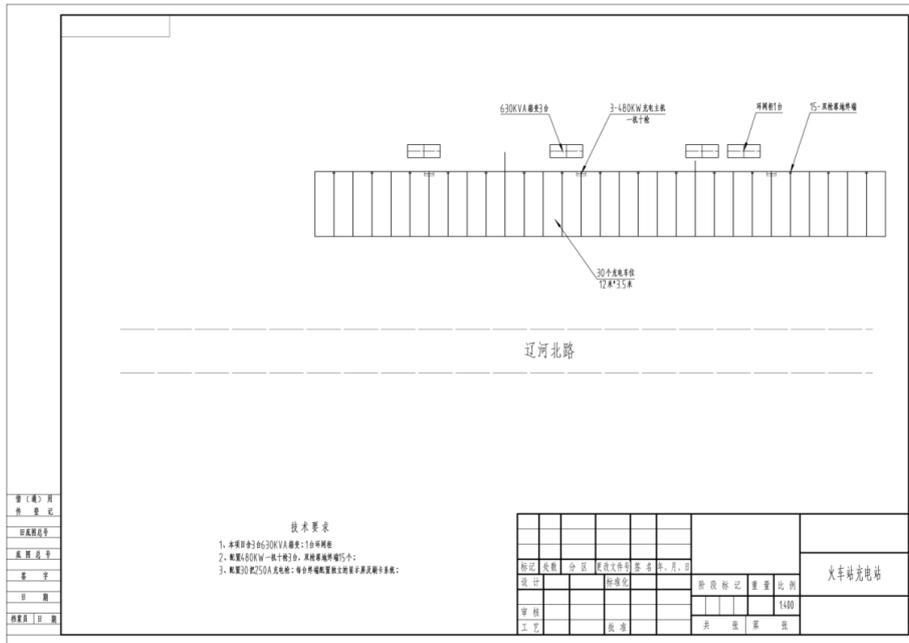


Figure 3-16 Layout of charging piles in the parking lot of Panjin Shuangtaizi Railway Station

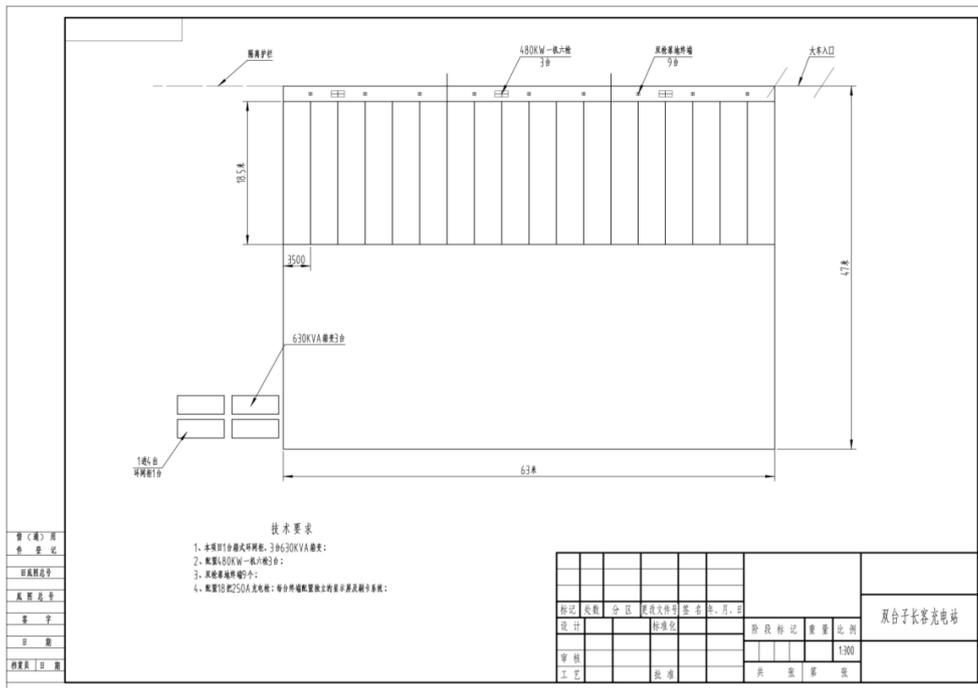


Figure 3-17 Layout of long-distance passenger charging piles in Shuangtaizi, Panjin

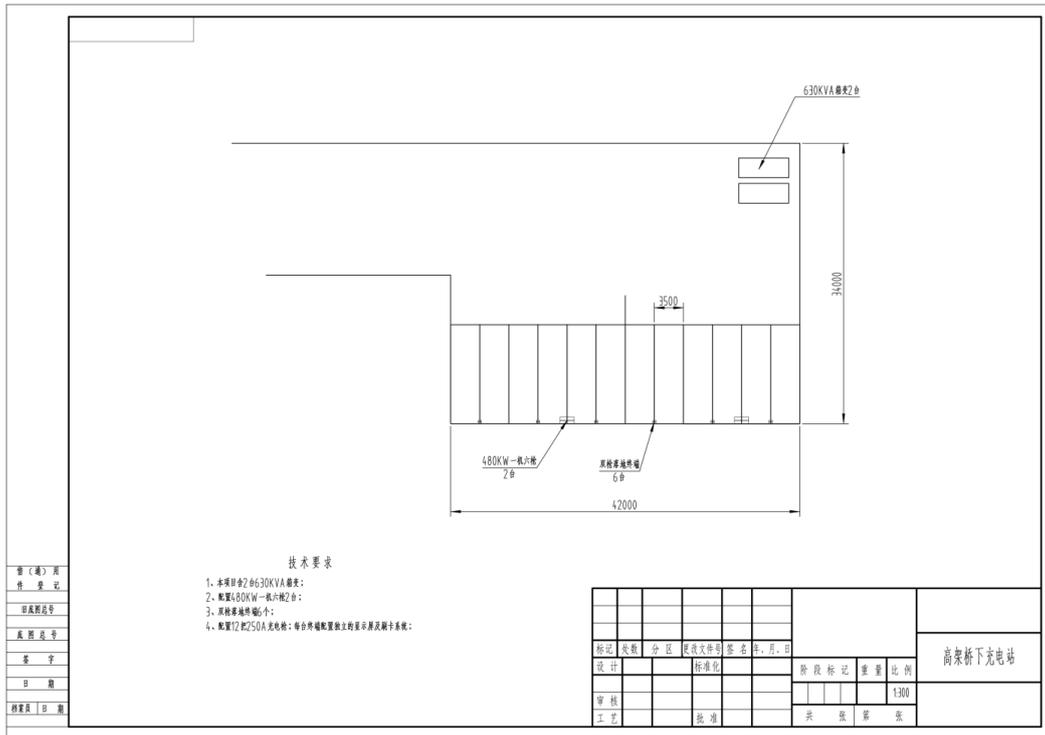


Figure 3-18 Layout of charging piles under Panjin viaduct

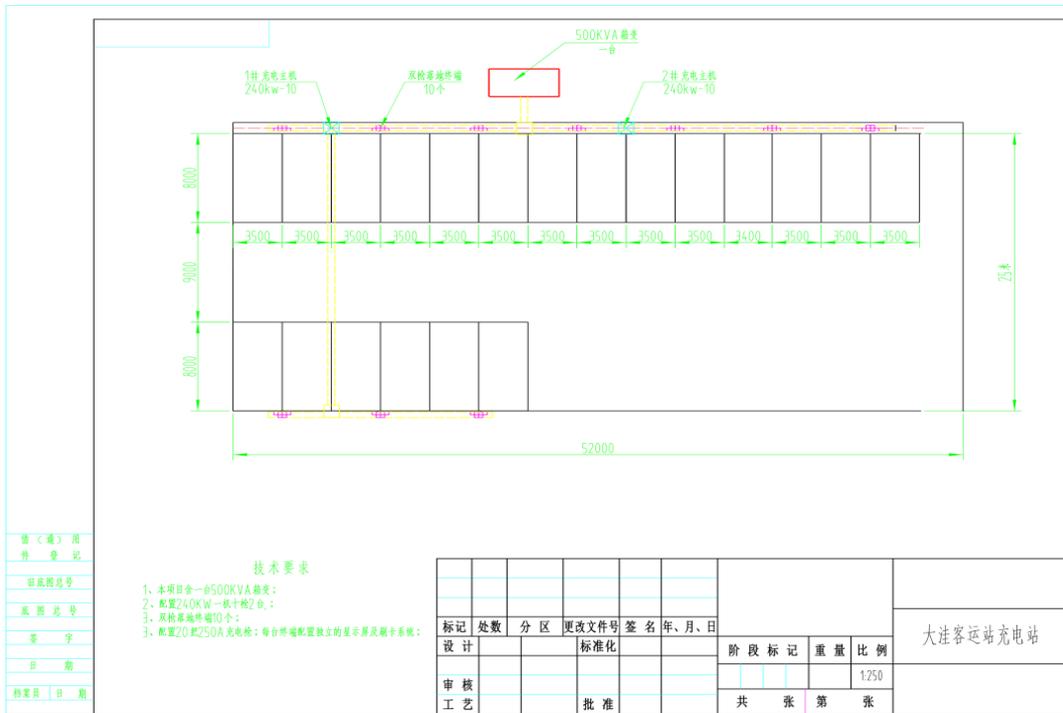


Figure 3-19 Layout of charging piles at Panjin Dawa Passenger Station

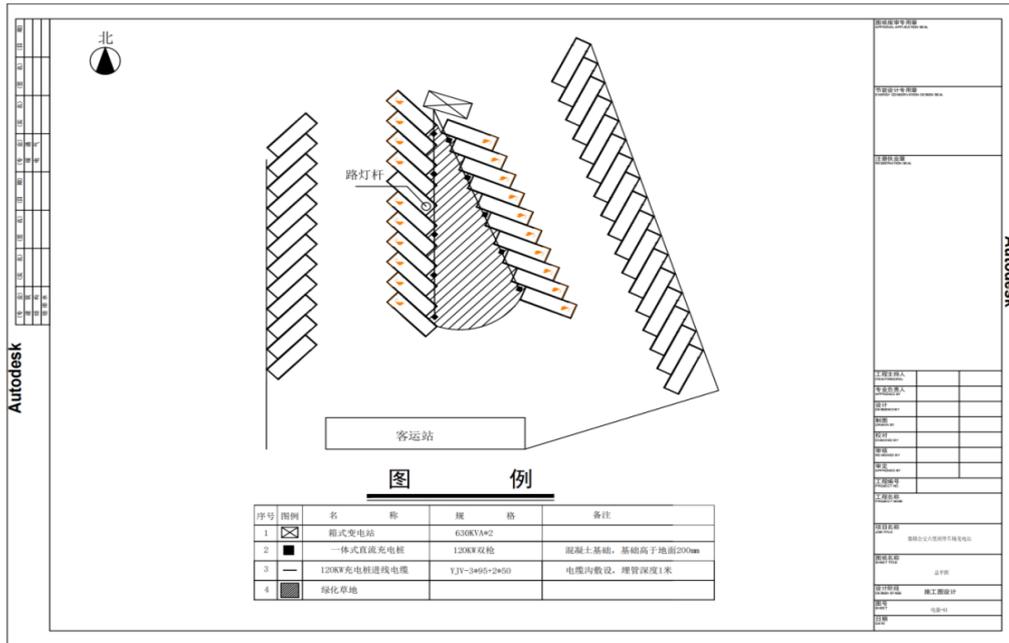


Figure 3-20 Layout of the charging piles in the Liulihe parking lot of Panjin Public Transport

(4)To build the Liaodong Bay Intercity Bus Integrated Service Center

The Liaodong Bay Intercity Public Transport Comprehensive Service Center will be located to the west of the intersection of Xianghai Avenue and Liuyang Road, with a land area of 25,497 square meters and a construction area of 5,910 square meters (including 1 comprehensive building, 1 maintenance workshop, and 1 washing workshop). There are 116 bus parking spaces in the field. See figure 3-21 for specific layout plan.

The total investment of the Panjin project is 354.14 million CNY.

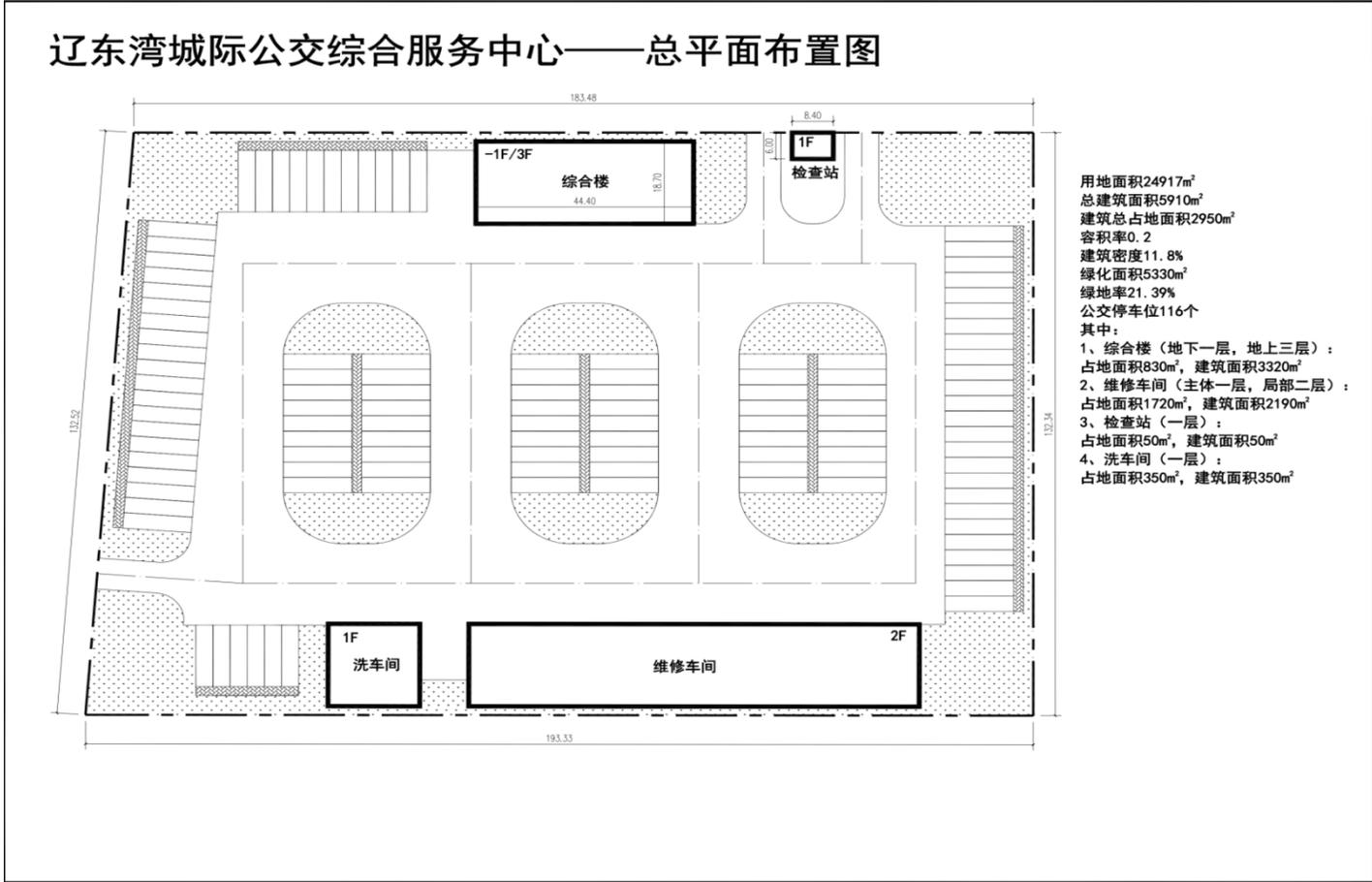


Figure 3- 21 Layout of Panjin Liaodong Bay Intercity Bus Integrated Service Center

3.4.5 Huludao Green Smart Public Transport Demonstration Project

(1) Build a smart public transport system

① One bus dispatch center will be intelligently upgraded and constructed with equipment installation funded by AIIB.

② There will be 1897 sets of bus smart equipment to be procured and installed, including: 720 sets of intelligent vehicle integrated terminals, 450 sets of safety auxiliary driving equipment, 450 sets of passenger flow statistics equipment and 277 sets of rear LED advertising screens.

③ Six major public transportation intelligent software will be procured and deployed, including intelligent dispatching platform, passenger flow analysis and line network optimization simulation platform, new energy management platform, enterprise integrated management platform, travel service platform, operation decision analysis platform.



Figure 3-22 Huludao dispatch center equipment and system installation location

(2) Buy green and energy-saving buses

It will use the AIIB loan to procure 277 clean, environmentally-friendly and energy-saving electric buses, including 30 8-meter pure electric buses, 147 10.5-meter pure electric buses, and 100 11-meter pure electric buses; 171 of the vehicles will be used in addition to the capacity of the main bus line, 106 units will be used to update the existing old fuel vehicles.

(3) To build public transportation facilities

48 sets of special charging piles for buses with a total capacity of 7560KVA will be procured, with 144 chargers. The charging piles will be distributed in 6 charging stations. The specific layout is shown in Figure 3-24 to Figure 3-27.



Figure 3-23 Distribution of the installation locations of charging piles in Huludao

① Huludao Dongcheng No. 1 Charging Station

Dongcheng No. 1 charging station is located opposite the Yunxitai Community. The terminals of buses 20 and 33 are less than one kilometer away from the charging station. After the completion of Dongcheng No.1charging station, it will provide conditions for pure electric vehicles to replace No. 20 and No. 33 buses.

②Huludao Dongcheng No. 2 Charging Station

Dongcheng No. 2 charging station will be located opposite the Yunxitai community. The terminals of buses 14 and 16 will be less than one kilometer away from the charging station. After the completion of Dongcheng No. 2 charging station, it will provide conditions for pure electric vehicles to replace No. 14 and No. 33 buses.



Figure 3-24 Layout of Charging Pile in Huludao Dongcheng

③Huludao Bus Company No. 1 Charging Station

The Bus Company's No. 1 charging station will be located in the terminal parking lot of the No. 18 bus. The bus terminal of Line 30 is about 400 meters away from the Bus Company. Buses such as Line 17 and Line 11 pass through the Bus Company. After the

construction of the Bus Company's No. 1 charging station, it will provide conditions for the replacement of pure electric vehicles with buses on Route 30.

④Huludao Bus Company No. 2 Charging Station

The No. 2 charging station of the Bus Company will also be located in the terminal parking lot of bus No. 18.

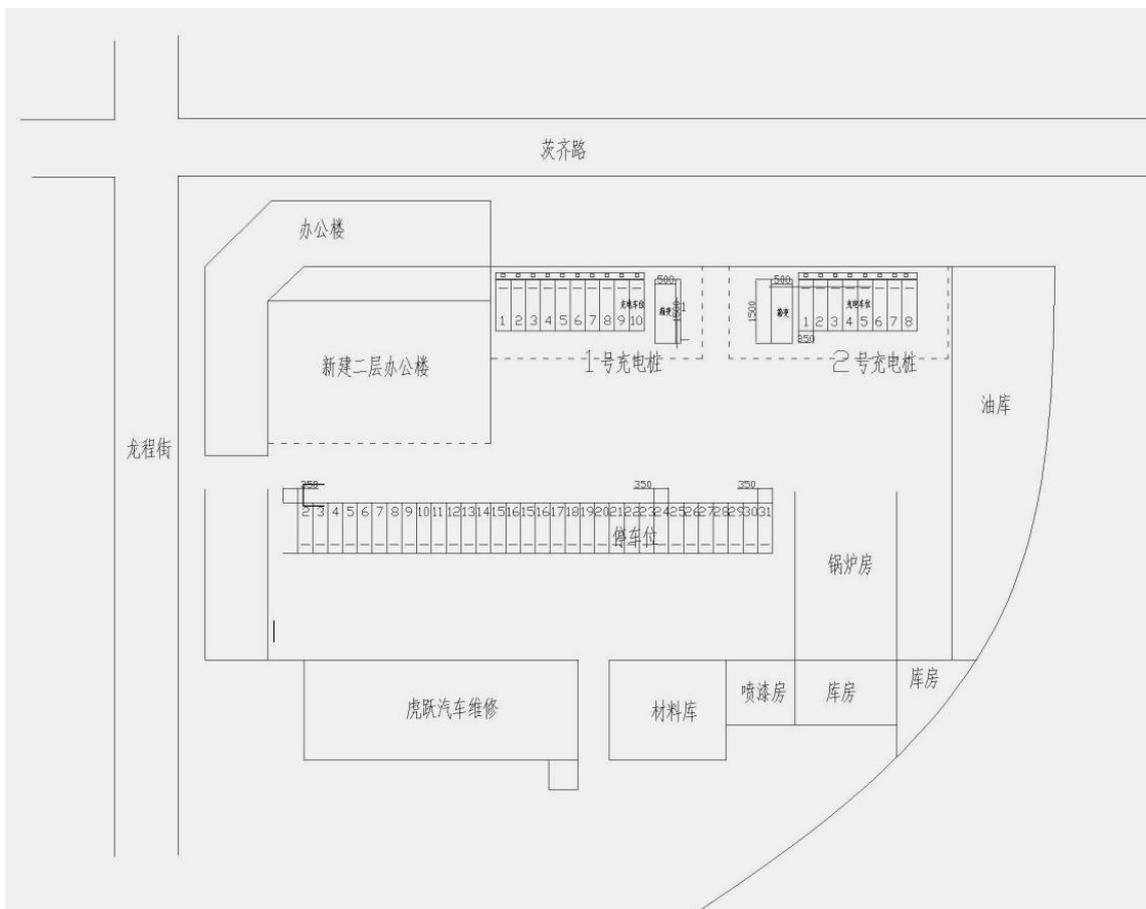


Figure 3- 25 Layout of the charging piles of Huludao Bus Company

⑤Huludao Passenger Transport Company Charging Station

The charging station of Huludao Passenger Transport Company will be located inside the passenger transport company. The operation mode of Huludao Passenger Transport

Company is mostly customized buses, and routes are developed according to the actual needs of passengers to complete the operating mileage. Therefore, after the completion of the charging station of the passenger transport company, more customized bus lines will be developed to provide more convenience for the general public. It will also provide more development space for the company to develop new operating models.

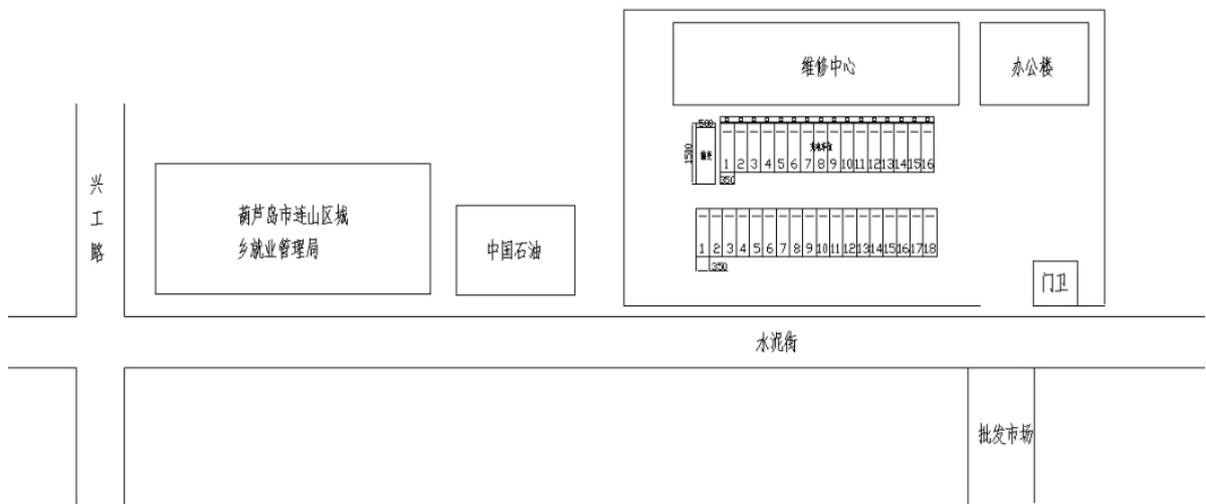


Figure 3- 26 Layout of the charging piles of Huludao Passenger Transport Company

⑥ Longgang District Charging Station

The charging station in Longgang District is located in Lianghe Sancun. The terminal of bus No. 26 is about one kilometer away from the charging station. After the completion of the charging station in Longgang District, it will provide conditions for the replacement of pure electric vehicles and the addition of new lines for buses 22 and 26. As there are hospitals, schools and newly developed communities nearby, pure electric buses and the addition of new lines can not only attract a large number of passengers, but also greatly facilitate the travel of the general public nearby.

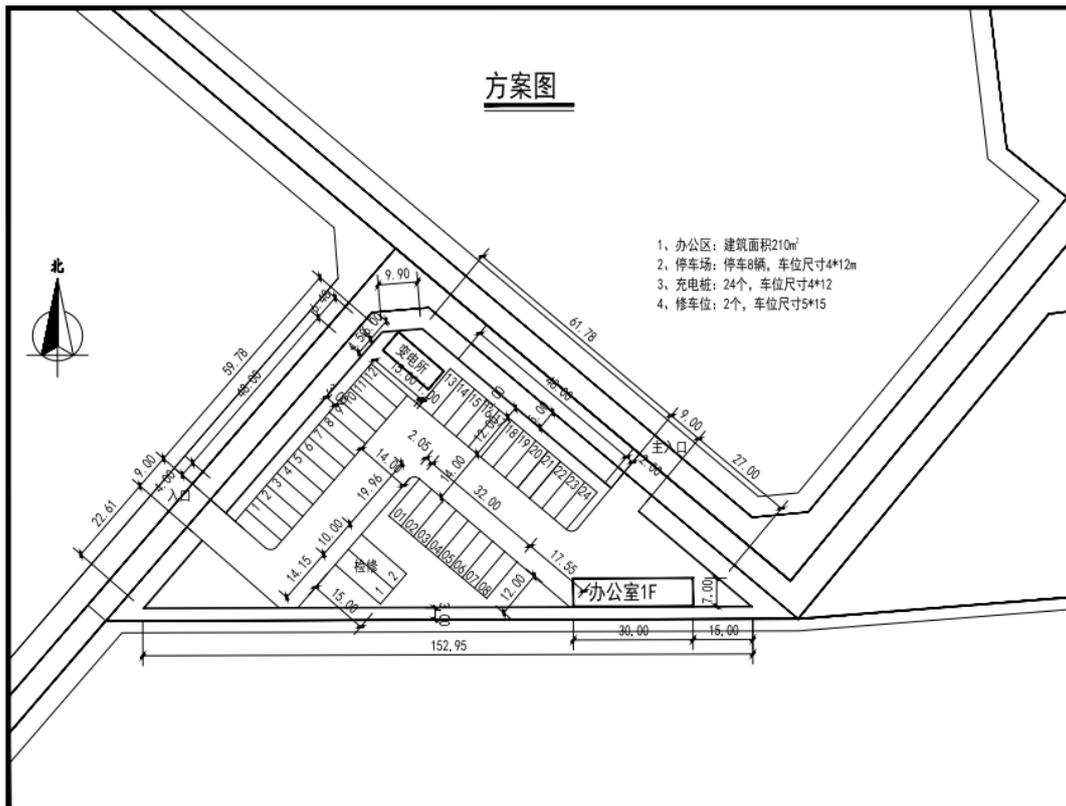


Figure 3- 27Layout of charging piles in Longgang District, Huludao

The total investment of the Huludao project is 248.86 million CNY.

3.5 Construction Method Statement

Equipment procurement: The procurement procedures will be strictly implemented in accordance with the relevant laws and regulations of our country and the procedures and regulations of the AIIB.

Installation of charging piles: Installed by qualified professional and technical personnel in strict accordance with the installation specifications of the charging pile.

The construction of the comprehensive service center (Fuxin, Panjin): The bidding will be completed by a professional construction company in strict accordance with the relevant laws and regulations of our country and the procedures and ESF of AIIB.

The construction tasks of Fuxin and Panjin Bus Service Center mainly include:

construction site preparation, foundation construction, the construction in main buildings and so on. (See Figure 3-28-Figure 3-30).



Figure 3-28 Site preparation



Figure 3-29 foundation construction

Figure 3-30 Main buildings construction

Learning from the experience of similar construction, the gravel, crushed stone and other materials required for the construction of Fuxin and Panjin Bus Service Centers are mainly purchased at the production place and transported to the construction site by dump trucks and the concrete required for the project is all commercial concrete.

3.6 Existing Facilities

The roads of the proposed new bus routes are all the original roads, and the conditions for the opening of buses are already available. Related bus station services (stations, stop

signs, etc.) are completed by government investment. The construction of the bus station pavilion has been completed in Panjin, and is expected to complete the construction of all stations by the end of 2022 in Fuxin and Jinzhou. There is no land acquisition and house demolition for the construction of this project.

All the Existing sites to install the charging stations have been examined in accordance with AIIB's ESF and the site conditions are listed/described in 5.1.2.3. The two sites to construct the Depot and Service Center in Fuxin and Panjin are described in the following sections.

3.6.1 The Existing Site Conditions of E-buses Depot Planed by Fuxin

The bus station to be renovated is located at No. 7, Jiefang Street, Xihe District, Fuxin City. The nature of the land is state-owned land and belongs to Liaoning Huyue (Fuxin) Passenger Transport Co., Ltd. The east side of the project plot is Jiefang Street, with Fuxin Road Administration Enforcement Team of Liaoning Province on its south side., Zhengda Freight Station on the west side , and the Yintong Bocuiyuan residential area on the north side(about 60 meters away) .The specific location is shown in Figure 3-31. This project does not emit harmful gases, so there is no sanitary protection distance requirement for the maintenance field construction.



Figure 3-31 The location and surrounding areas of Fuxin's proposed E-buses Depot

The site covers an area of 18,500 square meters. One building which covers an area of 1,200 square meters is waiting to be demolished. The building to be demolished belongs to Fuxin Bus Company.



Figure 3-32 The current status of Fuxin's proposed E-buses Depot

The project plans to build a public transportation service center where old buildings are demolished. The reconstructed public transportation comprehensive service center will have a construction area of 2,594 square meters (including 834 square meters of auxiliary production area and 1,760 square meters of maintenance plants). The E-buses Depot will set up vehicle repair, maintenance and vehicle testing. The office building will include the dispatch room, the driver's lounges, the training rooms, a canteen, restrooms, and the administrator's offices. There will be 100 bus parking spaces.

3.6.2 Existing Site Situation of Building Liaodong Bay Intercity Public Transport Integrated Service Center planed by Panjin

The proposed Liaodong Bay Intercity Public Transport Comprehensive Service Center will be located in the west of the intersection of Xianghai Avenue and Liuyang Road, with a land area of 24,917 square meters (see Figure 3-33, Figure 3-34). The east side of the plot is close to Xianghai Avenue and Liaodong Bay Bridge. The west side, south side and north side are wasteland at present. There is a temporary garbage collection station about 500 meters southwest.

The land was originally a state-owned construction land, and the land belonged to Panjin City Government. On March 31, 2021, Panjin Bus Company obtained the ownership of the land through bidding and signed a purchase agreement. On May 26, 2021, the Panjin Municipal Government's construction land approval letter was obtained. On June 7, 2021, obtain the land ownership certificate. See the attachment for the relevant approval documents and land ownership certificates.. At present, the land belongs to Panjin Public Transport Company, and the current state of the land is pure land, and there is no need for land acquisition and house demolition.

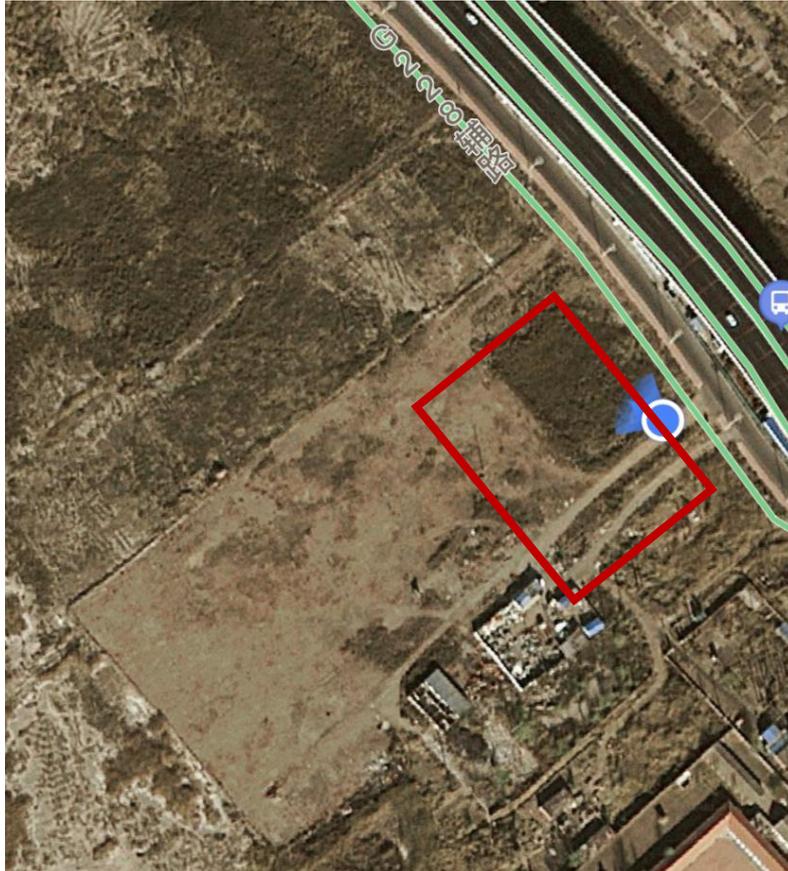


Figure 3-33The Location and Surroundings of Panjin Liaodong Bay Intercity Bus Integrated Service Center



Figure 3-34 Site of Panjin Liaodong Bay Intercity Public Transport Comprehensive Service Center

After completion, the Liaodong Bay Intercity Public Transport Comprehensive Service Center will be able to provide stops for buses in Liaodong Bay and surrounding areas to avoid conflicts between random bus parking and pedestrians, and make the originally complicated and dangerous traffic condition safe and smooth. At the same time, the service center is equipped with a maintenance workshop, which will be able to do the maintenance and repair of public buses, and escort the safe driving of public buses. At the same time, the charging piles to be built will also provide supporting charging equipment for the more than 300 pure electric buses to be procured by Panjin City with the loan of the AIIB, which can effectively mobilize public transportation resources and solve the difficulty of parking, maintenance, and charging. At the same time, the project itself, as a comprehensive service center, can further promote the economic development of surrounding areas after completion.

4 Baseline of Environmental and Social Conditions

4.1 Physical Environment

4.1.1 Geographical Location

Liaoning Province, abbreviated as Liao, is located in the south of Northeast China. It is an important junction of Northeast China Economic Zone and Bohai Rim Economic Zone. The geographical coordinates are between $118^{\circ} 53' E$ and $125^{\circ} 46' E$ and $38^{\circ} 43' N$ to $43^{\circ} 26' N$. The total land area of the province is 148,000 square kilometers, accounting for 1.5% of the total land area of China. In the total land area of the province, the mountainous area is 88,000 square kilometers, accounting for 59.5%; the flat land is 48,000 square kilometers, accounting for 32.4%; the water area and other areas are 12,000 square kilometers, accounting for 8.1%. The sea area (continental shelf) covers 150,000 square kilometers, including 64,000 square kilometers of offshore waters.



Fig. 4-1 Administrative map of Liaoning Province

By the end of 2016, Liaoning Province has jurisdiction over 14 prefecture level cities (including Shenyang and Dalian as sub provincial cities), 16 county-level cities, 25 counties (including 8 minority autonomous counties) and 59 municipal districts.

(1) Jinzhou

Jinzhou City is located in the southwest of Liaoning Province, the eastern end of the "Liaoxi corridor", bordering Bohai Sea in the South and Songling mountains in the north. In the East, it is connected with the industrial zone of "central and southern Liaoning", the industrial zone of "Beijing, Tianjin and Tang" in the west, and the vast hinterland of Heilongjiang and Jilin in the north. It is the intersection of Bohai economic circle and Northeast Asian economic circle, and the golden corridor connecting the Northeast inland and Bohai Sea. Longitude is 120°43'to 122°36'E and 40°48'to 42°08'N. It is a transportation hub connecting North China and Northeast Chi.

(2) Yingkou

Yingkou City is located in the center of Liaodong Peninsula and the left bank of Liaohe river estuary. It is adjacent to Liaodong Bay of Bohai Sea in the West and Huludao across the sea in the west, Dawa District in the northwest, Anshan City in Liaoning Province in the north, Dandong City in Liaoning Province in the East and Dalian City in the south. The geographical coordinates are between 121°56'E and 123°02'E and 39°55'N to 40°56'N. The longest part of the city is 111.8 km from north to South and 50.7 km from east to west. The total area of the city is 5,402 square kilometers.

(3) Fuxin

Fuxin city is located in the northwest of Liaoning Province, with a straight-line distance of 147.5km from Shenyang, the provincial capital. To the south, Jinzhou leads to Beijing and Tianjin with Huolinhe mining area in Tongliao in the north; to Shenyang and Liaodong coastal cities in the East; to Chaoyang and Chifeng in Inner Mongolia in the West. Fuxin is a rectangle, with its central axis obliquely intersecting at the intersection

of 42°10'N and 122°00'E. It is 170km long from east to west, 84km wide from south to north, with a total area of 10445km².

(4) Panjin

Panjin City is located in the southwest of Liaoning Province, the center of Liaohe River Delta. Anshan City is adjacent to the East and northeast, Daliao River is to the southeast, Jinzhou City is to the West and northwest, and Liaodong Bay of Bohai Sea is to the south. The urban area is 155 kilometers away from Shenyang, the provincial capital. The geographical coordinates are 40°39'N to 41°27'N and 121°25'E to 122°31'E. The total area is 4,071 square kilometers, accounting for 2.75% of the total area of Liaoning Province.

(5) Huludao

Huludao City is a prefecture level city under the jurisdiction of Liaoning Province, located in the southwest of Liaoning Province, with a total area of 10,415 square kilometers. The central geographical position of Huludao is 120°38'E and 40°56'N. Huludao City has a superior geographical location. Shenshan line, National Expressway, Beijing Harbin Expressway and National Highway 102 run through the whole territory. Huludao, together with Dalian, Yingkou, Qinhuangdao, Qingdao and other cities, forms the Bohai Sea economic circle. It is the west gate of Northeast China and the first city outside Shanhai Pass.

4.1.2 Meteorology

Liaoning Province is located in the east coast of Eurasia and the middle latitude area, belonging to the temperate continental monsoon climate zone. The territory has hot and rainy season, rich sunshine, high accumulated temperature, long winter, warm summer, short spring and autumn, four distinct seasons. The rainfall is uneven, wet in the East and dry in the West. In spring, sunshine is insufficient in most areas; in summer, it is

insufficient in the early stage and more in the later stage; in autumn, it is more in most areas; in winter, the light illumination is insufficient. The annual average temperature ranges from 7°C to 11°C, and the maximum temperature is above 30°C. The extreme maximum temperature is above 40°C, and the minimum temperature is below -30°C. Affected by the monsoon climate, there are great differences among different regions, decreasing from southwest to northeast and from plain to mountainous area. The annual average frost free period is 130-200 days, and the general frost free period is more than 150 days, which gradually increases from northwest to Southeast. Liaoning Province has the largest precipitation in Northeast China, with annual precipitation between 600-1100 mm. The annual precipitation in the eastern mountainous and hilly areas is more than 1100 mm; the western mountainous and hilly areas are connected with the Inner Mongolia Plateau, and the annual precipitation is about 400 mm, which is the area with the least precipitation in the whole province; the precipitation in the central plain is relatively moderate, with an annual average of about 600 mm.

The major meteorological disasters in the province are droughts, floods, and strong winds, etc. Floods mostly occur in the Yalu River, Taizi River, Daling River and other basins.

According to the record, in the past 50 years, the flood occurring in the east areas of Liaohe River in 1951 is the most serious one in Liaoning Province, The areas hardest hit by the flood were Taian, Panshan and several other counties.

The major flood disasters that have occurred in each project city in the past 20 years are as follows:

There was a heavy rain in Panjin City from the night of July 31, to 5 a.m. on August 1, in 2006, which was the heaviest one since the establishment of Panjin City. Water logging in the urban area was serious, with the deepest part of the accumulated water reaching about half a meter.

Huludao City suffered the heaviest rainfall from the night of August 8th to 13:00 pm on the 9th, 2017. The roads in many urban areas were heavily flooded, and the deepest part of the accumulated water reached 30 cm.

From 8:00 to 14:00 on August 19, 2010, the heaviest rainfall in Fuxin, Liaoning, caused severe water logging in the urban area. The deepest accumulated water of the main trunk road in the downtown exceeded 40 cm.

From 14:00 to 17:00 on July 22, 2015, the urban area of Gaizhou, Yingkou, encountered short-term strong precipitation, and all streets in the urban area experienced serious water logging with 20-40 cm of accumulated water.

The distribution of windy areas in Liaoning province belongs to the zonal distribution type, and the stronger wind areas are distributed in the southwest coastal areas. The wind is gradually weakening from south to north and from west to east. Strong wind mostly occurs in the coastal areas of the southwest. Among the project cities, the once-in-a-hundred-year strongest wind occurred in Jinzhou and the highest wind force at 24.7 (m/s), followed by Huludao with the wind force at 24.2 (m/s). The once-in-50-year strongest wind occurred in Huludao with, the highest wind force at 23.6 (m/s), followed by Jinzhou with the wind force at 23.3 (m/s). The speed of once-in-50-year wind in Yingkou is 21.2 (m/s). The annual maximum wind speed in Fuxin is 22.4 m/s (April 17, 2019), and the annual maximum wind speed in Panjin is 21.7 m/s (July 9, 2017).

When the Fuxin and Panjin Service Centers were designed, baselines were set according to designing specifications.

(1) Jinzhou

Jinzhou City is located in the eastern part of Eurasia, with a warm temperate semi humid climate. The atmospheric circulation is dominated by westerly belt and subtropical system, which is a continental monsoon area. It is mild and windy in spring, hot and rainy in summer, warm and cool in autumn, cold and dry in winter, four distinct seasons, concentrated precipitation, obvious monsoon and strong wind. The annual average temperature of Jinzhou is 7.8-9.0°C, and the annual extreme maximum temperature is 41.8°C and the annual extreme minimum temperature is - 31.3°C. The annual frost free period is 144-180 days. The average annual precipitation is 567mm, and the precipitation

is unevenly distributed in four seasons, and 60-70% of the precipitation is concentrated in summer.

(2) Yingkou

Yingkou is adjacent to Liaodong Bay of Bohai Sea in the west, belonging to the continental monsoon climate of warm temperate zone, with four distinct seasons, rainy and hot seasons, mild climate, moderate precipitation, sufficient sunlight, and favorable climate conditions. The annual average temperature of Yingkou is 7-9.5°C, which is slightly higher in coastal, plain and hilly areas, and slightly lower in eastern mountainous areas. The annual precipitation is 670-800mm, with moderate rainfall. The regional distribution of rainfall is that there is more rainfall in the southeast mountainous area, and less in the northwest coastal plain and hilly area, and it decreases from southeast to northwest. The sunshine duration is 2600-2880 hours, which is rich in light resources.

(3) Fuxin

Fuxin city climate belongs to the north temperate continental monsoon climate. The annual average temperature is 7.6°C, and the effective accumulated temperature is 3324-3299°C. The sunshine hours are 2868 hours / year, and the average annual precipitation is 481mm. The evaporation of large water surface is 1400-1800mm, and the frost free period is 154 days.

(4) Panjin

Panjin City is a warm temperate and a continental semi humid monsoon climate zone. Climate characteristics are four seasons, rain and heat in the same season, dry and cold in the same period, suitable temperature and plenty of light. The annual average temperature is 9.2°C with the highest temperature of 34.8°C and the lowest temperature of -26°C. The annual sunshine time is more than 2700 hours, and the frost free period is 170 days. The annual average rainfall is 627 mm, and the annual average wind speed is 4.3m/s.

(5) Huludao

Huludao area is located in the coastal area, it belongs to the warm temperate sub humid monsoon climate, with four distinct seasons. The annual average temperature is 8.2-9.2°C, and the annual average maximum temperature is 14.3-15.1°C. The annual average minimum temperature is 2.3-4.0°C, and the average precipitation in Huludao is 560-630 mm. The annual precipitation is mainly concentrated in July to August, and the winter precipitation only accounts for 3-4% of the annual precipitation.

4.1.3 Topography

The general outline of Liaoning's topography is basically "60% Mountain areas, 10% water bodies and 30% agricultural land". The terrain is high in the north and low in the south. On both sides of Liaodong and Liaoxi, there are mountains and hills with an average elevation of 800m and 500m; the central part is the Liaohe plain with an average altitude of 200m; and the coastal plain of Bohai Sea in western Liaoning is a narrow and long coastal plain, called "Liaoxi corridor".

(1) Jinzhou

Jinzhou city has a continuous range of mountains, and the terrain characteristics are high in the northwest and low in the southeast. There are Yiwulv Mountain range in the northeast and Songling mountain range in the northwest. The terrain is inclined from northwest to Southeast, which is followed by low mountain area, hilly area and plain area. The city's land structure is generally "five mountains, one water and four Fen fields". The cultivated land area is 357800 hectares, including 20400 hectares of paddy field and 337300 hectares of dry land. The orchard area is 31500ha; the forest land area is 110900 ha; the pasture land area is 19800ha; the water area is 85000ha; and the unused land area is 207500ha. The total length of the coastline is 97.7 km. The offshore water area (0-20m) is 120000ha, and the coastal beach area is 17700ha.

(2) Yingkou

The terrain of Yingkou City gradually inclines from southeast to northwest. The eastern part is mountainous, with an altitude of 100-1000 meters; the middle part is hilly land with an altitude of 50-200 meters; the western part is a plain with an altitude of 2-10 meters. Their respective areas accounted for 27%, 31.6% and 41.4% of the total area of the city. There are 2800 peaks in the territory, of which 4 are above the altitude of km, 11 peaks are 800-1000m, and 29 peaks are 500-800m. Buyun mountain, the highest peak, is 1130.7 meters above sea level, and the lowest point is the river beach of Shigua village, Shifo Town, Dashiqiao City, with an altitude of 1.2 meters.

(3) Fuxin

Fuxin is high in the northwest and low in the southeast, and high in the southwest and low in the northeast. The highest point in the northwest is 831.4 meters of Wulanmutu, the lowest point is 48.5 meters in the South Ten of the southeast village. The terrain extends from southwest to northeast and mountainous.

(4) Panjin

The terrain of Panjin is flat and slightly undulating, with regular alternating distribution of highlands and lowland. The average altitude of Panjin is 4 meters. The highest is 18.2 meters, and the lowest is 0.3 meters. The north is high and the south is low. The ratio is 1/10000, and the slope is less than 2 degrees. Inland rivers and rivers are crisscross, with luxuriant vegetation, abundant resources and deep ecological deposits.

(5) Huludao

Huludao City is close to the mountains and the sea, and its terrain gradually decreases from northwest to Southeast. From the mountainous areas above 400 meters above sea level to the coastal plain below 20 meters above sea level. Huludao City forms a long and narrow coastal plain along the coast of Bohai Sea, known as "Liaoxi corridor". The

southern foot of Songling mountain and Yanshan system lie obliquely in the northwest, forming the barrier of Northwest Huludao. The highest peak is Daqingshan in Jianchang, with an altitude of 1223.8 meters. There are overlapping mountains, rolling hills and thick loess cover. Topographically, the city is divided into Northwest Mountainous Area, central hilly area and southeast coastal plain area. Among them, the mountainous area accounts for 41% of the total area. The hilly area accounts for 26% of the total area, and the plain area accounts for 33% of the total area. There are few forest vegetation in Huludao mountain area, and soil erosion is serious.

4.1.4 Seismicity

Liaoning Province is located in the Tancheng Yingkou seismic zone. According to the "China earthquake motion parameter zoning map" (GB18306-2015), the peak acceleration of the ground motion in Jinzhou, Fuxin, Panjin and Huludao is 0.05-0.15g and Yingkou is 0.15-0.2g.

According to the data from the website of the Liaoning Earthquake Administration, the largest earthquake recorded in Liaoning's history was the Haicheng's M7.3 earthquake on February 4, 1975.

4.2 Ambient Environment

The following environmental data comes from the literature published by government departments and institutions. The baseline shall be collected by contractor/PMC before site clearance.

4.2.1 Current situation of ambient air quality

According to "the communique on ecological environment status of Liaoning Province"

in 2019, the urban ambient air quality of the whole province in 2019 is evaluated according to the secondary standard of ambient air quality standard (GB95-2012). In addition to the fine particles, the annual average concentrations of 5 indexes such as inhalable particulate matter, sulfur dioxide, nitrogen dioxide, ozone and carbon monoxide were all up to the standard.

The days of reaching the standard of ambient air quality in 14 cities above prefecture level were 275-339 days (the days of air quality index (AQI) between 0 and 100), and the average days of reaching the standard were 295 days, accounting for 80.7%. Among them, the proportion of excellent and good days was 23.5% and 57.2% respectively. The main pollution indicators were fine particulate matter and ozone. The number of days exceeding the standard (the days with air quality index (AQI) greater than 100) accounted for 57.3% and 38.5% respectively.

Details are listed in Table 4-1 and Table 4-2.

Table 4-1 days and proportion of urban air quality standards in the project¹

City	Days of compliance (days)	Proportion of reaching the standard	Days proportion of air quality levels					
			Excellent	Good	Mild pollution	Moderate pollution	Heavy pollution	Serious pollution
Jinzhou	286	78.4%	21.1%	57.3%	14.8%	4.1%	2.2%	0.5%
Yingkou	275	75.3%	21.9%	53.4%	18.1%	4.4%	2.2%	0.0%
Fuxin	304	83.3%	29.0%	54.2%	12.9%	2.5%	0.8%	0.5%
Panjin	293	80.3%	28.8%	51.5%	14.8%	2.2%	2.7%	0.0%
Huludao	278	76.2%	18.9%	57.3%	16.4%	4.1%	2.7%	0.5%

Note1: The data source is "Liaoning Province Ecological Environment Status Bulletin in 2019".

Table 4-2 Air quality comparison table

Air quality index	Jinzhou	Yingkou	Fuxin	Panjin	Huludao	Average concentration in Liaoning Province	"Ambient Air Quality Standard" (GB 3095—2012) ¹		IFC General Guidelines for Environment, Safety and Health
							Level 1 concentration limit	Level 2 concentration limit	
PM _{2.5} Annual average (μg/m ³)	447	443	337	339	447	40	15	35	35 (First stage target value) 25 (The second stage target value)
PM ₁₀ Annual average (μg/m ³)	778	669	667	557	777	70	40	70	70 (First stage target value) 50 (The second stage target value) 30 (The third stage target value) 20 (Guide value)
SO ₂ Annual average (μg/m ³)	229	110	225	114	227	19	20	60	50
NO ₂ Daily average (μg/m ³)	333	228	223	226	333	28	40	40	40
CO ₂₄ Hourly average (mg/m ³)	11.9	11.6	11.3	—	22.0	1.7	4	4	—
O ₃ Daily maximum 8 hours average (μg/m ³)	1157	1166	1150	—	1158	151	100	160	160 (First stage target value) 100 (Guide value)

(1) Current situation of ambient air quality in Jinzhou City

In 2019, the comprehensive index of ambient air quality in Jinzhou City is 1.082, which belongs to moderate pollution level. In terms of pollution level, grade III mild pollution lasted for 54 days, grade IV moderate pollution for 15 days, level 5 severe pollution for 8 days, and level 6 severe pollution for 2 days, including three consecutive severe pollution and serious pollution processes from January 11 to 12, March 2-5, and December 9-10. The highest AQI index day was 381, and the lowest day was 23. The number of days exceeding the standard in the whole year was 79 days, and the exceeding rate was 21.6%. In the 79 days of air quality exceeding the standard, the primary pollutant was fine

particulate matter (PM_{2.5}) in 46 days, inhalable particulate matter (PM₁₀) in 2 days, and ozone maximum 8-hour average value (O₃) in 31 days.

Fine particulate matter (PM_{2.5}): The average annual value was 47μg/m³, which was 0.34 times higher than the level II standard of ambient air quality standard (35μg/ m³), with a year-on-year increase of 2.2%.

Inhalable particulate matter (PM₁₀): The annual average value was 78μg/m³, which was 0.11 times higher than the level II standard (70μg/m³) in the "ambient air quality standard", and decreased by 1.3% year on year

Sulfur dioxide (SO₂): The annual average value was 29μg/m³, lower than the national secondary standard (60μg/m³), with a year-on-year decrease of 25.6%.

Nitrogen dioxide (NO₂): The average annual value was 33μg/m³, lower than the national secondary standard (40μg/m³), with a year-on-year decrease of 5.7%.

Carbon monoxide (CO): The 95th percentile of the daily average value was 1.9mg/m³, lower than the national secondary standard (4.0mg/m³), with a year-on-year decrease of 5.5%.

Ozone (O₃): The 90th percentile of the daily maximum 8-hour average value was 157μg/m³, which was lower than the national secondary standard (the daily maximum 8-hour average value was 160μg/m³), with a year-on-year increase of 4.0%.

Natural dust fall: the annual average value of urban area is 8.03tons/square kilometers month, which is 0.003 times higher than the local standard of Liaoning Province (8tons/square kilometers month), with a year-on-year decrease of 1.35tons/square kilometers month.

(2) Current situation of ambient air quality in Yingkou City

In 2019, there are 275 days of excellent air quality in Yingkou, accounting for 75.3%; the annual average concentrations of fine particles, inhalable particles, sulfur dioxide and nitrogen oxides are $43\mu\text{g}/\text{m}^3$, $69\mu\text{g}/\text{m}^3$, $10\mu\text{g}/\text{m}^3$ and $28\mu\text{g}/\text{m}^3$, respectively.

The days of different levels of ambient air quality index (AQI) were 80 days for excellent, 195 days for good, 66 days for mild pollution, 16 days for moderate pollution and 8 days for severe pollution. The proportion of days reaching the standard was 75.3%.

The concentrations of various pollutants in the ambient air are as follows:

The average concentration of $\text{PM}_{2.5}$ was $43\mu\text{g}/\text{m}^3$, which exceeded the secondary standard ($35\mu\text{g}/\text{m}^3$) of ambient air quality standard (GB3095-2012)

The average concentration of PM_{10} was $69\mu\text{g}/\text{m}^3$, which was in line with the secondary standard ($70\mu\text{g}/\text{m}^3$) of ambient air quality standard (GB3095-2012).

The average concentration of SO_2 is $10\mu\text{g}/\text{m}^3$, which conforms to the second level standard ($60\mu\text{g}/\text{m}^3$) of ambient air quality standard (GB3095-2012).

The average concentration of NO_2 was $28\mu\text{g}/\text{m}^3$, which met the second level standard ($40\mu\text{g}/\text{m}^3$) of ambient air quality standard (GB3095-2012).

The ninetieth percentile of the maximum 8 hour sliding average on O_3 day is $166\mu\text{g}/\text{m}^3$, which is higher than the two grade of ambient air quality standard (GB3095-2012) standard (the maximum 8 hour average of O_3 days: $160\mu\text{g}/\text{m}^3$).

The average ninety-fifth percentile of CO for 24 hours is $1.6\text{mg}/\text{m}^3$, which is in line with the two grade of ambient air quality standard (GB3095-2012) standard (CO hour average: $4\text{mg}/\text{m}^3$).

The ambient air quality of Yingkou City ranks the eighth among the 14 cities in the province.

(3) Current situation of ambient air quality in Fuxin City

In 2019, the air quality standard days in Fuxin city will be 304 days, with the compliance rate of 83.3%; the average concentration of PM_{2.5} is 37 $\mu\text{g}/\text{m}^3$; the average concentration of PM₁₀ is 67 $\mu\text{g}/\text{m}^3$; the average concentration of sulfur dioxide is 25 $\mu\text{g}/\text{m}^3$; the average concentration of nitrogen dioxide is 23 $\mu\text{g}/\text{m}^3$; the percentile concentration of carbon monoxide is 1.3 mg/m^3 ; and the percentile concentration of ozone eight hours is 150 mg/m^3 . Among them, the annual average concentration of fine particles exceeded the national ambient air quality level II standard by 0.06 times, and other indicators met the national ambient air quality class II standard. The comprehensive index ranked fourth in the province.

In 2019, four precipitation processes were monitored in Fuxin City, with a total precipitation of 153.7mm, no acid precipitation and pH value ranging from 7.18 to 7.66. Compared with the previous year, the precipitation increased by 102.2mm, the precipitation quality remained good, and there was no acid rain.

In 2019, there are two sand dust weather events in Fuxin City, and the affected days are 2 days. The impact of dust weather on the concentration of inhalable particles is lower than that in 2018.

(4) Current situation of ambient air quality in Panjin

In 2019, the number of days with good ambient air quality in Panjin is 293. The annual average concentration of sulfur dioxide (SO₂) in the ambient air decreased year on year, The annual average concentration of PM₁₀ and ozone (O₃) were the same, and the annual average concentration of PM_{2.5}, nitrogen dioxide (NO₂) and carbon monoxide (CO) increased year on year.

The proportion of days with good air quality was 80.3%. According to the environmental air quality index (AQI), the first level (excellent) was 105 days; the second level (good) was 188 days; the third level (mild pollution) was 54 days; the fourth level (moderate

pollution) was 8 days; the fifth level (severe pollution) was 10 days, and there was no level six (serious pollution) days.

In the exceeding standard days with mild pollution and above, the number of days with PM_{2.5} as the main pollutant was the most, accounting for 55.5%, followed by ozone (O₃) accounting for 41.7% and PM 2.8%.

The annual average concentration of PM₁₀, sulfur dioxide (SO₂) and nitrogen dioxide (NO₂), carbon monoxide (CO) and ozone (O₃) concentrations all reached the second grade standard of the national ambient air quality, and the annual average concentration of PM_{2.5} exceeds the standard 0.11 times. The range of precipitation acidity (pH) is from 6.60 to 7.34, and there is no acid precipitation throughout the year.

(5) Current situation of ambient air quality in Huludao City

In 2019, the ambient air quality in Huludao City is mainly good, with 76.2% of the days with good air quality. The annual average concentrations of sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO) and ozone (O₃) all meet the national ambient air quality class II standard, and the natural dust fall meets the provincial standard. The average value of inhalable particles and fine particles exceeded the national secondary standard.

In 2019, there are 278 days of good ambient air quality, including 69 days of excellent and 209 days of good; 60 days of mild pollution, 15 days of moderate pollution, 10 days of severe pollution and 2 days of serious pollution. The number of days exceeding the standard was 87 days, and the exceeding rate was 23.8%. In the days exceeding the standard, PM_{2.5} accounted for 51.7%, O_{3-8h} accounted for 36 days, accounting for 41.4%, and PM₁₀ for 6 days, accounting for 6.9%.

Inhalable particulate matter (PM₁₀): Respirable particulate matter has an average annual value of 77μg/m³, and is 0.10 times higher than the ambient air quality standard (GB3095

- 2012)the second level(average annual value is $70\mu\text{g}/\text{m}^3$). It was 11.6% higher than in 2018.

Fine particles ($\text{PM}_{2.5}$): The annual average of fine particles is $47\mu\text{g}/\text{m}^3$, which is 0.34 times higher than the level II standard of ambient air quality standard (GB3095-2012) (the average annual value standard is $35\mu\text{g}/\text{m}^3$), which is 11.9% higher than that in 2018.

Sulfur dioxide (SO_2): The annual average value of sulfur dioxide is $27\mu\text{g}/\text{m}^3$, which meets the class II standard of ambient air quality standard (GB3095-2012) (the average annual value standard is $60\mu\text{g}/\text{m}^3$), which is 22.9% lower than that in 2018.

Nitrogen dioxide (NO_2): The annual average value of nitrogen dioxide is $33\mu\text{g}/\text{m}^3$, which meets the class II standard of ambient air quality standard (GB3095-2012) (the average annual value standard is $40\mu\text{g}/\text{m}^3$). 10.0% higher than that in 2018.

Carbon monoxide (CO): The average 95th percentile concentration of carbon monoxide in 24 hours was $2.0\text{mg}/\text{m}^3$, which reached the second level standard of ambient air quality standard (GB3095-2012) (the standard was $4.0\text{mg}/\text{m}^3$), which was 11.1% higher than that in 2018.

Ozone (O_3): The 90th percentile concentration of the maximum 8-hour daily moving average of ozone was $158\mu\text{g}/\text{m}^3$, which reached the level II standard of ambient air quality standard (GB3095-2012) (the standard was $160\mu\text{g}/\text{m}^3$), which was 9.0% higher than that in 2018.

Natural dust fall: the average annual value of the city is 3.91tons/square kilometer per month. According to the provincial standard, the standard is 38.3% lower than that in 2018. Clean areas, residential areas, industrial areas and traffic areas were all up to standard.

4.2.2 Current Situation of Acoustic Environment Quality

In 2019, the average equivalent sound level of road traffic noise environment in Liaoning Province is 67.9 dB, which is 2.1 dB lower than the regional standard on both sides of national traffic trunk lines. A total of 1077 effective road sections were monitored in the province, with a total length of 1681km, including 300 sections exceeding the standard and 508km exceeding the standard, accounting for 30.2% of the total monitoring length. In addition to Anshan slightly exceeding the regional standard of both sides of the national traffic trunk line, the equivalent sound level of road traffic noise environment of 14 cities in the province is good and relatively good.



Figure 4-2 ranking of average equivalent sound level of urban road traffic noise environment in Liaoning Province in 2019

(1) The present situation of sound environmental quality in Jinzhou

Jinzhou acoustic environmental quality monitoring includes noise in functional areas, road traffic noise and environmental noise in urban areas. The environmental quality standard for noise (GB3096-2008) is implemented.

① Functional area noise

Functional areas of noise are divided into four categories: the residential area, the mixed area, the industrial area and the traffic area. In 2019, the annual average noise value of the functional area was 57.8 dB (A) in the daytime, decreased by 0.3dB (A) year on year, and 51.4db (A) at night, with a year-on-year decrease of 0.5dB (A). The annual average noise value of each functional area is up to the standard in daytime, and at night, except the traffic area which exceeds the standard by 5.4db (A), other functional areas meet the standard at night.

②Road traffic noise

In 2019, 50 monitoring points of urban traffic trunk roads were monitored for road traffic noise by Jinzhou Environmental Monitoring Station. The total length of the monitored traffic trunk line was 152.44km, and the average width of the road section was 21.1m. The average daytime equivalent sound level of road traffic noise was 66.5dB(A), which decreased by 2.3DB(A) year on year. The daytime average equivalent sound level of road traffic noise was level 1, good (the national first-class standard daytime average equivalent sound level ≤ 68 dB(A)).

③Environmental noise in city area

In 2019, there are 206 environmental noise monitoring grids in Jinzhou. The average daytime equivalent sound level of regional environmental noise monitoring was 52.3dB(A), decreased by 1.2dB(A) on a year-on-year basis, and the grid compliance rate was 93.7%, with a year-on-year increase of 2.4%.

(2) Present situation of sound environment quality in Yingkou City

In 2019, the daytime equivalent sound level of regional environmental noise in Yingkou City is 49.5- 60.9dB(A), and the average equivalent sound level is 55.4dB(A), and the pollution degree is aggravated year on year. The rate of exceeding the standard was 5.0%, which was the same as that of last year. Among them, the over standard rate of class 1 area was 33.3%, with a year-on-year increase of 6.6%; the over standard rate of class 2

area was 1.1%, with a year-on-year decrease of 1.5%; there were no over standard points in Category 3 and 4 areas, which were flat on a year-on-year basis.

The daytime equivalent sound level of traffic noise in the city is 57.2-69.1db (a), and the average equivalent sound level is 62.4db (a). The pollution degree is reduced year on year. The rate of exceeding the standard was 0%, with a year-on-year decrease of 1.5%.

(3) Present situation of acoustic environment quality in Fuxin City

In 2019, the main characteristics of the sound environment in Fuxin functional areas are that the overall daytime conditions are good, and the monitoring results of the average equivalent sound level in different seasons and years in Fuxin functional areas are up to the standard.

① Acoustic environment of road traffic

In 2019, the average daytime equivalent sound level of road traffic noise in Fuxin city is 66.6dB(A), and the overall situation meets the national standard. The noise intensity level is "level I", and the evaluation result is "good".

② Regional acoustic environment

In 2019, the average equivalent sound level of the ambient noise in Fuxin was 52.8dB(A), and the noise intensity grade was "two levels". The evaluation grade was "better" and the grid compliance rate was 91.5%.

(4) Current situation of sound environment quality in Panjin City

In 2019, the daytime intensity level of road traffic noise in Panjin City is level 1(excellent), and the overall level of regional noise environment in daytime is level 2(good).

① Acoustic environment of road traffic

The road traffic noise environment is at a good level in the daytime, which is good , accounting for 95% of the total length. The average, poor and poor levels account for 5.0% of the total length.

② Regional acoustic environment

The regional acoustic environment is relatively good in the daytime. Traffic noise and social life noise are the main noise sources, accounting for 55.1% and 40.6% respectively.

(5) Present situation of sound environment quality in Huludao City

① Environmental noise in functional areas

In 2019, the average ambient noise in urban functional areas is 57.0dB(A) in daytime and 47.5db(A) at night. Compared with that in 2018, it decreased by 0.3dB(A) in daytime and 1.7dB(A) at night. Among them, class 1, 2 and 3 functional areas met the standard in daytime and night, while class 4 functional areas exceeded the standard at night in the first quarter and the third quarter.

② Road traffic noise

In 2019, the average equivalent sound level of main roads in Huludao City is 66.3db (a) in daytime, which meets the traffic noise standard. Compared with 66.6db (a) in 2018, it decreased by 0.3dB (a), and the exceeding rate increased by 16.2%. Among the 37 road sections monitored, 10 sections exceeded the standard, accounting for 27.0% of the total; the total length of the exceeding standard sections was 12.036 km, accounting for 20.7% of the total length of the monitoring trunk lines.

③Regional acoustic environment

The average equivalent sound level of regional environmental noise in Huludao City in 2019 is 63.8dB(A), which is 1.4dB(A) lower than 65.2dB(A) in 2018. In the daytime, the

over standard rates of class 1, 2 and 3 functional areas were 100% and 81.1% respectively, and the over standard rates of 33.3% and 4 categories were 10.0%. The main noise sources of the city are social life noise and traffic noise.

In the monitored urban area, 14.38% of the population live in 45-60dB (A) acoustic environment, and 85.62% of the population are exposed to more than 60 dB(A).

4.2.3 Current Situation of Surface Water and Groundwater

Environmental Quality

There is no water body within 500m radius of all subprojects sites during the site survey.

(1) Current situation of water environment quality in Jinzhou City

The main surface water in Jinzhou City is Daling River and Xiaoling river. The evaluation of surface water follows the environmental quality standard for surface water (GB3838-2002).

Water quality of Daling River: the water quality of Daling River in Jinzhou Section is slightly polluted. The whole reach meets the class IV standard. Compared with 2018, COD was 20.59mg/L, increased by 18.5%; permanganate index was 4.54mg/L, increased by 25.7%; biochemical oxygen demand was 3.14mg/L, increased by 16.2%; total phosphorus was 0.080mg/L, decreased by 2.4%; fluoride was 0.789mg/L, increased by 7.9%.

Water quality of Xiaoling River: the water quality of Jinzhou reach of Xiaoling river is slightly polluted. The whole reach meets the class IV standard. Compared with 2018, COD was 19.57mg/L, increased by 1.6%; permanganate index was 5.30mg/L, increased by 5.6%; biochemical oxygen demand was 3.95mg/L, increased by 13.2%; ammonia nitrogen was 1.33mg/L, increased by 111.1%; total phosphorus was 0.146mg/L, increased by 21.7%.

Urban centralized drinking water sources: Bozi, Suifeng and Daling River are the three main centralized drinking water sources in Jinzhou. 23 monitoring indicators are monitored in January and February, and 39 monitoring indicators are monitored from March to December. The results are better than the class III standard of groundwater quality standard (GB/T14848-2017), and the water quality is in good condition.

(2) Current situation of water environment quality in Yingkou City

In 2019, the annual average water quality of Daliao River Liaohe Park section is class IV, meeting the requirements of class IV water quality assessment. There is one excellent water quality section in the whole year, which reaches the requirement of 33.3% of excellent water quality. In the whole year, the proportion of excellent water quality in coastal waters reached 59.62%, which was better than the assessment target of 36.8%.

① Assessment of river water quality section in Yingkou City

The water quality of Biliuhe cocoon field section is class II, which meets the requirements of class II water quality assessment.

The water quality of the section from Daqing River to Daqing estuary is class III, which meets the requirements of class V water quality assessment.

The section of Dahanhe yinggai highway is inferior to class V water quality, which does not meet the requirements of class V water quality assessment objectives. Main pollutants: total phosphorus 0.43mg/l, exceeding the standard by 0.1 times; ammonia nitrogen 2.11mg/l, exceeding the standard by 0.1 times.

The water quality of Xiongyue River yangjiatun section is class III, which meets the requirements of class IV water quality assessment.

The water quality of Shahe- Shahe estuary section is class IV, which meets the requirements of class IV water quality assessment.

② Current situation of centralized drinking water sources

In 2019, Yingkou city monitored 7 centralized drinking water sources in use, including 4 surface water sources and 3 groundwater sources. Four surface water sources meet the standard (reaching or better than Class III standard). Among them, Shimen Reservoir and Yushi reservoir reach class II standard, accounting for 50%. All the three groundwater sources are up to the standard.

(3) Current situation of water environment quality in Fuxin City

In 2019, the average water quality of Gaotaizi section of Xihe River in Fuxin city reaches the class V standard of GB3838-2002 environmental quality standard for surface water, and the average value of each index meets the standard. Liuhe, Raoyang River and Yangxi Mu River have better water quality. The water quality of changtuozi section of Liuhe river, Xinglongshan section of Raoyang River and Yangximuman section of yangximuhe reach class IV standard of GB3838-2002 environmental quality standard for surface water. The water quality of the centralized drinking water sources in Naodehai and Wangfu is good, and the water quality standard rate of each month is 100%.

(4) Current situation of water environment quality in Panjin City

In 2019, the water quality of Panjin section of Liaohe River mainstream in Panjin City meets the class V standard of surface water environmental quality, and does not meet the class IV assessment standard. The annual average concentration of chemical oxygen demand is 32 mg / L, which is 0.07 times higher than the standard. The water quality standard rate of urban centralized drinking water sources is 100%, and the function areas of coastal waters are not up to the standard.

① Water quality of Panjin section of Liaohe River

The water quality of Panjin section of the main stream of Liaohe River meets the class V standard of surface water environmental quality, and does not meet the class IV

assessment standard. The annual average concentration of chemical oxygen demand is 32 mg / L, which is 0.07 times higher than the standard. Among the three sections, the water quality of Xing'an and Zhaoquan river sections meets the class IV assessment standard for surface water; Shuguang bridge meets the class V surface water standard, which does not meet the assessment standard. The annual average concentration of chemical oxygen demand is 36 mg / L, which is 0.20 times higher than the standard.

Among the six main tributaries in Panjin section of Liaohe River, the water quality of three sections of Xiaoliuhe sluice North Bridge, Yitong River Zhonghua Road Bridge and Raoyang River Shengli pond all meet the class V standard of surface water; the water quality of three sections of Yugangzi, Xinsheng bridge of Taiping River and Qingshui River Gate of Qingshui River is inferior to class V standard of surface water. The water quality of Yugangzi section, Xinsheng bridge section and Qingshuihe sluice section is inferior to class V standard of surface water.

② Water quality of centralized drinking water sources in cities

The water quality of urban centralized drinking water source is in line with the class III standard of groundwater environmental quality, and the compliance rate is 100%.

(5) Current situation of water environment quality in Huludao City

In 2019, the water quality of six rivers in Huludao will be basically stable. The water quality of the upper reaches of Nver River, Liugu River, Daling River, Xingcheng River and Wuli River reaches the class II standard of surface water; the water quality of Lianshan river reaches the class III standard of surface water, meeting the requirements of water quality.

10 new rivers into the sea, the strong River, the Jiujiang River, the Yantai River and the Shihe River reach the second class standard of surface water; the dog River, the East Shahe, the Ling Jiao River and the cat eye river reach the surface water type III standard; Daxing river water quality reaches the surface water type V standard; the Cishan River

pollution is severe, and it is inferior type V.

The measured factors of Gongshanzui reservoir, Wujintang reservoir and Qingshan Reservoir meet the class II standard of environmental quality standard for surface water(GB3838-2002), and the overall eutrophication state of the reservoirs is mesotrophic.

Pingshan water source, Wujin pond water source and Qingshan Reservoir water source meet the "surface water environmental quality standard" (GB3838-2002) category III standards. Wujin Tang water source molybdenum exceeds the standard limit of specific items for centralized drinking water surface water sources.

4.3 Ecological Environment

4.3.1 Ecological Environment Status

In 2018, the ecological environment quality of Liaoning was good, and the ecological environmental quality index (EI) was 67.3. It is at a moderate level in all provinces (municipalities and autonomous regions), and is generally suitable for human habitation.

The ecological environment quality of 58 counties (cities, municipal districts) is excellent, good and average, among which, the ecological environment quality of 8 counties (cities) with excellent ecological environment quality are Qingyuan County, Xinbin County, Fushun County, Benxi county, Huanren County, Kuandian County, Fengcheng City, Xiuyan County, accounting for 22.8% of the total area of the province, mainly distributed in the eastern region; There are 44 counties (cities and municipal districts) with good environmental quality, including Xinmin City, Faku County, Dalian City District, Dandong City District, Liaoyang City District, Tieling City District and Huludao City District, accounting for 72.0% of the total area of the province. There are 6 counties (municipal districts) with general ecological environment quality, including Shenyang City District, Anshan City District, Jinzhou City District, Heishan County, Fuxin City

District and Panjin City District, accounting for 5.2% of the province's area, mainly distributed in the central region. Generally speaking, it is more suitable for human habitation.

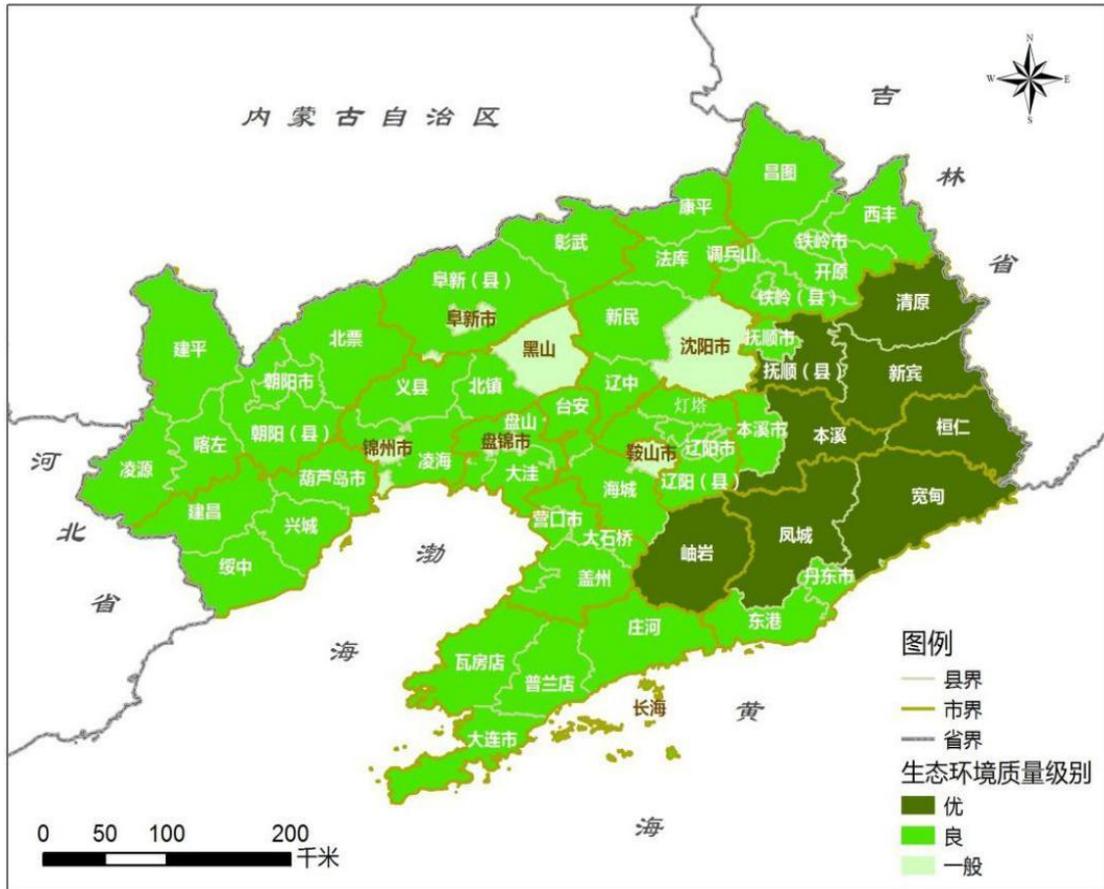


Fig. 4-3 2018 distribution map of ecological environment quality in counties (cities and municipal districts) of Liaoning Province

In 2018, the ecological environment quality of Jinzhou remained stable, with the ecological environment quality index (EI) of 57.51, of which the ecological environment quality of Yixian, Linghai and Beizhen was good; the ecological environment quality of Jinzhou City and Heishan County was general.

In 2018, the ecological environment index (EI) of Fuxin city is between 35-55, the ecological environment quality is "average". The vegetation coverage is medium, and the biodiversity is general, which is more suitable for human survival, but there are some constraints that are not suitable for human survival. The eco-environmental quality index

(EI) of Fumeng county and Zhangwu County is between 55-75, the ecological environment quality is "good". The vegetation coverage is high, and the biodiversity is rich, which is suitable for human survival.

In 2018, the ecological environment of Panjin was good, indicating that the vegetation coverage was high and the biodiversity was rich. The ecological environment index (EI) was 66.1. The biological abundance index, vegetation coverage index, water network density index, land stress index and pollution load index were 39.3, 79.2, 57.3, 6.2 and 0.8, respectively. The eco-environmental index (EI) of each county ranged from 56.3 to 67.4. Among them, the ecological environment status index of Panjin City is 56.3, and the ecological environment condition is general; the ecological environment index of Dawa district and Panshan County is greater than 55.0, and the ecological environment condition is good.

4.3.2 Flora

There are more than 2200 species of plants belonging to 161 families in Liaoning Province, of which more than 1300 species have economic value. There are more than 830 kinds of medicinal products, such as ginseng, asarum, *Schisandra chinensis*, *Codonopsis pilosula*, *Gastrodia elata*, gentian, etc.; there are more than 70 kinds of wild fruit and starch brewing, such as *Vitis amurensis*, kiwi fruit, shanlihong, Sorbi, etc.; 89 kinds of aromatic oils, such as evening primrose, borneol, etc.; 149 kinds of oils, such as pine nuts, *Xanthium sibiricum*, and wild vegetables, miscellaneous materials and fibers. There are no national key protected plants in the affected area of this project.

Table 4-3 Plants affected in the project areas^{1,2}

Name	Information source ¹	List of National Key Protected Plants in China	IUCN ²	Picture
Peach	PS	No	LC	
Juniper	PS	No	LC	

Note: 1. PS: First level survey

2. IUCN: International Union for Conservation of Nature, LC: Minimal attention

4.3.3 Fauna

There are a wide variety of animal species in Liaoning, including amphibian, mammals, reptiles, and birds. They are 7 classes, 62 orders, 210 families, 492 categories and 827 species. Among them, there are 6 kinds of first class protected animals, 68 kinds of second class protected animals and 107 kinds of third class protected animals. Animals with scientific value and economic significance include white stork, Red Crowned Crane, abdominal snake, salamander, red fox, seal, dolphin, etc. There are more than 400 species of birds, accounting for 31% of the total.

Except for the Liaodong Bay Bus Service Center, the other construction sites in this project are all in the urban areas, where human activities are frequent. No wild animals were found during the on-site investigation. Only sparrows and gray magpies fly by occasionally. The project site of Liaodong Bay Bus Center is a barren land with grass, and no wild animals were found on the site.

Table 4-4 Animals affected in the project areas^{1,2}

Common name	Scientific name	Information source	List of National Key Protected Wildlife in China	IUCN ²	Picture
Sparrow	Passer montanus	PS ¹	No	LC	
Grey Magpie	Grey Magpie	PS	No	LC	

Note: 1. PS: First level survey

2. IUCN: International Union for Conservation of Nature, LC: Minimal attention

4.3.4 Ecologically Sensitive Areas(NP, Protected Areas, IBAs etc.)

According to the list of nature reserves issued by the Ministry of Ecological Environment, the State Forestry and Grass Administration, and the Ministry of Natural Resources, as well as the functional zoning map of nature reserves, the background data of national nature reserves as of December 2019 were collected. There were 19 national nature reserves in Liaoning Province, including: Dalian spotted seals, Snake Island, Laotie mountain, Chengshantou fellow coastal landform, Liaoning Xianren cave, Huanren Laotuzi, Baishilazi, Dandong Yalu River Mouth Wetland, Yiwulv mountain, Haitang mountain, Zhanggutai, Liao River mouth, Liaoning big black mountain, Nuluerhu mountain, Louzi mountain, Beipiao bird fossil, Qinglong River, rainbow mountain, five flower top, white wolf mountain. The nearest reserve to the subproject's area is Haitang mountain, which is 18 km from the Fuxin urban area. The project implementation site is

not in an ecologically sensitive area.

4.4 Socioeconomic Environment

4.4.1 Demography

According to the statistical bulletin of national economic and social development of Liaoning Province in 2019, and the 1 ‰ population sampling survey, the number of permanent residents at the end of the year is 43.517 million. Among them, the urban population is 29.639 million, accounting for 68.11% of the permanent population; the rural population is 13.878 million, accounting for 31.89%. The annual birth is 281 thousand, and the birth rate is 6.45 per thousand. The death is 316 thousand. The mortality rate is 7.25 per thousand, and the natural population growth rate is -0.80 per thousand.

Jinzhou: by the end of 2019, the registered population of Jinzhou is 2.934 million. Among them, the urban population is 1.244 million, accounting for 42.4% of the registered population; the rural population is 1.69 million, accounting for 57.6%. According to gender, there are 1.464 million males, accounting for 49.9% of the registered population, and 1.469 million females, accounting for 50.1%. According to age, there are 358000 people aged 0-17, accounting for 12.2% of the registered population; 547000 people aged 18-34, accounting for 18.6%; 1213000 people aged 35-59, accounting for 41.3%; 816000 people over 60 years old, accounting for 27.8%.

Yingkou: by the end of 2019, there are 2.431 million permanent residents. Among them, the urban population is 1.575 million, accounting for 64.79% of the permanent population; the rural population is 856000, accounting for 35.21%. At the end of the year, the registered population was 2.308 million. Among them, there are 1 million 219 thousand urban population, accounting for 52.83%. The annual birth is 16226, and the birth rate is 7.02 per thousand. The death is 15560, and the mortality rate is 6.73 per thousand, and the natural growth rate of the population is 0.29 per thousand.

Fuxin: by the end of 2019, the total registered population of Fuxin is 1.837 million. Among them, 909000 are men, accounting for 49.5%, and 928000 are women, accounting for 50.5%. The population aged 0-17 was 227000, accounting for 12.4%; the population aged 18-34 was 359000, accounting for 19.5%; the population aged 35-59 was 800000, accounting for 43.5%; and the population aged 60 and above was 451000, accounting for 24.6%. The city's urban population is 780 thousand, accounting for 42.5%; the number of births registered in the city is 10733, and the birth rate is 5.42 per thousand. 14814 people die, 7.48 death rate, and the natural population growth rate is -2.05 per thousand.

Panjin: by the end of 2019, there are 1.44 million permanent residents. Among them, the urban population is 1 million 54 thousand, accounting for 73.2% of the permanent population, and 386 thousand of the rural population, accounting for 26.8%. The annual birth is 10802, and the birth rate is 8.3 per thousand. The death is 6296, and the mortality rate is 4.8 per thousand. The natural growth rate of the population is 3.5 per thousand. Among the registered population of the city, there are 182000 people aged 0-17, accounting for 14.0%; 265000 people aged 18-34, accounting for 20.4%; 554000 people aged 35-59, accounting for 42.6%; and 298000 people aged 60 and above, accounting for 22.9%.

Huludao: from the perspective of household registration, by the end of 2019, the total number of households in the city is 995000, with a total population of 2.758 million. The urban population is 966000, accounting for 35.0% of the total population; the rural population is 1.792 million, accounting for 65.0% of the total population. There are 1.406 million males, accounting for 51.0% of the total population; 1.351 million females, accounting for 49.0% of the total population; the sex ratio is 104:100. The annual birth rate was 6.64 ‰, and the mortality rate was 5.42 ‰.

4.4.2 Ethnic Minorities

Liaoning Province is one of the provinces with a large minority population. In addition to the Han nationality, there are 51 ethnic minorities in the province, including Man,

Mongolian, Hui, Korean and Xibo. The population of ethnic minorities is 6.7 million, accounting for 16.02% of the total population of the province. The absolute number of ethnic minority population in Liaoning ranks the fifth in China, and the proportion of ethnic minorities in the total population ranks tenth behind Tibet, Xinjiang, Guangxi, Ningxia, Yunnan, Guizhou, Inner Mongolia and other provinces.

There are eight minority autonomous counties in the province, including six Man autonomous counties (Xinbin, Xiuyan, Qingyuan, Benxi, Huanren, Kuandian) and two Mongolian Autonomous Counties (Kazuo and Fuxin). There are also two cities (Fengcheng and Beining) that enjoy the treatment of ethnic autonomous counties in the province. The land area of the eight minority autonomous counties is 34,300 square kilometers, accounting for 23.3% of the total area of the province; the population of ethnic minorities is 1.74 million, accounting for 54.3% of the total population of the autonomous counties, accounting for 26% of the total population of the province.

There are 77 ethnic townships in the province, mainly distributed in Huludao Suizhong County, Xingcheng City, Xifeng County, Kaiyuan City, Jinzhou City, Yixian County and so on. There are 912 administrative villages in the ethnic townships of the whole province, with a total area of 9,911 square kilometers and a total population of 1 million 280 thousand people, of whom 699 thousand and 700 are ethnic minorities, accounting for 54.65% of the total population.

There are 41 ethnic minorities in Jinzhou, including Man, Hui, Mongolian, Xibo and Korean, with a population of nearly 850,000, accounting for 27.15% of the total population of Jinzhou City. There are 777785 Manchu, 30043 Mongolian, 20459 Hui, 168.79 million Xibo and 1773 Korean in Jinzhou. The minority population is widely distributed in Jinzhou City.

There are 39 ethnic minorities in Yingkou, including Manchu, Hui, Korean, Mongolian and Xibe, with a population of 165,000, accounting for 7% of the city's total population. There are five ethnic minorities with a large population, including 133,565 Manchu,

15,948 Hui, 10,253 Korean, 5,525 Mongolian and 1,478 Xibe.

There are 36 ethnic minorities in Fuxin, with a total population of 266715. The top five ethnic minorities are Mongolian, Manchu, Hui, Xibo and Korean, and the minority population accounts for 0.01% of the total population.

There are 35 ethnic groups in Panjin, and ethnic minorities account for 4.83% of the total population in Panjin. Among them, Manchu accounted for 3.01%. Korean accounted for 0.90%, and other ethnic minorities accounted for 0.92%. According to the 2000 census data, the ethnic minorities with a larger population are: Korean 11307, Mongolian 5914, Hui 4113 and Xibe 744.

Huludao is also a multi-ethnic area with 27 ethnic groups, including Han, man, Mongolia, Hui, Korean, Xibo, Miao, Yi, Li, Tujia, Zhuang, Daur, Tibetan, Mulao, Russia, Uygur, Buyi and Dong.

Table 4-5 Situation of Ethnic Minority¹

City	Jinzhou	Panjin	Yingkou	Huludao	Fuxin
Ethnic Minority's population (10000)	85	7	16.5	75.7	2.7
Proportion of Ethnic Minority(%)	27.15	4.83	7	27.45	0.01
Types of Ethnic Minority in the Project Area	Manchu, Hui, Mongolian	Korean, Hui, Mongolian	Manchu, Hui, Korean	Manchu, Hui, Mongolian	Manchu, Mongolian, Hui
Cultural Characteristics	Basically consistent with Han				
Residential Mode of Ethnic Minority in the Project Area	Scattering in urban areas				
Language	Mandarin Chinese				
Ethnic Groups in the Project Areas	None	None	None	None	None

Note1: The data are from the sixth census report of China

It can be seen from the above table that the proportion of ethnic minority in Jinzhou City and Huludao City is relatively high (27.15% and 27.45%).

According to the report of China's Sixth Population Census and Research on the spatial distribution of Manchu population in Liaoning Province (Zhangjiarui, ZhangLei, Tourism Management Research, second half of August 2017), the Manchu population in Jinzhou City is 777785, accounting for 24.88% of the total population. They mainly live in Jiudaoling Manchu Town, Youwei Manchu Town, Wendilou Manchu Town, Juliangtun Manchu Town, Dizangsi Manchu Town, Hongbizi Manchu Town, Liulonggou Manchu Town, Dadingbao Manchu Township, Shaohuying Manchu Township, Toudaohe Manchu Township, Toutai Manchu Township, Wuliangdian Manchu Township, Chefang Manchu Township, Baichangmen Manchu Township, Zhen'an Manchu Town and Erdaochuanzi Manchu Town of Jianchang County.

In the population of the Ethnic Minorities in Huludao City, the Manchu population is 669915, accounting for 25.53% of the total population. About 310000 of them live in the following 18 towns: Shahousuo, Dongxinzhuang, Guojia, Yangan, Yuantaizi, Baita, Wanghai, liutaizi, Dazhai, Nandashan, Weiping, Gaojialing, Jianchang, Sandaogou, Hongyazi and Jiumen Manchu Town, Medicine King Manchu Town, Seaside Manchu Township. Nearly all the rest live in 15 towns in Suizhong County, Huludao City: Xipingpo Manchu Township, Fanjia Manchu Town, Dawangmiao Manchu Town, Gejia Manchu Town, Gaodianzi Manchu Town, Huangjia Manchu Town, Huangdi Manchu Town, Mingshui Manchu Town, Kuanbang Manchu Town, Shahe Manchu Town, Gaojiabao Manchu Town, Xiaozhuangzi Manchu Town, Wanghu Manchu Town, Dataishan Manchu Town, Yejia Manchu Town.

Jinzhou City and Huludao Manchu inhabited areas are not included in the project affected areas.

According to the survey, most ethnic minorities and Han nationalities live in mixed residential areas in each project city. There is not much difference in living habits and

there are no obvious ethnic characteristics and customs. Therefore, the project did not take special consideration to it.

4.4.3 Distribution by Age Group

According to the statistical bulletin of national economic and social development of Liaoning Province in 2019, there are 4.793 million people aged 0-15 years (including those under 16 years old), accounting for 11.0% of the permanent population; 27.967 million people aged 16-59 years (including those under 60 years old), accounting for 64.3%; and 10.757 million people aged 60 years or above, accounting for 24.7%. Among them, 7.061 million people aged 65 and above accounted for 16.2%.

4.4.4 Education

Statistics of Liaoning's 2019 national economic and social development statistics show that in 2019, 44 thousand graduate students were enrolled, with 127 thousand students and 33 thousand graduates. In general college 344000 students were enrolled, with 1041000 students and 257000 graduates. 203000 students were enrolled in ordinary senior high schools, with 602000 students and 207000 graduates. 345000 students were enrolled in junior high schools, with 1.015 million students and 316000 graduates. 340000 students were enrolled in ordinary primary schools, with 1951000 students were enrolled and 346000 graduates were graduated. 2000 students were enrolled in special education, with 13000 students and 2000 graduates, and 915000 preschool children in kindergartens.

4.4.5 Working Population

According to the statistics in the bulletin of the fourth national economic census of Liaoning Province, at the end of 2018, the number of employed people in Liaoning Province was 22.6 million. Among them, 7.118 million, 5.34 million and 10.148 million people were employed in the primary, secondary and tertiary industries respectively, and

the registered urban unemployment rate was 4% (see table 4-6 for details).

Table 4-6 Basic employment situation of Liaoning Province(Ten thousand people)

Index	In 2016	In 2017	In 2018
Employment at the end of the year	2301.2	2284.7	2260.6
Primary industry	705.4	714.8	711.8
The secondary industry	572.6	560.1	534.0
The tertiary industry	1023.1	1009.8	1014.8
Employment by urban and rural areas			
Urban employees	1082.6	1071.2	1050.2
State owned Units	261.6	241.0	209.9
Urban collective unit	24.4	18.4	14.6
Other domestic capital	206.6	196.4	214.2
Foreign investment unit	46.3	41.5	40.1
Investors from Hong Kong, Macao and Taiwan	15.7	16.6	13.8
Other	5.8	5.6	9.0
Private enterprises	220.6	265.1	251.9
Individual	301.6	286.6	296.7
Rural employees	1218.6	1213.4	1210.4
Number of employees on the job	526.6	488.7	469.4
State owned Units	250.2	231.5	199.9
Urban collective unit	22.9	17.2	13.7
Other units	253.5	240.0	255.9
Number of employed (re-employed) urban residents in the year	81.3	81.8	91.5
Urban registered unemployed	47.3	42.7	44.4
Unemployed female sex	22.6	21.1	20.8
Urban registered unemployment rate(%)	3.8	3.8	4.0

Jinzhou: 17000 new jobs were created in 2019, and the registered urban unemployment

rate will be 4.5%. There are 818000 people participating in the basic endowment insurance for urban enterprise employees.

Yingkou: in 2019, 18300 new urban jobs were created, and 24800 registered urban unemployed will be registered. The registered urban unemployment rate will be 3.44%, which is 0.16 percentage points lower than the provincial control index.

Fuxin: in 2019, there were 15000 new urban employment, and the registered urban unemployment rate will be 4.7%. The number of urban and rural labor export was 191000.

Huludao: in 2019, there were 15136 new jobs in cities and towns, 411 supporting entrepreneurs and 2580 jobs. The registered urban unemployment rate was 4.9%.

4.4.6 Income and Social Insurance

Income of urban and rural residents: in 2019, the per capita income of permanent residents in the province was 31820 CNY, an increase of 7.1% over the previous year. Among them, the per capita income of urban residents was 39777 CNY, an increase of 6.5%; that of rural residents was 16108 CNY, an increase of 9.9%.

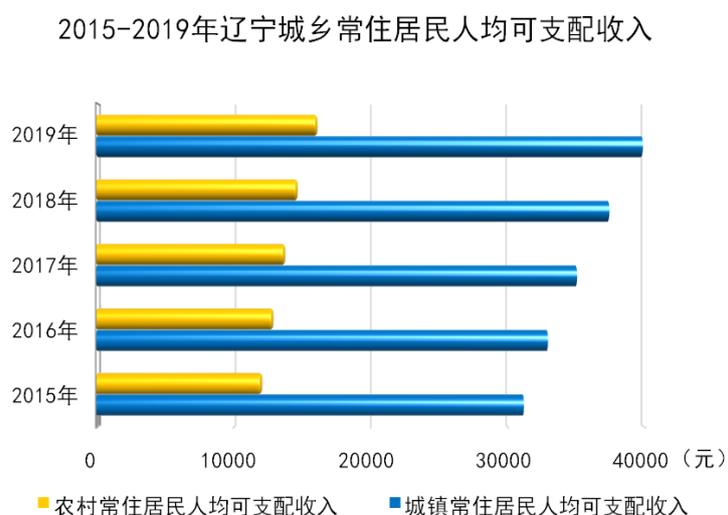


Figure 4-4 Per capita income of urban and rural residents in Liaoning Province from 2015 to 2019

Urban and rural security system: by the end of 2019, 20.261 million people participated in the basic endowment insurance for urban employees, an increase of 1.6% over the end of the previous year; and 10.577 million people participated in social endowment insurance for urban and rural residents, an increase of 1.6%. At the end of the year, 38.946 million people participated in the basic medical insurance, including 15.521 million urban employees and 23.425 million urban and rural residents. At the end of the year, 6.682 million people participated in unemployment insurance, including 126000 receiving unemployment insurance benefits. At the end of the year, 8.168 million people participated in work-related injury insurance, including 469000 migrant workers. At the end of the year, 7.893 million people participated in maternity insurance. 392000 urban residents and 603000 rural residents received the government's minimum living guarantee.

Jinzhou: in 2019, the per capita disposable income of urban residents was 34699 CNY, an increase of 6.8% over the previous year. The per capita disposable income of rural residents was 16817 CNY, an increase of 9.3%. There are 818000 people participating in the basic endowment insurance for urban enterprise employees. 142000 people participated in the endowment insurance of institutions. The number of urban and rural residents participating in endowment insurance was 1.051 million. 2.631 million people participated in urban basic medical insurance. Among them, 951000 urban employees and 1.68 million urban and rural residents participated in the basic medical insurance. The number of people insured by unemployment insurance was 310000. There were 375000 people who participated in the work-related injury insurance. 260000 people participated in maternity insurance.

Yingkou: in 2019, the per capita disposable income of urban residents was 39405 CNY, an increase of 6.4% over the previous year; the per capita disposable income of rural residents was 18494 CNY, an increase of 10.4%. At the end of the year, 853000 people participated in the basic endowment insurance for urban employees, an increase of 2.2% over the end of the previous year. 536000 people participated in social endowment

insurance for urban and rural residents, an increase of 0.4%. At the end of the year, 1.982 million people participated in the basic medical insurance, including 875000 urban employees and 1.107 million urban and rural residents. At the end of the year, 239000 people participated in unemployment insurance, of which 13000 received unemployment insurance benefits. At the end of the year, 329000 people participated in work-related injury insurance, including 34000 migrant workers. At the end of the year, 284000 people participated in maternity insurance.

Fuxin: in 2019, the per capita disposable income of urban residents was 29514 CNY, an increase of 6.9% over the previous year; the per capita disposable income of rural residents was 14849 CNY, an increase of 10.5% over the previous year. At the end of 1999, 565000 people (including retirees) participated in the basic endowment insurance for urban and rural residents, including 231000 people enjoying pension insurance benefits. 1.593 million people participated in the basic medical insurance, including 554000 urban employees and 1.039 million urban and rural residents. 167000 people participated in unemployment insurance. 196000 people participated in industrial injury insurance. 154000 people participated in maternity insurance. 8000 people received unemployment insurance benefits.

Panjin: in 2019, the per capita disposable income of urban residents was 41575 CNY, an increase of 6.3% over the previous year, and the disposable income per capita of rural residents was 18890 CNY, an increase of 10.2% over the previous year. At the end of the year, 659500 urban employees participated in the basic endowment insurance, 589000 in the basic medical insurance for urban employees, 704000 in the basic medical insurance for urban residents, 284000 in the industrial injury insurance, 231000 in the maternity insurance and 352000 in the unemployment insurance.

Huludao: in 2019, the per capita disposable income of urban residents was 32031 CNY, an increase of 7.2% over the previous year, and the per capita disposable income of rural residents was 13721 CNY, an increase of 9.9%. The number of urban employees who have participated in the basic endowment insurance is 642000. The number of urban

workers' basic medical insurance coverage was 585 thousand. The number of basic medical insurance coverage for urban and rural residents was 1 million 705 thousand. The number of unemployed insurance participants was 226 thousand. The number of workers covered by industrial injury insurance was 332 thousand, and the number of insured persons for reproductive insurance was 210 thousand.

4.4.7 Others

(1) Cultural resources

At the end of 2019, there were 125 cultural and art museums in the province, 130 public libraries, 65 museums and 136 archives.

(2) Hygiene

By the end of 2019, there were 309000 health technical personnel in the province, including 124000 licensed doctors and licensed assistant doctors and 139000 registered nurses. The total number of patients diagnosed and treated was 200 million, and the number of discharged patients was 7.09 million.

(3) Sports

In the annual competitions at home and abroad, Liaoning athletes won the world championship in 15 events. 3 athletes won the Asian Championship in 3 events, and 50 athletes won the national championship in 51 events and 62 times.

According to the survey, there are no historical and cultural resources within 200 meters of all project sites.

4.4.8 Basic Infrastructure and Services

In 2018, the city facilities and municipal facilities in Liaoning and other cities were

shown in tables 4-7 and 4-8.

Table 4-7 Urban facilities level of Liaoning Province in 2018¹

Provinces and cities	Urban water utilization rate (%)	Popularity rate of urban gas (%)	Per capita urban road area (M²)	Per capita park green area (M²)
Liaoning Province	98.44	95.73	14.81	11.95
Shenyang	98.85	97.00	14.65	12.37
Dalian	99.98	97.92	15.27	11.27
Anshan	97.76	97.62	21.64	10.88
Fushun	99.53	95.46	11.63	11.70
Benxi	99.10	97.79	13.33	12.58
Dandong	98.41	98.98	14.29	12.91
Jinzhou	97.01	97.09	11.84	12.65
Yingkou	98.16	98.09	18.71	12.28
Fuxin	95.83	86.23	12.22	11.32
Liaoyang	99.77	96.24	18.36	11.74
Panjin	100.00	100.00	21.22	16.17
Tieling	96.05	93.85	13.62	10.02
Chaoyang	96.64	83.39	10.79	12.04
Huludao	95.45	86.49	6.91	10.62

Note1: Data source: Liaoning Yearbook in 2019.

Table 4-8 Status of municipal facilities in cities in Liaoning in 2018¹

Provinces and cities	Actual road length at the end of the year (km)	Actual road area at the end of the year (ten thousand m ²)	Urban Bridge	Road lighting (thousand)	Length of urban drainage pipeline (km)	Daily treatment capacity of urban sewage (ten thousand m ³)
Liaoning Province	21089	37427	1930	1347	23810	1090.0
Shenyang	5059	9050	470	131	7028	232.3
Dalian	3893	6912	478	424	4056	186.8
Anshan	2053	4089	77	92	1375	70.5
Fushun	963	1581	106	39	1048	61.8
Benxi	947	1382	108	60	664	78.2
Dandong	720	1624	79	42	804	27.5
Jinzhou	1011	1780	43	27	797	47.5
Yingkou	1538	2593	84	99	1882	33.5
Fuxin	552	1099	39	33	793	28.5
Liaoyang	1406	1794	136	115	1356	49.6
Panjin	993	1955	101	99	1228	28.1
Tieling	707	1419	90	100	1027	176.5
Chaoyang	657	1334	61	62	943	32.0
Huludao	589	814	58	23	809	37.2

Note1:Data source: Liaoning Yearbook in 2019.

4.4.9 Economic Profile

According to the preliminary calculation of "Liaoning Provincial statistical bulletin on national economic and social development in 2019", the annual GDP was 2490.95 billion CNY, an increase of 5.5% over the previous year. Among them, the added value of the

primary industry was 217.78 billion CNY, an increase of 3.5%; the added value of the secondary industry was 953.12 billion CNY, an increase of 5.7%; the added value of the tertiary industry was 1320.04 billion CNY, an increase of 5.6%. The per capita GDP of the whole year was 57191 CNY, an increase of 5.7% over the previous year.

(1) Agriculture, forestry, animal husbandry and fishery

The total grain output for the whole year was 24.3 million tons, an increase of 2.376 million tons over the previous year, an increase of 10.8%, a record high. Among them, the output of rice was 4.348 million tons, an increase of 4.0%; the output of corn was 18.844 million tons, an increase of 13.3%; the output of other grains was 551000 tons, an increase of 11.4%; the output of beans was 228000 tons, an increase of 14.2%. The annual oil production was 977000 tons, an increase of 25.0% over the previous year. The annual output of vegetables and edible fungi was 18.854 million tons, an increase of 1.8% over the previous year. The annual fruit output was 8.207 million tons, an increase of 5.0% over the previous year.

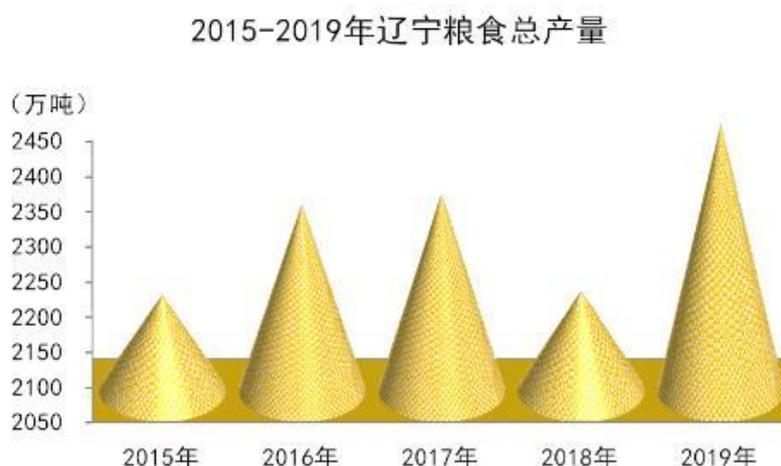


Figure 4-5Total grain output of Liaoning Province from 2015 to 2019

The annual a forestation area was 157.6 thousand hectares, forest tending area was 467 thousand hectares, seedling area was 22 thousand hectares, and 60 million trees were planted voluntarily. The annual volume of forest cutting is 1.558 million cubic meters.

The annual output of pigs, cattle, sheep and poultry meat was 3.566 million tons, down 2.4% over the previous year. Among them, the output of pork was 1.894 million tons, down 9.9%; the output of beef was 296000 tons, an increase of 7.6%; the output of mutton was 68000 tons, an increase of 3.2%; the output of poultry meat was 1.398 million tons, an increase of 7.1%. The annual output of eggs was 3.079 million tons, an increase of 3.6% over the previous year. The annual output of raw milk was 1.339 million tons, up 1.6% over the previous year. 22 million 402 thousand pigs were slaughtered throughout the year, down 10.2% compared with the previous year. At the end of the year, 10 million 552 thousand pigs were down, down 16.4%.

The annual output of aquatic products (excluding ocean fishing) was 4.285 million tons. Among them, 40,000 tons of freshwater fishing, 800,000 tons of freshwater aquaculture, 497,000 tons of marine fishing, and 2.947 million tons of mariculture.

(2) Industry and construction industry

The added value of industries above designated size increased by 6.7% over the previous year. Among them, the added value of high-tech manufacturing industry increased by 18.7%. In the whole year, the operating revenue of Industrial Enterprises above Designated Size reached 303.65 billion CNY, an increase of 7.9% over the previous year.

2019年辽宁规模以上工业增加值行业构成



Figure 4-6 Composition of industrial added value industries

(3) Domestic trade

The total retail sales of consumer goods totaled 150.86 billion CNY, an increase of 6.1% over the previous year.

In terms of business location, the retail sales in urban and rural areas were 1310.17 billion CNY, an increase of 5.9% over the previous year, and 190.69 billion CNY in rural areas, an increase of 7.7%.

In terms of consumption types, the retail sales of commodities in the year totaled 1,323.19 billion CNY, an increase of 5.9% over the previous year, and the catering revenue was 177.67 billion CNY, an increase of 7.5%.

(4) Foreign economic and trade

The total import and export volume of the whole year was 725.51 billion CNY, down 4.0% over the previous year. Among them, the total export was 312.98 billion CNY, down 2.6%; the total import was 412.53 billion CNY, down 5.0%.

Economic situation of each project city:

According to the preliminary calculation of Jinzhou, the GDP of the whole year in 2019 will reach 107.3 billion CNY, an increase of 2.5% over the previous year in terms of comparable prices. Among them, the added value of the primary industry was 19.83 billion CNY, an increase of 3.8%; the added value of the secondary industry was 27.92 billion CNY, down 9.7%; the added value of the tertiary industry was 59.56 billion CNY, an increase of 9.7%.

According to the preliminary calculation of Yingkou, the GDP of the whole year in 2019 will be 132.82 billion CNY, an increase of 7.0% over the previous year. Among them, the added value of the primary industry was 10.82 billion CNY, an increase of 2.7%; the added value of the secondary industry was 60.12 billion CNY, an increase of 6.8%; the

added value of the tertiary industry was 61.88 billion CNY, an increase of 8.2%. The annual per capita GDP was 54,612 CNY, an increase of 7.2% over the previous year.

According to the preliminary calculation of Fuxin, the GDP of the whole year in 2019 will be 48.81 billion CNY, an increase of 6.4% over the previous year. Among them, the added value of the primary industry was 10.62 billion CNY, an increase of 7.3%; the added value of the secondary industry was 12.95 billion CNY, an increase of 6.4%; the added value of the tertiary industry was 25.24 billion CNY, an increase of 6.1%. The proportion of added value of the three industries is 21.8:26.5:51.7. The annual per capita GDP was 27,945 CNY, an increase of 7.3% over the previous year.

According to the preliminary calculation of Panjin, the GDP of the whole year in 2019 will be 128.09 billion CNY, an increase of 9.0% over the previous year in terms of comparable prices. Among them, the added value of the primary industry was 10.1 billion CNY, an increase of 2.6%; the added value of the secondary industry was 68.69 billion CNY, an increase of 10.6%; the added value of the tertiary industry was 49.3 billion CNY, an increase of 8.2%. The per capita GDP of the whole year was 88,983 CNY, an increase of 8.9% over the previous year in terms of comparable prices.

According to the preliminary calculation of Huludao, the GDP of the whole year in 2019 will be 80.71 billion CNY, an increase of 5.3% over the previous year in terms of comparable prices. Among them, the added value of the primary industry was 13.31 billion CNY, an increase of 2.5%; the added value of the secondary industry was 30.22 billion CNY, an increase of 7.6%; the added value of the tertiary industry was 37.18 billion CNY, an increase of 4.5%. The per capita GDP of the whole year was 31,802 CNY, an increase of 5.5% over the previous year.

5 Analysis of Alternatives

5.1 Technical Alternatives

5.1.1 Comparison of Schemes for Bus Procurement

By comparing the advantages and disadvantages of pure electric buses with those of oil power, gas power, LNG, CNG and other buses in terms of safety and economy, the application of pure electric buses can significantly reduce the pressure of urban environmental governance and obtain multi-win effect. From the operation of national new energy vehicle pilot cities in the early stage, the effect of overall operation of pure electric bus is good, and the win-win results are satisfactory to the government, enterprises and passengers.

(1) The government, enterprises and passengers benefit from it

The government's benefits: the national new energy subsidy policy promotes the renewal and procurement of public transport vehicles, improves the appearance and image of the city, and attracts more people to choose public transportation. At the same time, it greatly improves the urban atmospheric environment and promotes the industrial development.

Enterprise's benefits: it can save fuel consumption cost and reduce operation cost. At the same time, compared with traditional and hybrid electric bus drivers, the operation complexity of pure electric bus is reduced. With the rapid development of new energy technology, the guarantee of safety performance of vehicle manufacturers is higher and higher. The vehicle failure and accident rate is greatly reduced, and the enterprise benefit is improved.

Passengers' benefits (especially the elderly, women, the disabled) : the new energy vehicle has reasonable design, improved ride comfort, complied with and met the public's demands for environmental protection, energy conservation and safety, which has

significant social benefits. Purchase barrier-free electric buses, and set up special seats for the elderly, the weak, and the disabled to make it convenient for the elderly, women, and the disabled to travel.

The accessibility improvements will be fully considered in the design stage. On the basis of negotiation between the design unit and the bus company, the accessibility improvements design of the various contents involved in the project is completed.

The evaluation team puts forward the following suggestions for the design unit's reference.

① In order to enhance the convenience of passengers getting on and off the bus, the standing area between the front and middle passenger doors adopts a flat floor design, and a design with fewer steps behind the middle door;

② In order to meet the riding needs of special groups such as the elderly, women and the disabled, the front door area of the vehicle is designed with priority seats arranged in the forward direction, distinguished by color, and signs are set at the seats;

③ Handrails are provided in multiple places such as vehicle passenger door, vehicle interior passage, side window, etc. to facilitate passengers to grab and hold when getting on and off the vehicle or moving in the vehicle, so as to prevent passengers from falling;

④ In order to facilitate the safety of low-height groups such as women and children, the standing area in front of the door of the vehicle is equipped with handrails and lifting rings with a height of not higher than 1600mm to facilitate passengers to grasp;

⑤ To make it easier for the disabled to ride in a wheelchair, a wheelchair storage area can be set in the standing area in front of the middle door, and a wheelchair restraint device can be installed to ensure the convenience and safety of the disabled.

(2) Significant environmental benefits

Compared with traditional diesel / gas vehicles and oil / gas electric hybrid buses, pure electric buses can effectively reduce carbon dioxide, PM2.5 and nitrogen oxides in an effective way to improve air quality in large and medium-sized cities.

The cumulative emission reduction of pollutants achieved during the construction period and operation period of this project is as follows:

Table 5-1 Annual pollutant emission reductions achieved during the construction period and operation period of the project (pollutant unit: ton)

City	Year	CO	NOx	CO ₂	SO ₂	PM
Fuxin	2022 emission reduction	147.89	28.43	1749.83	16.54	0.41
	2023 emission reduction	305.41	43.82	3377.78	23.83	0.59
	2024 emission reduction	383.18	59.73	4313.24	33.19	0.82
	Cumulative emission reductions during the construction period	383.18	59.73	4313.24	33.19	0.82
	Cumulative emission reduction during the operation period	3831.85	597.26	43132.42	331.93	8.21
	Total emission reduction	4215.03	656.98	47445.67	365.12	9.03
Huludao	2022 emission reduction	132.16	58.53	1838.29	37.76	0.94
	2023 emission reduction	287.66	64.16	3632.69	38.32	0.95
	2024 emission reduction	441.29	69.66	5543.84	38.55	0.95
	Cumulative emission reductions during the construction period	441.29	69.66	5543.84	38.55	0.95
	Cumulative emission reduction during the operation period	4412.91	696.59	55438.43	385.52	9.53
	Total emission reduction	4854.20	766.25	60982.27	424.07	10.48

Table 5-1 Annual pollutant emission reductions achieved during the construction period and operation period of the project (pollutant unit: ton) (cont.)

City	Year	CO	NO _x	CO ₂	SO ₂	PM
Jinzhou	2022 emission reduction	360.49	35.94	4351.66	16.14	0.39
	2023 emission reduction	624.43	46.03	7709.43	16.57	0.39
	2024 emission reduction	624.43	46.03	7709.43	16.57	0.39
	Cumulative emission reductions during the construction period	624.43	46.03	7709.43	16.57	0.39
	Cumulative emission reduction during the operation period	3604.89	359.37	43516.58	161.41	3.91
	Total emission reduction	3965.38	395.31	47868.23	177.55	4.30
Panjin	2022 emission reduction	425.35	13.99	2120.21	0.56	—
	2023 emission reduction	425.35	13.99	2120.21	0.56	—
	2024 emission reduction	425.35	13.99	2120.21	0.56	—
	Cumulative emission reductions during the construction period	425.35	13.99	2120.21	0.56	—
	Cumulative emission reduction during the operation period	4253.45	139.92	21202.15	5.60	—
	Total emission reduction	4678.80	153.91	23322.36	6.16	—
Yingkou	2022 emission reduction	126.87	4.84	484.44	0.21	—
	2023 emission reduction	205.58	7.55	976.27	0.32	—
	2024 emission reduction	279.82	10.36	1274.01	0.44	—
	Cumulative emission reductions during the construction period	279.82	10.36	1274.01	0.44	—
	Cumulative emission reduction during the operation period	2798.20	103.64	12740.10	4.38	—
	Total emission reduction	3078.02	114.00	14014.11	4.82	—

The project will achieve the following goals in 10 years after its implementation (2022-2034): the cumulative reduction of carbon monoxide (CO) will be 20791.43 tons; the cumulative reduction of nitrogen oxides (NOx) will be 2086.45 tons; the cumulative reduction of carbon dioxide (CO₂) will be 193632.64 tons; the cumulative reduction of sulfur dioxide (SO₂) will be 977.72 tons, and the cumulative reduction of PM particulate matter will be 23.81 tons. Eventually, it can achieve 100% reduction of air pollutants and 52% reduction of greenhouse gas (CO₂). The environmental benefits of the project are very obvious

(3) Significant economic benefits

Taking a 10.5-meter bus as an example, comparing the operating costs of traditional fuel/gas vehicles, petrol-electric/gas-electric vehicles, and pure electric vehicles over an 8-year life cycle, the operating costs of pure electric vehicles can be reduced by 1.177 million CNY compared with traditional gas vehicles. Hybrid electricity saves 388,000CNY, compared with gas-electric hybrid electricity saving of 315,000CNY, combined with national policy-oriented charging station subsidies and Liaoning Province new energy subsidies, advantages of less operating and maintenance cost will be more obvious.

Table 5-2 Comparison of operating costs of different types of buses¹

Item		Diesel	LNG	Oil electric	Gas electric	Pure electric
Basic information	Daily operating mileage (km)	200	200	200	200	200
	Annual operation days (days)	350	350	350	350	350
	Annual operating mileage (km)	70000	70000	70000	70000	70000
	Estimated number of vehicles to be procured	400	400	400	400	400

Table 5-2 comparison of operating costs of different types of buses¹ (cont.1)

	Item	Diesel	LNG	Oil electric	Gas electric	Pure electric
Fuel cost	Energy consumption per 100 km (nm ³ / L / kWh)	36	40	14.4	16	70
	Electricity charge (CNY / kWh)	—	—	—	—	1
	Gas price (CNY/nm ³ or CNY/ kg)	—	4	—	4	—
	Fuel price (CNY/ L)	5.2	—	5.2	—	—
	Fuel cost per kilometer (CNY / km)	1.872	1.6	0.7488	0.64	0.7
	Urea cost (CNY / km)	0.072	—	0.0288	—	—
	Annual fuel cost (ten thousandCNY)	13.61	11.2	5.44	4.48	4.9
Operating subsidies	Operation subsidy (ten thousand/year)	—	—	4	4	8
	Fuel subsidy (ten thousand/year)	—	—	—	—	—
Maintenance cost	Clutch (CNY/ year)	1400	1400	600	600	—
	Gearbox (CNY/ year)	765	765	0	0	—
	Engine (CNY/ year)	3000	3000	2500	3000	—
	Retarder (CNY/ year)	450	450	0	0	—
	Driving motor (CNY/ year)	—	—	396	396	396
	Power battery (CNY/ year)	—	—	380	380	380
	Vehicle control system (CNY/ year)	—	—	475	475	475
	Integrated controller (CNY / year)	—	—	285	285	285
	Total annual maintenance cost (CNY)	5615	5615	4636	5136	1536

Note1: Data come from the supplementary material of the "Liaoning Huludao Green and Smart Public Transport Project Feasibility Study Report"

Table 5-2 comparison of operating costs of different types of buses¹ (cont.2)

Item		Diesel	LNG	Oil electric	Gas electric	Pure electric
Total cost	Fuel and maintenance cost (ten thousand/year)	14.17	11.76	1.91	0.99	-2.95
	Fuel and maintenance cost (ten thousandCNY / 8 years)	113.36	94.09	15.25	7.95	-23.57
	Cost savings (ten thousandCNY / 8 years)	-136.9	-117.7	-38.8	-31.5	—

Note1: Data come from the supplementary material of the "Liaoning Huludao Green and Smart Public Transport Project Feasibility Study Report"

(4) Safety and reliability

Compared with traditional and hybrid electric buses, pure electric buses abandon the traditional transmission mechanisms such as engine, gearbox, clutch, etc., so that the vehicle operation is more light, which can effectively reduce the driver's fatigue, and make the driver have more energy to pay attention to the safe driving of the vehicle; at the same time, the vehicle is equipped with more safety functions, such as, the bus will not move if the passenger door is not closed and the speed of the bus will automatically slow down under the condition of traffic congestion. The driver does not need to frequently shift gears, step on the brake, to avoid the occurrence of passengers' injury and so on.

Pure electric bus cancels the engine, gearbox and other institutions, and after the continuous upgrading of pure electric technology, the reliability of vehicles has been greatly improved compared with traditional vehicles, reducing the failure rate of vehicles and improving the vehicle attendance rate.

The pure electric vehicle is driven by motor, with low noise inside the vehicle, improved passenger comfort, and equipped with advanced intelligent equipment. The line occupancy rate has been greatly improved compared with the original, and the public travel is more convenient.

5.1.2 Analysis of the Rationale of Schemes for Installation of Charging Pile

The number and location of charging pile installation should be based on the basic principle of meeting the night charging demand of all new energy bus vehicles in each city, and reasonable and effective charging supporting facilities should be constructed.

5.1.2.1 Calculation of Supporting Charging Scale and the Number of Charging Piles

Considering the charging demand of existing electric buses, the charging service capacity of charging stations in each city, the charging demand of new electric buses and the scale of charging stations to be built by each subproject in the next 2-3 years, the supporting charging scale and the number of charging piles in the project are forecasted in table 5-3.

Table 5-3 The amount of charging piles to be matched in various cities

Project city	New electric buses Quantity (vehicle)	Number of matching charging piles
Jinzhou	273	Beishan charging station: 12 charging piles, each with two chargers. 24 100kW chargers.
Yingkou	203	There are 110 charging piles, 1 pile with 4 chargers, with a total of 440chargers.
Fuxin	238	There are 50 charging piles, 1 pile with 3 chargers, with a total of 150 chargers.
Panjin	294	264 sets of charging piles and chargers
Huludao	277	There are 48 charging piles, 1 pile with 3 chargers, with a total of 144 chargers.

5.1.2.2 Function Requirements of Charging Stations

The construction of charging station and supporting facilities needs to meet the charging demand of new energy vehicles with high efficiency and low cost.

First of all, it is necessary to meet the requirements of high-power and fast charging of new energy vehicles in the daytime and small power charging at night. In particular, it is necessary to meet the charging demand of all pure electric bus vehicles at night, so as to maximize the utilization of low electricity consumption for charging and reduce the operation cost.

Secondly, the charging station needs to realize multiple protection of software and hardware and platform, which is committed to realizing zero accident operation of charging station.

As for the selection of key equipment such as charging piles, the charging equipment with the advanced technology shall be selected as far as possible, so as to ensure that the charging function of the charging point can meet the requirements of charging interface in GB/T20234-2015"connecting device for conductive charging of electric vehicle" and GB/T27930-2015"communication protocol between monitoring unit and battery management system of off board charger of electric vehicle" (at the same time backward compatible with the 2011 version of the national standard vehicle charging). Meanwhile, it has the functions of fast charging, slow charging and charging strategy customization.

Combined with the existing charging pile specifications in various cities, it is required that the special charging pile for electric buses should also have the following functions:

(1) Security protection function. The charger shall have input overvoltage and under voltage protection, input phase loss protection, output over-voltage and over-current protection, over temperature protection, leakage protection, output reverse connection protection, BMS communication interruption protection, insulation monitoring protection and other protection functions. With the function of active safety protection, it can

prevent the vehicle battery from overcharging in case of BMS problems.

(2) Remote charging scheduling function. The charger provides remote scheduling function, which supports a variety of charging strategies and can be customized according to the actual needs of users, so as to meet the demand of vehicle scheduling in actual charging operation.

(3) Charging booking function. It can receive the remote charging reservation instruction and realize the charging reservation function.

(4) Alarm function, fault isolation function and communication function.

(5) Human computer interaction function. It has charging, metering, charging display and payment functions.

(6) The charging power unit and control part require intensive and modular design with the function of dynamic power allocation.

(7) Storage function. Save related fault and charging records.

(8) Charging state parameter acquisition and transmission function. It can collect but not limited to charger status and charging module parameters, and transmit relevant parameters to charging operation management integrated information platform through 2G / 3G / 4G or Ethernet.

5.1.2.3 Site Selection of Charging Stations

Charging stations location selection criteria are as follows:

(1) In full consideration of the planning of urban charging stations, combined with the number of new energy buses of public transport companies in various cities, as well as the site of charging stations and the difficulty of power supply and distribution coordination, the sites of stations are selected for construction.

(2) Consider the complementary cooperation with existing charging stations. The existing charging stations vary widely in scale, dispersed in distribution, and the number of charging stations is uneven. The charging demand of some charging stations is greater than the supply of charging stations. Vehicle charging needs to wait in line. At the same time, individual charging stations have low utilization rate of charging equipment and long idle time. The location of new charging stations should be fully combined with the location of existing charging stations, create a charging circle with reasonable service radius, and gradually build a network service system of charging facilities in public areas.

(3) Taking into full account the basic environmental conditions of the bus station, the actual situation of the Bus Company's operating lines and new energy vehicle configuration, the site selection and number allocation of charging piles are carried out. Ensure to optimize the space layout of supporting facilities of new energy public transport vehicles and improve the efficiency of charging facilities under the site conditions of stations.

(4) Make full use of the trough time during the night to charge. The scale and site selection of the charging station should match, and must meet the demand of all pure electric buses charging at night.

Through the analysis of the service demand of the station yard and the environmental characteristics of the proposed site selection, the rational analysis of the public transport supporting infrastructure construction site selection of each subproject is shown in table 5-4.

The Charging Stations to install the charging piles are shown in Figure 5-1-Figure 5-23.



Figure 5-1 Panjin Liulihe Parking Lot



Figure 5-2 Panjin Long-distance Passenger Station Parking Lot



Figure 5-3 Panjin Shuangtaizi Railway Station Parking Lot



Figure 5-4 Panjin Liaodong Bay Intercity Public Transport Comprehensive Service Center Parking Lot



Figure 5-5 Parking under Panjin Overpass



Figure 5-6 Panjin Dawa Passenger Station Parking Lot



Figure 5-7 Yingkou Bus Company Parking Lot



Figure 5-8 Yingkou Traffic Logistics Parking Lot



Figure 5-9 Yingkou West Depot



Figure 5-10 Yingkou Passenger Station Parking Lot



Figure 5-11 Jinzhou Beishan Charging Station



Figure 5-12 Parking lot of Liaoning Huyue (Fuxin) Passenger Transport Company



Figure 5-13 Fuxin Bus Company Parking Lot



Figure 5-14 Fuxin Yulong Parking Lot



Figure 5-15 Fuxin Xinqiu Passenger Station Parking Lot



Figure 5-16 Fuxin High-speed Railway Station Parking



Lot

Figure 5-17 Fuxin South Station Parking Lot



Figure 5-18 Huludao Dongcheng No. 1 Charging Station



Figure 5-19 Huludao Dongcheng No. 2 Charging Station



Figure 5-20 Huludao Bus Company No. 1 Charging Station



Figure 5-21 Huludao Bus Company No. 2 Charging Station



Figure 5-22 Huludao Passenger Transport Company Charging Station



Figure 5-23 Huludao Longgang District Charge

Table 5-4 Installation location of charging pile

City	No.	Station name	Location	Reasonable location	land acquisition	demolition	Utility to be shifted	Remarks
Panjin	1	Liulihe Parking Lot	Shuguang Committee of Shuangsheng Sub-district	Located in Shuguang Committee of Shuangsheng Street. It is now a bus parking lot. Meet the construction conditions. After completion, it can form a reasonable charging network with other charging stations. Meet existing and newly added electric bus charging needs. No demolition. The location is reasonable.	No	No	No	See Figure 5-1
	2	Long-distance passenger station parking lot	Opposite the train station	Located opposite to Panjin Railway Station. It is now a parking lot. Meet the construction conditions. After completion, it can form a reasonable charging network with other charging stations to meet the charging needs of existing and newly-added electric buses. No demolition. The location is reasonable.	No	No	No	See Figure 5-2
	3	Shuangtaizi Railway Station Park	Near No. 23 Shuangxing North Road	It is located in the parking lot of Shuangtaizi Railway Station, Panjin City. The construction conditions are suitable. After completion, it will form a reasonable charging network with other charging stations, which will meet the charging needs of existing and newly added electric buses. There is no demolition and the site selection is reasonable.	No	No	No	See Figure 5-3
	4	Liaodong Bay Intercity Bus Integrated Service Center	Intersection of Xianghai Avenue and Liuyang Road	Located in the west of the intersection of Xianghai Avenue and Liuyang Road, it is in the new public transportation service center in Panjin subproject. After completion, it will be able to meet the charging needs of electric buses in the parking lot and form a reasonable charging network together with other charging stations. There is no demolition and the site selection is reasonable.	No	No	No	See Figure 5-4

City	No.	Station name	Location	Reasonable location	land acquisition	demolition	Utility to be shifted	Remarks
Panjin	5	Parking lot under the overpass	Opposite “City Star”	Located opposite “City star”. Meet the construction conditions. After completion, it can form a reasonable charging network with other charging stations to meet the charging needs of existing and newly-added electric buses. No demolition. The location is reasonable.	No	No	No	See Figure 5-5
	6	Dawa Passenger Terminal	West Gate of Dawa Passenger Transport Station, Panjin City	Located at the west gate of Dawa Passenger Transport Station. Meet the construction conditions. After completion, it can form a reasonable charging network with other charging stations to meet the charging needs of existing and newly-added electric buses. No demolition. The location is reasonable.	No	No	No	See Figure 5-6
Yinkou	1	Public automobile company park	No. 1, Yuejin Lane, Wanyou Street	Located at No. 1 Yuejin Lane, Wanyou Street, it is now Yingkou Bus Company and bus parking lot. The construction conditions are suitable. After completion, it will form a reasonable charging network with other charging stations. It will meet the charging needs of existing and newly added electric buses in Yingkou City. There is no demolition and the site selection is reasonable.	No	No	No	See Figure 5-7
	2	Traffic logistics park	108 Bohai Avenue East	Located at No. 108 East Bohai Street, the construction conditions are suitable. After completion, it will form a reasonable charging network with other charging stations. It will meet the charging needs of existing and newly added electric buses in Yingkou City. There will be no demolition and the site selection is reasonable.	No	No	No	See Figure 5-8
	3	West parking	No.90 West Bohai Street, Xishi District	The bus parking lot is located at No. 90 West Bohai Street, West District. The construction conditions are suitable. After completion, it will form a reasonable charging network with other charging stations, which will meet the charging needs of existing and new electric buses in Yingkou City. There will be no demolition and the site selection is reasonable.	No	No	No	See Figure 5-9

City	No.	Station name	Location	Reasonable location	land acquisition	demolition	Utility to be shifted	Remarks
Yinkou	4	Yingkou Passenger Station Park	23 Jinniushan Street East, Zhanqian District	It is in the parking lot of the passenger terminal at No. 23 Jinniushan Street East, Zhanqian District. The construction conditions are suitable. After completion, it will form a reasonable charging network with other charging stations, which will meet the charging needs of existing and new electric buses in Yingkou City. There will be no demolition and the site selection is reasonable.	No	No	No	See Figure 5-10
Jinzou	1	Beishan Charging Station	the south of Jinyi Road, East Songpo Road, Beishanli,	Located in the south of Jinyi Road, East Songpo Road, Beishanli, Linghe District, Jinzhou City, the area is 33,494 square meters. The location of the site fully considers the location of existing charging stations, the operating routes of the Bus Company, and the configuration of new energy vehicles, etc., to ensure that a charging circle with a reasonable service radius is created in the central city, and a network service system for charging facilities in public areas is gradually established.	No	No	No	See Figure 5-11
Fuxin	1	Liaoning Huyue (Fuxin) Passenger Transport Company Park	No. 7, Jiefang Street, Xihe District, Fuxin City	In the parking lot of Liaoning Huyue (Fuxin) Passenger Transport Co., Ltd., No. 7 Jiefang Street, Xihe District, Fuxin City, this place is relatively close to the power source, meets the power supply requirements of the Power Supply Bureau, saves construction costs, can form a more reasonable charging network with other charging stations, and has clear land ownership and no land acquisition.	No	yes	No	See Figure 5-12

City	No.	Station name	Location	Reasonable location	land acquisition	demolition	Utility to be shifted	Remarks
Fuxin	2	Bus Company park	West side of Electric Power Bureau, No.163 Zhonghua Road, Development Zone, Fuxin City	Located on the west side of the Electric Power Bureau, No.163 Zhonghua Road, Fuxin Development Zone, in the parking lot of the Fuxin Bus Company., this place is relatively close to the power-taking point, meets the power supply requirements of the power supply bureau, saves construction costs, and can form a more reasonable charging network with other charging stations. The land ownership is clear, and there is no land acquisition.	No	No	No	See Figure 5-13
	3	Yulong park	Yulong Highway Exit Parking Lot, Xihe District, Fuxin City	In the parking lot of Yulong Expressway, Xihe District, Fuxin City. This place is relatively close to the power supply point, which meets the power supply requirements of the power supply bureau, saves construction costs, and can form a more reasonable charging network with other charging stations. The land ownership is clear, and there is no land acquisition.	No	No	No	See Figure 5-14
	4	Xinqiu Passenger Station Park	West side of Xinqiu Passenger Transport Station, Xinqiu District, Fuxin City	Located on the west side of Xinqiu Passenger Transport Station in Xinqiu District, Fuxin City this place is relatively close to the power supply point, which meets the power supply requirements of the power supply bureau, saves construction costs, and can form a more reasonable charging network with other charging stations. The land ownership is clear, and there is no land acquisition.	No	No	No	See Figure 5-15

City	No.	Station name	Location	Reasonable location	land acquisition	demolition	Utility to be shifted	Remarks
Fuxin	5	High-speed rail station park	Bus Park of High-speed Railway Station, Xihe District, Fuxin City	Located in the bus parking lot of the high-speed railway station in Xihe District, Fuxin City, this place is relatively close to the power-taking point, meets the power supply requirements of the power supply bureau, saves construction costs, and can form a more reasonable charging network with other charging stations. The land ownership is clear, and there is no land acquisition.	No	No	No	See Figure 5-16
	6	Fuxin South Station Park	Fuxin South Station Ring Road Terminal, Haizhou District, Fuxin City	Located in the parking lot of the first and last station of Fuxin South Station Ring Road, Haizhou District, Fuxin City, this place is relatively close to the power-taking point, meets the power supply requirements of the power supply bureau, saves construction costs, and can form a more reasonable charging network with other charging stations. The land ownership is clear, and there is no land acquisition.	No	No	No	See Figure 5-17
Huludao	1	Dongcheng No.1 Charging Station	Beihe Road, Lianshan District, Huludao City	Dongcheng No.1 charging station is located opposite Yunxitai Community. The terminal of No. 20, No. 33 and other buses is less than one kilometer away from the charging station. After the completion of Dongcheng No. 1 charging station, No. 20 and No. 33 can be replaced with pure electric buses. The location is reasonable.	No	No	No	See Figure 5-18
	2	Dongcheng No.2 Charging Station	Beihe Road, Lianshan District, Huludao City	Dongcheng No. 2 charging station is located opposite Yunxitai Community. No. 14, No. 16, and other bus terminals are less than one kilometer away from the charging station. After the Dongcheng No. 1 charging station is completed, buses 14 and 16 can be replaced with pure electric buses. The location is reasonable.	No	No	No	See Figure 5-19

City	No.	Station name	Location	Reasonable location	land acquisition	demolition	Utility to be shifted	Remarks
Huludao	3	Bus Company No.1 charging station	36-2 Longcheng Street, Longgang District	Located in the terminal parking lot of bus No. 18, the bus terminal of No. 30 is about 400 meters away from the Bus Company, and buses such as No. 17 and No. 11 pass by the Bus Company. After the construction of the Bus Company's No. 1 charging station, buses such as No. 30 can be replaced with pure electric vehicles. The location is reasonable.	No	No	No	See Figure 5-20
	4	Bus Company No.2 charging station	36-2 Longcheng Street, Longgang District	It is located in the terminal parking lot of bus No.18. The terminal of bus No.30 is about 400 meters away from the Bus Company. Many buses such as No.22 bus pass through the Bus Company.The construction of No.2 charging station of the Bus Company provides a prerequisite for the replacement of some busesfor pure electric vehicles such as No.18 bus in the future, and the site selection is reasonable.	No	No	No	See Figure 5-21
	5	Huludao Passenger Transport Company Charging Station	14-4 Xinggong Street	The charging station of Huludao passenger transport company is located inside the passenger transport company, and its operation mode is mostly customized bus. According to the actual needs of passengers, the route is formulated to complete the operating mileage. Therefore, the completion of the charging station of the passenger transport company can provide more customized bus lines and more convenient travel plans for the general public. It also provides more development space for the company's development of new operation mode and reasonable site selection.	No	No	No	See Figure 5-22
	6	Longgang District Charging Station	Southwest of 88 Jinhu Road	Located in Liangheshan Villages, the terminal of bus No. 26 is about one kilometer away from the charging station. As there are hospitals, schools and newly developed communities nearby, they can not only attract a large number of passengers, but also greatly facilitate the travel of the general public nearby and provide residents with more travel plans. The location is reasonable.	No	No	No	See Figure 5-23

5.1.3 Analysis of the Rationale of Schemes for Bus Center Station Location (Panjin, Fuxin)

5.1.3.1 Panjin Liaodong Bay Intercity Public Transport Comprehensive Service Center

The planned Liaodong Bay Intercity Public Transport Comprehensive Service Center is located to the west of the intersection of Xianghai Avenue and Liuyang Road, with a land area of 24,917 square meters. The project unit demonstrated the site selection plan from the aspects of construction suitability, relationship with related planning, sensitive factors, environmental protection and public interest, public safety, etc. The details are as follows:

(1) Construction suitability analysis

The construction suitability analysis mainly includes the analysis of the topography, geology, hydrology, soil, site disaster conditions, traffic conditions, construction conditions and supporting facilities of the project site area.

Topography: The area where the project is located is the mouth of the Daliao River, with low altitude and flat terrain, which is suitable for project construction.

Geological conditions: According to the combined data of on-site surveys, judging whether there are unfavorable geological effects such as karst caves, collapses, landslides, and mudslides within the scope of the proposed site, the site is a relatively stable area and is suitable for construction.

Hydrological conditions: The area where the project is located is near the mouth of the Daliao River, with abundant water resources, low elevation and medium water content of groundwater. It is non-corrosive to concrete, weakly corrosive to reinforced concrete, and corrosive to steel bars and negative structures. The maximum depth of frozen soil in this

area in winter is 78cm.

Geological hazards: According to the collected data and geological survey and analysis, no active faults have been found to pass through the proposed site and surrounding areas, and no adverse geological effects such as collapses, landslides, and mudslides have been found in the site. The site has good stability. The general earthquake-resistant section of the building is suitable for the construction of this project.

The current traffic conditions do not meet the construction requirements, and roads need to be widened and repaired if construction is carried out.

Construction conditions: There are necessary or exploitable water sources in the site selection area during the construction phase; power supply conditions are available nearby. During the operation phase, domestic and fire-fighting water will be drawn from the nearby municipal pipe network, and regional electricity will be used for power and heating.

In summary, the construction suitability evaluation of the proposed site's topography, geology, hydrology, site disaster conditions, traffic conditions, construction conditions and supporting facilities all meet the development and construction requirements.

(2) The relationship between the proposed site selection plan and related planning

The urban and rural planning involved in this project includes "Panjin City Master Plan (2011-2020)", "Xianghai Avenue West, Shahe Street South Parcel Controlled Detailed Planning", "Panjin City National Economic and Social Development Thirteenth Five-Year Planning Outline", "Liaoning Panjin City Land Use Planning (2006-2020)".

According to "Panjin City Master Plan (2011-2020)" and "Controlled Detailed Planning for the West of Xianghai Avenue and South of Shahe Street", the land for this project is in the form of land for other service facilities (B9), which does not contradict the planning.

The proposed site of the Liaodong Bay Intercity Public Transport Comprehensive Service Center is located in the land of other service facilities in the urban planning, and there is no conflict with the overall urban planning. There is no conflict between the proposed site and the Panjin municipal infrastructure planning. It complies with the spatial layout plan of Panjin City.

The construction of this project will greatly improve the proportion of clean energy in the region, save corporate costs, reduce pollution, boost the local economy, improve the level of regional public transportation services, boost local revenue, and meet the requirements of the 13th Five-Year Plan.

The construction of this project will greatly improve the proportion of clean energy in the region, save corporate costs, reduce pollution, boost the local economy, improve the level of regional public transportation services, boost local revenue and meet the requirements of the 13th Five-Year Plan.

In summary, in terms of urban and rural planning, the 13th Five-Year Plan for national economic and social development, and land use planning, the proposed site is in line with the relevant planning.

(3) Sensitive factors and environmental protection

There are no famous trees, old trees and shelter forests in the proposed site area. The area has less vegetation and wildlife. The overall impact of the project construction on local plants is small, and it has no impact on ecological factors such as regional bird migration channels and bird habitats.

There are no sensitive factors such as water source protection areas, cultural relics and historic sites around the proposed site.

The assessment area does not have various mineral resources that have been discovered. There are no prospecting clues such as geophysical and geochemical anomalies,

mineralization, and alteration, and the structure and magmatic rocks are not developed. The assessment area has no mineral resources for development and utilization, nor does it have the conditions for mineralization and prospecting. Project construction can be carried out.

(4)The proposed site selection plan meets the public interest and public safety requirements

This project is implemented in strict accordance with laws and regulations and meets the requirements of current laws and regulations. The project adheres to strict approval and procedures which are legal and complete. The development and construction of the project meets the requirements of the national wind power development "13th Five-Year" plan and related provincial plans. The construction of this project has played an active role in promoting the development of the public transportation industry in Panjin City.

Analyze the risks that may be caused by this project and that are not conducive to social stability. The risk of environmental damage caused by this project is very small, no risk of land acquisition, the risk of causing people's discomfort in the living environment is small, and the risk of causing social conflicts is small. The possibility of group incidents during the implementation of the project is very small, but the possibility of incidents like individual conflict is not ruled out.

(5) Conclusion of site selection demonstration

Determined by analyzing and demonstrating the proposed site in the plan in the terms of topography, geological conditions, hydrological conditions, address disasters, traffic conditions, construction conditions, urban and rural planning, land use planning, 13th Five-Year Plan, sensitive factors, ecological protection, etc. , the proposed site has the basic conditions for the construction of the Liaodong Bay Intercity Public Transport Comprehensive Service Center, and it complies with the relevant regional planning, adapts to future development needs in all aspects, and promotes regional economic

construction. Therefore, the conclusion of the project site selection demonstration is that the project site proposed is reasonable and feasible.

5.1.3.2 Fuxin city bus service centers

There are currently 6 bus parking lots in Fuxin City, covering a total area of 60,000 square meters. There is no maintenance yard temporarily. This time, the AIIB loan will be used to procure 238 buses, while taking into account the parking needs of urban and rural passengers. The calculated bus parking demand is 112,000 square meters, and the gap is 52,000 square meters. Therefore, based on actual needs and Fuxin's bus development plan, with the aid of this AIIB loan, one bus station will be renovated.

The bus station planned to be renovated is located at No. 7 Jiefang Street, Xihe District, Fuxin City, which is the parking lot of Liaoning Huyue (Fuxin) Passenger Transport Co., Ltd. The first reason is that the station occupies an area of 18,500 square meters and the area is large, which can meet the usage needs in terms of floor area ratio; second, the geographical location is suitable, and the company's line operation is highly matched; third, the land of the station is state-owned land which belongs to Liaoning Huyue (Fuxin) Passenger Transport Co., Ltd. And has clear land ownership and no new land acquisition.

5.2 Without Project Scenario

Without project scenario means many current issues will remain the same, such as road congestion, low efficiency of public transport operation, large automobile exhaust emissions and so on.

(1) Public transport service does not match urban development

A lot of manpower and material resources have been invested in the establishment and improvement of urban public transport system in the project city and some effects have been achieved, however, with the development of economy and the acceleration of urbanization process, the continuous expansion of urban scale and the continuous

increase of urban population, a large number of private cars have caused urban traffic congestion. The development of urban public transport system fails to keep pace with the development of the city, which is one of the important factors causing urban traffic congestion.

The lack of funds restricts the development of public transport system with problems of few new routes, low ratio vehicles, low, density of the network and small service area. Due to the lack of transport capacity, the level of public transport service has declined significantly. The popularity of private cars has further led to the loss of a large number of passengers. The lack of passenger resources makes the operation of public transport into a more difficult predicament, forming a vicious circle.

Vigorously developing public transport can attract more people to give up driving private cars and take public transport instead, which can effectively reduce urban congestion.

(2) Some buses are in poor condition

Due to the lack of funds, some buses with obviously poor condition continue to operate in the project city. These vehicles emit black smoke and noise pollution. Moreover, due to the poor vehicle condition and slow driving, the waiting interval of passengers is increased when the bus line is too long, and in rainy, snowy and other extreme weather.

For example, Fuxin City currently has 70 urban and rural public transport buses, all of which are old fuel vehicles. Some 19-seat group minibuses (not used for bus exclusively) called small buses in Huludao are, with narrow doors, small space inside the vehicle and lack of humanized design. They are still taking the bus transportation task.

(3) The level of intelligent construction is not high

The intelligent terminal equipment of each project city is not complete, and the public transport informatization and intelligent construction is relatively backward, and there is a lack of comprehensive big data analysis platform. It is difficult to achieve real-time

control in management and operation, and it cannot effectively deal with passenger flow, transport capacity and line problems.

(4) Insufficient number of public transport vehicles

The number of public transport vehicles is generally insufficient in various cities and the transport capacity cannot meet the travel needs of citizens.

In Fuxin City, the share rate of motorized travel of public transport is only 20%; the coverage rate of 300 meters of public transport stations is 49.03%, and the coverage rate of 500 meters of public transport stations is 75.02%; the rate of bus ownership per 10000 people is 8.5 standard units. There is still a certain gap between the standards of 50% coverage rate of 300 m public transport stations, 90% coverage rate of 500 m public transport stations and 10 standard buses per 10000 people.

Huludao City public motorized travel share rate is only 11.1%; the coverage rate of public transport stops is 49.03% in 300 meters and the coverage rate of public transport stops is 75.02% in 500 meters; the rate of public transport vehicles with 10000 people is 7.6 standard units. There is still a certain gap between the standards of 50% coverage rate of 300 m public transport stations, 90% coverage rate of 500 m public transport stations and 10 standard buses per 10000 people.

(5) Insufficient number of charging piles or uneven distribution of charging stations

Due to the unreasonable layout of charging stations in Jinzhou City, it cannot be integrated with bus scheduling, and there is still charging queuing phenomenon in some stations in part of the time.

Huludao only has 1 charging stations in the old city train station and 15 charging piles in Xing Cheng Railway Station parking Plaza,

Obviously, the impact of no project on city bus development, comfort, convenience and

safety of city residents, urban environment and the development of intelligent public transport system is obvious. On the contrary, if the project is completed, it will increase the number of people who travel by public transport, slow down the growth of private cars' ownership, reduce pollutant emissions and facilitate pedestrians' travel, that is, energy conservation and emission reduction.

Overall, this project is a project conducive to people's livelihood, and it is a project with greater positive environmental benefits than negative benefits. The negative impact of project construction on the environment is obviously less than that of no construction.

5.3 Post Implementation Benefit

5.3.1 Promoting Regional Socio-economic Development

(1) Promoting the overall development of the city.

The public transport Industry is a basic livelihood service industry related to the travel problems of thousands of households in the city, and also an industry to show the image of the city. Therefore, the promotion of the sustainable development ability of urban conventional bus has obvious demonstration, education, publicity and driving effect, which is of great benefit to the improvement of the development ability of the whole city.

Social system is organized by "people" as the center. Social development is to satisfy people's needs as the ultimate goal. The change of travel reflects the change of living environment in a region, to some extent, it reflects the level of social development.

(2) Promoting regional economic development

On the one hand, the implementation of this project can improve the transportation infrastructure, improve the investment environment in the project area, create the basic conditions for city development, create a better environment for attracting investment, enhance regional competitiveness, attract more investment, improve the success rate of

attracting investment and promote the development of the project area economy.

On the other hand, it will help to promote the development of tourism. The improvement of traffic infrastructure in the project area has created good traffic conditions, which will attract more tourists to Huludao, Yingkou, Panjin, Jinzhou and other areas with rich tourism resources, which will help to promote the development of local tourism resources.

The implementation of this project has improved the urban transportation system, increased the operational efficiency of the public transportation system and the attractiveness of public transportation, alleviated urban congestion, improved urban air quality, optimized the urban environment, and promoted the harmonious development of local economy, society and environment. It will inevitably be further strengthened the external image of the city, improve the competitiveness of the city and attract more foreign investment.

(3) Promoting the progress of science and technology

In the process of implementation, the project adopts advanced intelligent public transport technology and management concept, which can be promoted to the same industry, and can cultivate and bring up a group of high-level technical personnel and management personnel. Through technology promotion and personnel flow, it will have a positive impact on the improvement of the technical level of the whole transportation industry.

(4) Promoting sustainable development of transportation system

The implementation of green bus project will help to promote the sustainable development of city transportation system in a multiplier way.

The number of urban public transport vehicles is small, but the number of cars is large; the number of public transport company dominated by state-owned enterprises is small, so it is easy to adopt unified management and policy measures; while the number of units

and individuals with car ownership is difficult to adjust in terms of policy formulation and implementation. Therefore, the promotion of green public transportation is lower in cost, better in effect and shorter in cycle than in promoting green cars. For example, compared with traditional energy buses, electric buses save up to 45% of fuel.

(5) Alleviating traffic congestion, improving operation efficiency and driving safety

The construction of intelligent public transport system and the establishment of a new generation of integrated traffic operation coordination system for coordinated operation of people, vehicles, roads and environment can effectively alleviate traffic congestion, improve the existing traffic conditions and give full play to the maximum urban traffic efficiency.

A good riding environment will attract more citizens to choose public transport. The operation of the project will definitely reduce the number of private cars and relieve congestion.

(6) The project not only provides basic travel services for local residents, but also provides a basis for social public service system to play a better role. It helps to reduce the time cost for residents along the line to obtain medical, health, education and other public services, improves the accessibility of medical, health, education and other public services, and is conducive to the employment, schooling, medical treatment and other social members enjoying other social services.

Figure 5-24 shows the current statistics of waiting time. After the completion of the project intelligent system, the average waiting time per person can be reduced by 1-3 minutes. It can provide more convenience for residents' life and let them share the fruits of social development.

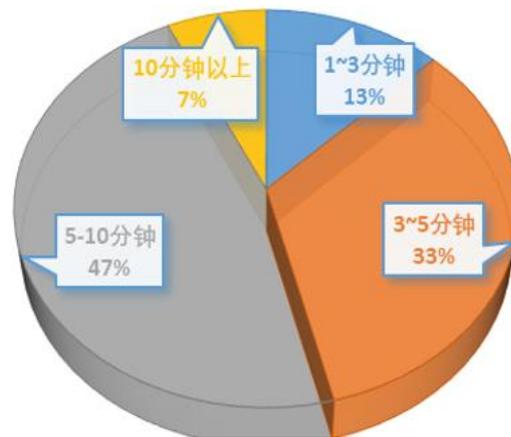


Fig. 5-24 average waiting time for passengers

5.3.2 Improving the Ecological Environment

(1) Promoting energy conservation and emission reduction in the field of transportation

The implementation of the project can provide high-level public transport services to the public and attract more public to choose public transport travel, thus promoting energy conservation and emission reduction in the field of transportation. It is estimated that in China's transportation travel proportion, if the car turns to public transportation every 1 percentage point, China's transportation energy consumption will be reduced by 0.8 percentage points. It is also conducive to energy saving and efficiency increasing of conventional bus enterprises, establishing a good social image, and achieving multi-win of economic, social and environmental benefits.

(2) Being conducive to improving the ambient environment

The problem of environmental pollution has become a widespread concern in the world, and urban transportation is undoubtedly an effective tool to reduce environmental pollution. At the same time, in order to continuously improve the urban traffic and air pollution problems, some backward means of transportation are gradually replaced by green and environmental protection means of transportation. On the basis of ensuring the basic transportation work, advanced means of transportation vigorously promote energy

conservation and environmental protection.

It has obvious energy saving and environmental protection benefits to strengthen the upgrading of the old and new buses in the city, vigorously develop the environment-friendly public transport vehicles, use clean electric energy and reduce vehicle exhaust emissions, which has a certain role in improving the regional atmospheric environment.

The implementation of the project can reduce the greenhouse gas emissions caused by traffic to a certain extent, and alleviate the urban air pollution.

① Emission reduction effect of pure electric vehicles replacing fuel vehicles

The project plans to invest in the procurement of pure electric buses to replace old fuel ones, which will play a positive role in promoting energy conservation and emission reduction of public transport.

Pure electric buses can reduce carbon dioxide emissions during operation. Taking the 264 pure electric buses to be procured in Jinzhou City as an example, the carbon dioxide emission will be reduced by 2491.56t from 2022 to 2024, while the emission of CO, NO_x, CO₂, SO₂ and PM will be 474.93t, 62.77t, 9144.04t, 32.10t and 0.79t respectively. If the average annual CO₂ absorption value of a tree is 18.3kg, then Jinzhou sub project will be equivalent to planting nearly 499700 trees in 3 years, with obvious energy saving and emission reduction effect.

② Increasing the emission reduction effect of bus travel burden rate.

The increase of public transport travel burden rate will effectively control the growth rate of private car travel proportion, so as to reduce greenhouse gas emissions caused by traffic and alleviate urban air pollution. According to statistics, the per capita energy consumption and carbon emissions per 100 km of buses are 8.4% of that of cars, and that of electric vehicles is 3.4% to 4%.

Through the construction of intelligent public transportation system, the project greatly improves the traffic efficiency of urban roads, reduces urban traffic congestion and greenhouse gas emissions, and improves the environmental quality of the city.

(3) Upgrading the city landscape environment

Replacing old vehicles, upgrading old bus stop boards and upgrading bus park will help to improve the old city appearance and enhance the city landscape.

(4) It does not affect the stability of the ecosystem of the project site

The construction site of the project is located in the urban area of the project city. The construction of the project will not lead to the loss of species and will not affect the stability of the local ecosystem.

5.3.3 Job Opportunities

The implementation of the project can increase the employment opportunities of the residents in the project area, improve the living standards of the residents, and help to get rid of poverty.

(1) Temporary jobs directly provided by the project during the construction period.

Projects (the construction of complex buildings, bus depots in Fuxin and Panjin) will provide some non-skilled jobs during construction, such as construction workers, transport sand, construction site cooks, etc. These employment opportunities will be given priority to the local vulnerable groups such as the poor and women, so as to increase their income.

(2) The indirect employment opportunities brought by the project.

The implementation of the project helps to promote the development of tourism which will promote the development of hotels, restaurants, travel agencies and other industries

around the scenic spots, which will help to increase the employment of local residents, such as hotel attendants, cleaners, catering waiters, chefs, taxi drivers, new employees in scenic spots, etc. These measures will increase the employment opportunities of local residents, especially the vulnerable groups, their economic income and improve their quality of life.

(3) Permanent jobs during project operation

Table 5-5 Directly increase employment¹

City	Jinzhou	Huludao	Panjin	Yingkou	Fuxin
Increase employment	170	300	95	56	380
The proportion of women in positions such as intelligent public transportation management system center, IC card salesperson, cleaning and other positions shall not be less than (%)	40	50	70	60	70
Total	1001				

Note1: Data provided by the Bus Company

Due to the different jobs created in each project city, the proportion of employed women is quite different. For example, Huludao and Fuxin mainly increase bus driver positions ,because bus drivers are more difficult, even if they are driving electric buses with good working conditions, the drivers often have to get up early and go to bed late. Many women are unwilling to engage in this job, and the probability of recruiting women is low. The probability of recruiting women as IC card salespersons could be high. Table 5-6 shows the current number of main positions and wages of the bus company.

Table 5-6 Number of current main positions and wages of bus companies ¹

	Job category	Number of people		Percentage %		average salary (Yuan/month)	
		Male	Female	Male	Female	Male	Female
Jinzhou	Bus driver	797	81	90.8	9.2	3012	2702
	Bus mechanic	98	2	98	2	2648	2606
	Bus charger	15	0	100	0	2124	—
	Intelligent Public Transportation Management System Center	2	28	6.7	93.3	2851	2744
	IC card salesperson	0	20	0	100	—	2049
	Administration	126	59	68	32	4107	3402
Yingkou	Bus driver	401	30	93.04	6.96	4592.94	4636.22
	Bus mechanic	38	2	95	5	3538	2564
	Bus charger	25	0	100	0	3105	—
	Intelligent Public Transportation Management System Center	12	33	26.67	73.33	2757.5	2768.5
	IC card salesperson	1	10	9.09	90.91	2610	2680
	Administration	177	74	70.52	29.48	3039	2912
Panjin	Bus driver	651	75	90	10	3609	3523
	Bus mechanic	66	0	100	0	4263	0
	Bus charger	25	0	100	0	1638	0
	Intelligent Public Transportation Management System Center	4	42	9	91	1967	1842
	IC card salesperson	1	19	5	95	1300	1521
	Administration	95	37	72	28	3047	2219
Fuxin	Bus driver	350	4	98.87	1.13	4000	4000
	Bus mechanic	12	0	100	0	4300	—
	Bus charger	10	0	100	0	2800	—
	Intelligent Public Transportation Management System Center	4	3	57	43	2500	2500
	IC card salesperson	0	6	0	100	—	2400
	Administration	158	50	75.96	24.04%	2500	2500
Huludao	Bus driver	426	17	96.2	4%	4237	3680
	Bus mechanic	21	0	100	0	4373	—
	Bus charger	4	0	100	0	3750	—
	Intelligent Public Transportation Management System Center	5	8	38	62	3560	3560
	IC card salesperson	0	8	0	100	—	2166
	Administration	47	39	55	45	4230	3664

Note1: Data provided by the Bus Company

5.3.4 Social Security and Stability

Bus drivers can also improve the working environment and ensure the driving safety because of the simpler operation and higher safety performance of pure electric vehicles. Moreover, through the use of intelligent public transport management means, traffic congestion can be effectively alleviated, and the level of urban road safety can be improved. To a certain extent, the occurrence of traffic jams and traffic accidents can be alleviated, and the personal safety of local residents can be guaranteed.

The comprehensive development of economy in the project area, the improvement of people's living standard and the increase of employment population can promote the maintenance of social security and stability.

5.3.5 Improving the Quality of Local Residents' Life

(1) Improving the quality of residents' life

The employment posts provided by the project and the indirect employment caused by the project have increased the income of the employed and improved the quality of life of the residents.

The convenience of people's travel will also promote the increase of travelling people and employment population, change people's living standard and consumption concept, and improve people's quality of life to a certain extent.

The implementation of the public transport project makes it more convenient, safe and hygienic for citizens to travel, which can facilitate patients' medical treatment, children's schooling and residents' shopping, so as to improve the quality of life of residents.

(2) Optimizing travel mode and save travel time.

Increasing operation vehicles and upgrading information and intelligence of existing

public transport system can further improve the city public transport system and play a fundamental and foreshadowing role for the future informatization and coordinated operation of public transport system. After the implementation of the project, the traffic speed of the city can be greatly improved, the travel time of travelers can be saved, and the travel efficiency can be improved.

(3) Good for people's health

Electric vehicles replace fuel vehicles, which can reduce air pollution and it is conducive to the health of residents.

5.3.6 The Significant Effect of Energy Saving and Emission Reduction

5.3.6.1 Energy Saving Estimation

Table 5-7 Energy saving estimation table¹

City	Energy consumption (tce)		Energy saving (%)
	2019	2024	
Fuxin	4297.33	591.74	86.23
Huludao	2873.09	575.23	79.98
Jinzhou	5822.98	724.55	87.56
Panjin	4917.21	1043.56	78.78
Yingkou	2169.85	709.04	67.32
Total	20080.47	3644.12	Average energy saving 81.85

Note1 : The data comes from the feasibility study report of each project city.

5.3.6.2 Estimation of Emission Reduction

(1) Air pollutant emission reduction effect

As we all know, carbon dioxide is the main cause of the greenhouse effect. If pure

electric vehicles can be promoted and used to completely replace traditional fuel vehicles, it can reduce total carbon emissions while reducing urban air pollution. Pure electric buses have an absolute advantage in reducing carbon dioxide emissions in cities.

In addition to greenhouse gas emissions, pure electric buses also play an important role in reducing conventional gas pollutant emissions. Table 5-8 shows the pollutant emission reduction situation of this project from construction to 10 years after implementation (2022-2034).

Table 5-8 Quantity of pollutants reduction during project construction and operation periods ^{Note}

City	Air pollutants and greenhouse gas emission reductions (tons)				
	CO	NO _x	CO ₂	SO ₂	PM
Fuxin	4215.03	656.98	47445.67	365.12	9.03
Huludao	4854.20	766.25	60982.27	424.07	10.48
Jinzhou	3965.38	395.31	47868.23	177.55	4.30
Panjin	4678.80	153.91	23322.36	6.16	—
Yingkou	3078.02	114.00	14014.11	4.82	—
Total	20791.43	2086.45	193632.64	977.72	23.81

Note:1.The data comes from the feasibility study report of each project city.

2. Use the 2019 data as a benchmark for comparison.

3. The electric buses purchased by Yingkou and Panjin are used to replace the original LNG or CNG buses. There is no PM emission reduction for these two models, so there is no need to calculate PM emission reduction.

Although a pure electric vehicle does not emit exhaust gas during use, it uses electric energy, and the production of electric energy will cause pollution. Harmful gases emitted by traditional fuel vehicles are scattered in the places they pass by as the vehicles travel, and they are concentrated in the air layer 20-30m above the ground, and they are not easily emitted. These spaces are the areas where people live. Although power generation will bring pollution, power plants are mostly built far away from densely populated cities or suburbs, and the pollution emitted cannot directly cause harm to humans, Furthermore, the power plants are fixed and it is easier to centralize treatment of pollutants.

(2) Noise reduction effect

Automobiles emit not only air pollutants, but also noise.

Automobile noise accounts for about 75% of urban noise, which pollutes the environment, makes people irritable, reduces work efficiency, and affects people's work and life. The noise and vibration of traditional fuel vehicles depend on the engine itself and driving conditions.

When traditional fuel vehicles are running, the engine, tires and exhaust pipes will continuously generate noise. At the same time, the cooling fans and other auxiliary equipment of traditional fuel vehicles will also make certain noises. Generally, the noise of large passenger cars is 70-75 decibels. Normally, the noise produced by vehicles on urban roads is above 70 decibels on average. This is mainly from the noise emitted by the engine. Long-term exposure to noise will affect the human nervous system, lengthen the reaction time of the bus driver, and affect driving safety. Pure electric vehicles have a more comfortable and stable operating environment, because the battery works according to chemical principles and it has fewer moving parts. The noise emitted by its own electric motor is much smaller than the noise emitted by the engine of a fuel vehicle. In the process of driving, the noise emitted by traditional fuel vehicles and pure electric vehicles at different speeds is shown in Table 5-9.

Table 5-9 Noise comparison between traditional fuel vehicles and pure electric vehicles¹

Working condition		Traditional fuel vehicle noise		Pure electric vehicle noise	
		In the bus	Outside the bus	In the bus	Outside the bus
Drive at a constant speed	35	71	67	67	66
	50	74	69	69	66
Speed up	35	81	75	72	66
	50	86	72	71	66

Note1: Zhao Qingqing. Harbin City Pure Electric Vehicle Application Analysis Research [D]. Chengdu: Northeast Forestry University, 2014

When driving at a constant speed, pure electric vehicles emit lower noise than traditional fuel vehicles, and the speed has little effect on the noise. When accelerating, pure electric vehicles emit significantly lower noise than traditional fuel vehicles, and as the speed increases, the noise gap increases.

This means during project operation stage, the noise level will be reduced from replacing traditional petroleum-fueled buses.

6 Potential Environmental and Social Impacts and Mitigation

Measures

6.1 Introduction

6.1.1 Environmental Impact Assessment

Environmental impact assessment is tracking and monitoring systems, which refers to the analysis, prediction and assessment of the possible environmental impacts after the implementation of the planning construction of projects, in order to put forward countermeasures to avoid, and mitigate adverse environmental impacts. Environmental impact assessment encourages the consideration of environmental factors in planning and decision-making to achieve more environmentally compatible human activities.

(1) The role of environmental impact assessment

Environmental impact assessment is an effective means to strengthen environmental management. It plays an important role in determining the direction of economic development and protecting the environment. Environmental impact assessment defines the environmental responsibility of developers and constructors, and stipulates the actions to be taken. It can provide environmental protection requirements and suggestions for the engineering design of constructing projects, and offer scientific basis for effective management of implementing projects

(2) Principles and methods of environmental impact assessment

①It meets the requirements of national and local environmental protection departments and sector departments on environmental protection management of construction projects, and it also meets the requirements of China's "notice on strengthening environmental management of construction projects financed by international financial organizations" and AIIB's ESF.

②By means of analogical investigation, data collection and analysis, and making full use of existing data, public participation is conducted by means of symposiums and individual interviews.

③From the point of environmental protection, the feasibility of project construction is demonstrated, and efforts are made to make the conclusion of the EIA scientific and operational, to provide scientific basis for environmental protection management in project approval, design, construction and operation.

(3) Evaluation period

The evaluation period of the project includes pre-construction, construction period and operation period.

(4) Relevant standards of evaluation

Table 6-1 summarizes the environmental standards and pollutant emission standards implemented by the five subprojects cities involved in the project.

6.1.2 Social Impact Assessment

Social evaluation of projects adheres to the development concept of people-oriented and the principles of objectivity, justice, fairness, legality, democracy and science, and strives to minimize the social risks of projects and maximize the social benefits of projects.

The social assessment of the project is based on the relevant laws, regulations and policies of the state, Liaoning Province, Jinzhou City, Panjin City, Huludao City, Fuxin city and Yingkou City, the project feasibility study report of the project city and AIIB's ESF.

Table 6-1 Relevant standards

Executive Standards		Jinzhou	Yingkou	Fuxin	Panjin	Huludao
IFC/WB General EHS Guideline		—				
Environmental quality standards	Environmental quality standard for surface water (GB3838-2002)	IV	III,IV, V	IV, V	IV	II, III
	Quality standard for groundwater (GB / T14848-1993)	III				
	Ambient air quality standard (GB3095-1996)	grade II				
	Environmental quality standard for noise (GB3096-2008)	class 1				
Pollutant discharge standard	Integrated wastewater discharge standard (GB8978-1996)					
	Integrated emission standard of air pollutants (GB 12697-1996)					
	Environmental noise emission standard for construction site boundary (GB 12523-2011)					
	Environmental vibration standard for urban area (GB 10070-88)					
	Standard for pollution control of storage and disposal site of general industrial solid waste (GB 18599-2001, revised edition in 2013)					
	Standard for pollution control of hazardous waste storage (GB 18597-2001, revised in 2013)					
	Emission standard of noise at boundary of industrial enterprises (GB 12348-2008)	1	1	1	1	1

The social impact assessment of the project mainly includes four aspects: social impacts analysis, social adaptability analysis, social risk analysis and social justice evaluation, as shown in Figure 6-1.

Social impacts analysis is mainly to analyze and predict the positive and negative effects

of the project on the local society.

Adaptability analysis is to study whether the project is in line with the national (regional) policies, the project can be accepted by the local social environment and humanistic conditions, or it can be supported by the local government and residents, and analyze the mutual adaptability between the project and the local society.

The adaptability of the project to the society mainly analyzes and predicts the local government's attitude towards the project construction and operators, the attitude and participation degree of major stakeholders, and the attitude and support degree of different organizations and departments to the project.

The social risk analysis is mainly based on the evaluation of the above two aspects, screening out the factors with significant negative impact and relatively obvious inadaptability to carry out further evaluation, determining the social risk and Countermeasures of the project, and putting forward corresponding preventive measures.

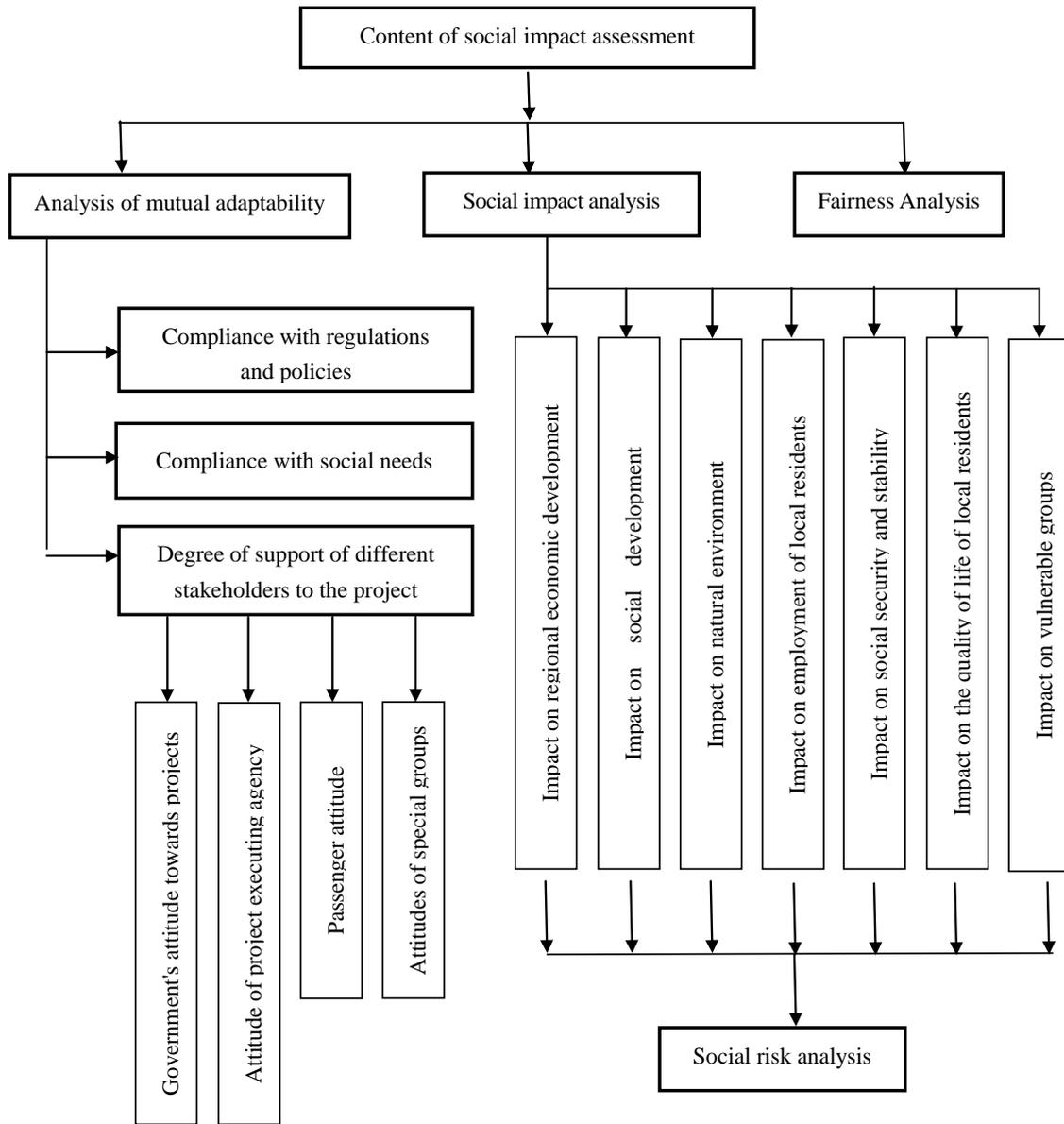


Figure 6-1 contents of social evaluation

6.2 Summary of Environmental & Social Impacts

6.2.1 Analysis of Mutual Adaptability between the Project and Local Society

The analysis of the social compatibility between the project and the locality is intended to determine the social environment and human condition of the project city, to see whether it can accept and support the existence and development of the project, and the extent of support from the local government residents for the existence and development of the project, and to investigate the adaptation between the project and the social environment in the locality.

(1) Analysis on the conformity of project objectives with national and local policies

The design and implementation of the project are in line with the project city planning and relevant industrial policies. The social goal of the project is consistent with the social development goal of the city plan.

(2) The content of the project meets the needs of the society

With the expansion of the city scale, the number of existing public transport vehicles cannot meet the needs of people's travelling. The procurement of vehicles through this project can meet the needs of city public transport capacity, the needs of public travel services, the needs of the industry owners, and the needs of city development.

(3) Stakeholders' attitude towards the project

The project has been widely supported by the local government, different local organizations or departments and residents.

Table 6-2 analysis of social adaptability between projects and their locality

Table 6-2 Analysis table of compatibility between the project and local society

Comment		Evidence evaluation	Source of evidence Collection method	Evaluation conclusion
Compliance with regulations and policies	Conformity with national guidelines and policies	"Notice of the State Council on Issuing the Development Plan for Energy-saving and New Energy Automobile Industry (2012-2020)" (Guo Fa [2012] No. 22), "Guiding Opinions of the General Office of the State Council on Accelerating the Promotion and Application of New Energy Vehicles" (issued by the State Council [2014] No. 35), "Notice of the General Office of the Ministry of Transport on Further Accelerating the Construction of Demonstration Projects for the Intelligent Application of Urban Public Transportation" (Jiaobanyun [2015] No. 88) and a series of national policies.	Data research Internet search	Highly consistent with national, provincial and municipal policies, and development outlines
	Compliance with local development policies	A series of local development policies including the "Notice of the General Office of the People's Government of Liaoning Province on Issuing the Implementation Plan for Accelerating the Development of New Energy Vehicles in Liaoning Province" (Liao Zheng Ban Fa [2016] No. 139).	Data research Internet search	
Compliance with social needs	Public participation survey results, analysis and prediction of feasible research reports.		Data research Field investigation	Highly consistent with social needs
Degree of support of different stakeholders to the project	Public participation survey results.		Field investigation	Highly supported

6.2.2 Environmental and Social Impact Analysis

6.2.2.1 Impact on Regional Economic and Social Development

The project adopts advanced science and technology in public transportation, which improves the progress of science and technology, the sustainable development of transportation system, and the overall development of the city and it effectively promotes the sustainable development of local economy, society and ecological environment.

The project not only provides basic traveling services for local residents, but also provides a basis for social public service system to play a better role. It helps to reduce the time cost for residents along the line to obtain medical, health, education and other public services, and improves the accessibility of medical, health, education and other public services, which is conducive to the employment, schooling, medical treatment, enjoyment and other social services of all social members.

6.2.2.2 Impact on Natural Environment

The use of pure electric vehicles can promote energy conservation and emission reduction in the field of transportation and improve the atmospheric environment. The project will contribute to climate mitigation.

The project is located in the urban area of the subprojects cities. The construction of the project will not lead to species loss, and affect the stability of the local ecosystem.

6.2.2.3 Impact on Employment of Local Residents

The implementation of the project can increase the employment opportunities of the residents in the project area, improve the living standards of the residents, and help to get rid of poverty.

Temporary jobs can be provided directly during the construction of the project. The project can provide permanent jobs during the operation period.

The implementation of the project can promote the development of local tourism and improve the investment environment, and indirectly bring employment opportunities for local residents.

6.2.2.4 Impact on Social Security and Stability

The improvement of public transportation and the application of intelligent command system can alleviate traffic jam and traffic accidents to a certain extent, and ensure the personal safety of local residents.

The comprehensive development of economy in the project area, the improvement of people's living standard and the increase of employment population can promote the maintenance of social security and stability.

6.2.2.5 Impact on the Quality of Life of Local Residents

The implementation of the project can not only promote employment, increase residents' income, but also improve residents' travel, so it is conducive to the improvement of local residents' quality of life.

Electric vehicles replace fuel vehicles, reducing air pollution, which is conducive to the health of residents.

The implementation of the project can provide more convenience for residents' life and let them share the fruits of social development.

6.2.2.6 Impact on Vulnerable Groups

(1) It helps to help the poor get rid of poverty

The direct and indirect employment opportunities provided by the project can enable more poor groups and women to work. This will help the poor, women and other vulnerable groups to achieve local employment and increase their economic income.

Temporary jobs will be provided directly during the construction of the project. During the construction period of the project (the construction of comprehensive buildings, busdepots in Fuxin and Panjin), some non-technical jobs will be provided, such as construction workers, transportation sand and gravel, site cooks, etc. These employment opportunities will be given priority to the local vulnerable groups such as poor people and women, so as to increase their economic income.

The project promotes the development of tourism resources and indirectly creates more employment opportunities, such as catering, accommodation, sightseeing, leisure experience, hygienic cleaning, etc. This will help the poor and women and other vulnerable groups to achieve local employment and increase their economic income.

In short, the implementation of the project will promote local economic development, improve the employment opportunities of the poor and reduce poverty.

(2) Contribute to the promotion of women's socio-economic status

The implementation of the project has increased women's employment opportunities. Women's employment helps to improve their own ability and quality, and then improve their social and economic status.

(3) Provide safer and more convenient travel environment for women

(4) Promote social equity and let vulnerable groups share the fruits of development

The improvement of bus conditions can not only provide better living experience for the poor (such as comfortable riding environment), but also bring more development opportunities for the poor, such as increasing employment opportunities. To a certain

extent, the construction of the project can benefit the local residents, including a large number of poor people, so that they can share the fruits of social development.

Table 6-3 Fairness Analysis Table

Category	Employment fairness	Fairness of public participation	Enjoy the fairness of project results
The elderly, the disabled	The employment of the disabled is coordinated by the Disabled Persons' Federation. There are no employment positions for the disabled in this project	Collected suggestions from the elderly and the disabled	The elderly and some disabled persons (blind) enjoy the free bus policy and can enjoy more project results; Other disabled people and local residents share the project results on an equal basis
Women	Give priority to employment opportunities in individual positions	Special collection of women's suggestions	Share project results equally with local residents
The poor	Prioritize employment opportunities	Collected suggestions from the poor	Share project results equally with local residents

For the convenience of the elderly, the disabled and women and let them benefit from the achievements of the project, special seats were set for them, and the special seats should be set in the front of buses.

In order to facilitate the safety of low-height groups such as women and children, the standing area in front of the exit door is equipped with handrails and lifting rings with a height of not higher than 1600mm for passengers to grasp.

In the new bus station, especially Panjin bus station (far away from the residential area), waiting seats should be set for the elderly, the disabled and women to have a rest while waiting for the bus.

(5) Create convenient conditions for old and children to travel

Due to their age or physical reasons, the elderly often need to be accompanied by others or with the help of crutches, wheelchairs and other tools when they travel. These difficulties make them have higher requirements for travel safety, and they need more perfect transportation ancillary facilities to ensure their safety. After the completion of the project, it can provide more convenient travel conditions for children to go to school and the elderly to travel, and bring great convenience to this group of people. Purchase some barrier free BEBs to facilitate the needs of the elderly, children and the disabled to get on and off the bus

A wheelchair storage area can be set in the bus, and wheelchair restraint devices can be installed to ensure the convenience and safety of the elderly and the disabled.

6.3 Non-permissible Activities

- (1) It is not allowed to employ children under the age of 18 to participate in the work of the project;
- (2) Forced labor or harmful or exploitative forms of labor are not allowed;
- (3) It is not allowed to carry out construction, production or activities in violation of Chinese laws or regulations and international conventions and agreements.

6.4 Impacts and Mitigations

The noise and dust caused by the construction machinery and material transportation in the project construction, the environmental problems such as domestic sewage discharge and domestic and construction waste disposal during the construction period may have a certain negative impacts around the project area.

6.4.1 Impacts and Mitigations during Pre-Construction and Construction Phase

The adverse effects of the project on the environment and society will mainly occur during the construction period. The dust, construction noise, waste water and solid waste during the construction period will have a certain impact on the surrounding environment. Safety risks, inconvenience of traffic nuisance and poor accessibility due to road closures and diversions, noisy conditions etc. will be created due to plying of large number of heavy trucks transporting construction material, equipment and machinery in and around the project areas. Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing are predicted if without proper management. However, the impacts will be limited to sites, and will be short-term and reversible.

6.4.1.1 Civil Work Impacts on Traffic and Mitigation Measures

The civil engineering construction of this project mainly includes the construction of charging piles and the construction of comprehensive public transportation service centers in Panjin and Fuxin.

(1) Charging piles installation

The civil engineering task is less and the construction period is short. The excavation of one charging pile is about 0.8-1m³. According to the estimates of each city, the duration of civil construction for installing a charging pile is about 3-4 days, and the charging piles are installed in the bus parking lot, so there is little impact on the traffic and health and safety of the surrounding residents.

(2) Construction of public transport comprehensive service centers

The service center proposed in Fuxin has a construction area of 2,594 square meters, and the service center proposed in Panjin is 5,910 square meters. During the construction

period, the traffic of construction vehicles (trucks) will affect the local traffic. A large number of cement, building materials, earthwork and some mechanical equipment need to be transported from different places to the construction sites, which will inevitably lead to the increase of traffic flow. However, the existing roads in Panjin and Fuxin are in good condition, so the local traffic pressure will not be significantly increased.

When underground pipelines such as drainage and heating need to be constructed on roads, local traffic will be temporarily affected or interrupted. The traffic impact can be reduced by optimizing the design and construction management, coordinating with the traffic police to organize alternative routes, and timely notifying the relevant crowd.

It is suggested to take the following mitigation measures to reduce the negative impact of construction on society.

(1) Strictly control the condition of construction vehicles and drivers' safety awareness to ensure driving safety.

(2) Reasonably plan the transportation route and transportation time to minimize the impact on the surrounding residents' travel and traffic.

6.4.1.2 Impact Analysis and Mitigation Measures of Urban Ecological Land Scape

The construction projects with ecological impact are mainly Panjin and Fuxin public transport service centers, and the charging pile installation project has little impact on the surrounding ecological environment. The ecological impact of public transport service center mainly comes from the impact of land occupation.

(1) Impacts on greening vegetation

At present, Panjin bus service center station is an idle plot full of weeds, so the construction has no impact on the greening vegetation.

Fuxin bus service center station is demolished and built on the site of the existing station, which has no damage to the urban green belt around the station. There are 3 peach trees and 5 Juniper trees in the parking lot, which need to be transplanted during the construction process and compensated with green plants after the completion of the project.

(2) Impacts on urban landscape

During the construction process, the impact of the bus service center station on the surrounding landscape is mainly reflected in the following aspects:

① During construction, excavation of soil and stone, stacking of building materials, especially construction waste and temporary dumping of construction waste will affect the city's sanitary environment and city landscape.

② In urban areas, dust from transport vehicles will affect the roads, green belts and houses on both sides, and also bring certain effects to the city's health environment.

③ The stacking of some temporary buildings or mechanical equipment in the construction process will also bring uncoordinated factors and influence to the surrounding landscape.

④ In the construction process of the main project, guardrail, fence and other isolation measures will bring certain damage to the urban landscape.

(3) Impacts on wildlife

The project is mainly located in the urban area, and there are no other wildlife activities except for sparrows and gray magpies. The construction may damage the habitat and affect some individuals. However, due to the large number and strong adaptability of this kind of bird, it usually does not have a great impact on its population.

(4) Analysis on the impact of construction on cultural and natural resources

According to the survey, the affected area of this project does not involve sensitive areas such as cultural relics, ruins, folk customs, and scenic spots.

To sum up, the impact of the construction process on the existing ecological landscape environment is only temporary, and will disappear with the completion of the project. However, taking appropriate preventive measures during the construction period can reduce the impact. Therefore, it is recommended to pay attention to the following points in the construction:

(1) During the construction process, the land, vegetation and roads shall be occupied as little as possible to reduce the adverse impact of construction on the ecological environment.

(2) Temporary excavation and excavation of earthwork piles should take measures such as the measures of anti soaking, scour prevention and soil erosion prevention.

(3) The reasonable allocation of excavation and filling earthwork should be done well, and protective measures should be taken at the spoil stacking point to avoid earthwork excavation and filling during rainfall, so as to prevent soil erosion caused by rain erosion and blockage of drainage pipeline.

(4) Attention should be paid to the protection of trees, green space and other vegetation in the adjacent zone during construction.

(5) During site clearance, any bird nests or fauna habitats found shall be consulted with wildlife authority to shift to a safe place.

(6) If cultural relics and historic sites are found during the construction process, immediately stop the construction to protect the site; and immediately report to the cultural relics department and take measures according to the requirements of the cultural

relics department; work can only be resumed after obtaining the consent of the cultural relics section.

6.4.1.3 Impacts on Air Quality and Mitigation Measures

During the construction period of the project, the factor that mainly impact environmental air is fugitive dust and emissions from heavy machinery. Dust emission occurs in the process of Engineering demolition, concrete mixing, construction site operation, material transportation, loading and unloading and material storage, especially when the wind speed is large, the materials are dry and uncovered, and the dust pollution is serious. During the transportation, loading and unloading and mixing of powdery materials, a certain amount of dust will escape into the surrounding atmosphere, which has a certain impact on the regional air quality. The other type of air pollutants is the exhaust gas emitted by construction machinery and heavy transport vehicles during operation.

(1) Dust from project demolition

In this project, the construction of Fuxin public transport service center involves the demolition of a two-story building. In this process, TSP content in the ambient air around the demolition site will increase, which will have a certain impact on the surrounding air quality.

(2) Road dust of transport vehicles

According to the construction experience of similar projects, the road dust caused by vehicle transportation in the construction area accounts for more than 50% of the total site dust. The amount of road dust is related to the vehicle speed, load capacity, contact area between tire and ground, road dust content and relative humidity. The wind speed also directly affects the transmission distance of the dust. Due to the strong wind in spring in the project area, the road dust pollution is serious.

(3) Dust in the process of storing gravel.

In windy weather, the dust from sand and gravel will reduce the air quality in the downwind direction, which will cause adverse impact on the environmental protection targets within this range.

(4) Construction dust

Among all kinds of construction dust (land leveling, soil sampling, material loading and unloading, concrete mixing, steel beam installation, etc.), the dust generated by concrete mixing is the most serious.

(5) Mechanical fuel, exhaust gas

During the construction period, the fuel pollutants mainly come from the exhaust gas emitted by construction machinery and transport vehicles during operation. The power source of transport vehicles and construction machinery is mainly diesel oil, and the main pollutants are carbon monoxide (CO), nitrogen oxide (NO_x), sulfur dioxide (SO₂) and hydrocarbons (HC). Construction machinery mainly includes excavators, bulldozers, garbage transport vehicles, etc., which are distributed in various construction areas.

Table 6-4 Ambient air quality standard (extract) mg /m³

Pollutant factor	1 hourly average	24 hourly average	Annually average
SO ₂	0.50	0.15	0.06
NO ₂	0.20	0.08	0.04
CO	10.00	4.00	-
O ₃	0.2	0.16 (daily maximum 8 hourly average)	-
PM ₁₀	-	0.15	0.07
PM _{2.5}	-	0.075	0.035

According to the environmental air functional zoning level of the project location, the

environmental air quality of all project cities implements the second level of the "Ambient Air Quality Standard" (GB3095-2012), and the specific indicators are shown in Table6-4.

According to the survey, the two bus service centers in Fuxin and Jinzhou are flat and open, which is conducive to the dilution and diffusion of exhaust gases, and the emission is highly limited. The scope of the impact is limited to the construction site and the transportation road, and has the characteristics of small and concentrated pollution. It is estimated that the emission of waste gas from construction machinery will mainly affect the ambient air quality in the construction area and along the transportation line, which will slightly increase the concentration of CO, NO₂ and other indicators in the ambient air. Due to the low background value of regional atmospheric environment, although the exhaust emission during the construction period has increased, it will not affect the atmospheric environment quality level.

The following mitigation measures are recommended to reduce the impact of construction on air quality:

(1) The construction site should be watered daily to suppress dust. In the earthwork, foundation construction stage and the weather with high wind speed, the frequency of watering should be increased. During the construction of civil engineering and decoration engineering, curtain shielding construction is required.

(2) The construction site should be enclosed. The height of enclosure shall not be less than 2.5m, and the enclosure shall be firm, stable, clean, standard and beautiful. The outside of scaffold on construction site must be fully closed with safety net, and the height of enclosure shall be more than 1.5m higher than the working face, and shall be cleaned regularly.

(3) The roads in the construction site and the stacking place of building materials must be hardened. Vehicle washing and drainage facilities must be set at the entrance and exit of

the construction site.

(4) Use ready mixed concrete. It is forbidden to mix concrete at the construction site.

(5) The powder (granular) material pile in the construction site should be selected at the wind shelter and covered to prevent a large amount of dust.

(6) Strengthen dust control on construction site. It is strictly forbidden to dump garbage from the height of the building.

(7) Strengthen the management of transport vehicles on the construction site. The concrete shall be transported in a closed way. The transport vehicles driving into the construction site must be clean and tidy and the loading vehicles should be in good condition. The loaded goods should be stacked neatly, and the road should not be polluted. The transport vehicles driving out of the construction site must be washed clean and the speed should be limited the ultra-high and overload transportation should be strictly prohibited. By covering and protective measures, all materials easy to be exposed should be transported in a closed way to effectively control dust and secondary dust pollution. The transportation route should be selected reasonably Line, and try to avoid residential areas.

(8) The construction machinery with low fuel consumption, high efficiency and up to standard exhaust emission should be selected for the project and the exhaust emission of transport vehicles must meet the standard. Contractor's transport vehicles and other equipment shall conform to emission standards. The Contractor shall carry out periodical checks and undertake remedial measures including replacement, if required, so as to operate within permissible norms.

Procedure for truck maintenance, including selection of service providers considering environmental aspects, application of low-Sulphur fuel, no idling of trucks, routine maintenance (including assurance of proper engine operations related to emissions and

noise), and disposal of used oil and other fluids, batteries, and tires etc.(9) Special personnel shall be responsible for the cleaning of the construction site and vehicles to ensure the cleanness of the construction site and its roads.

(10) Coal burning and garbage burning are strictly prohibited in the project area to prevent the emission of smoke, SO₂ and other pollutants.

(11) Measures such as covering, watering and dust suppression shall be taken for the temporary storage yard of spoil and waste building materials, and timely clearing and transportation or backfilling shall be carried out.

(12) Shorten the construction period as far as possible, and reduce the influence surface and time of construction waste gas.

6.4.1.4 Noise Impacts and Mitigation Measures

During construction, the main source of noise will be the noise generated during the construction of the bus service centers in Fuxin and Panjin. Construction noise mainly includes construction machinery noise, transportation vehicle noise, demolition and civil construction noise.

(1) Noise impact analysis

① Construction machinery noise

It mainly refers to the construction noise generated by the use of various mechanical equipment on the construction site. These construction machinery include loaders, excavators, bulldozers, pile drivers, concrete mixers, medium-sized cranes, etc. The noise source characteristics of different equipment are different. Some equipment noise is vibration, sudden and impulsive, which has a greater impact on people. Some equipment (such as mixer) has low frequency, is not easy to decay, and makes people feel irritable.

In the construction, this kind of machinery is the main construction noise source, and the operation noise of some equipment can be as high as 90dB. See table 6-5 for the different distance intensity of the sound source.

Table 6-5 Noise source intensity of common construction machinery and transportation vehicles at different distances

Name of construction machinery and transportation vehicles	Noise value Leq(dB)				
	10m	30m	60m	120m	220m
Bulldozer	76~82	66~72	60~66	54~60	<40
Excavator	76~84	66~74	60~68	54~62	<40
Shovel	76~82	66~72	60~66	54~60	<40
Loader	81~84	71~74	65~68	59~62	<40
Rock drill	82~85	72~75	66~69	60~63	<40
Diesel pile driver	90~109	80~99	74~93	68~87	44~63
Drop hammer pile driver	94~105	84~95	78~89	72~83	48~59
Grader	78~86	68~76	62~72	56~64	<40
roller	75~90	65~80	59~74	53~67	<45
Concrete mixer	70~86	60~76	54~70	48~62	<40
Riveting machine	82~95	72~85	66~79	60~73	<49
Vibrator	95~104	85~94	79~88	73~82	49~58
Hoist	84~86	74~76	68~70	62~64	<40
Heavy crane	85~95	75~85	69~79	63~73	<49
Truck	72~82	62~72	56~66	50~60	<40
Bulldozer	76~82	66~72	60~66	54~60	<40

②Noise of transport vehicles

During the construction of the project, all kinds of equipment, materials and a large amount of earthwork are mainly transported to the construction site by vehicles;

especially, the noise radiation intensity generated by heavy vehicles is relatively high. Due to the frequent driving of various transport vehicles on construction sites, construction roads and existing roads, traffic noise will be affected on the surrounding environment. See table 6-5 for the noise source intensity of common transport vehicles.

③Demolition of buildings and civil construction noise

In the construction of public transport comprehensive service center, not only some existing buildings should be demolished, but also a large number of new buildings should be built. In the process of demolition and new buildings (structures), a lot of construction noise will also be generated, as shown in table 6-6.

Table 6-6 Construction noise source strength¹

Construction stage	Construction noise source category	Noisesource strength (dB (A))
Demolition and on-site clearance	Transport vehicles	90-95
	Air compressor	90-100
	Air hammers, air picks	100
Earthwork	Bulldozer	92.4~97.6
	Transport vehicles	90-95
	digger	110
	Water pump	90
Structural construction	pile driver	90-110
	Concrete canning machine	90-100
	Vibrating tube	90-100
	Electric welding machine	95
	Transport vehicles	90-95
Decoration stage	Electrodrill	100-110
	Electric saw	100-115
	Multifunctional woodworking planer	95-100
	Cranes, lifts, etc	95-105

Note1: The distance between measuring points is 1m.

(2) Noise Control Standard

The proposed site of Fuxin service center is close to the residential area, and strictly implements “the emission standard of noise for social living environment” (GB 22337-2008) (table 6-9) and “emission standard of environmental noise for construction site boundary” (GB 12523-2011) (table 6-7).

**Table 6-7 Environmental noise emission limits at the boundary
of construction sites (extract) (dB(A))**

Noise category	Daytime	Night
Construction noise	70	55

The proposed site of Panjin Public Transport Service Center is close to the urban expressway and there are no residential areas around it. However, considering the overall control requirements of the environment, contractor will need to adopt the above-mentioned limits for noise emission.

(3) Sensitive Receptor Analysis

On the one hand, the influence of construction noise depends on the condition of sound source, on the other hand, it is related to the distance between sensitive points and sound sources.

The proposed site of Fuxin Public Transport Service Center has Jiefang Avenue on the east, Fuxin Road Administration and Law Enforcement Team of Liaoning Province on the south, Zhengda Cargo Station on the west, and Yintong Bocuiyuan residential area on the north, as shown in Figure 6-2.

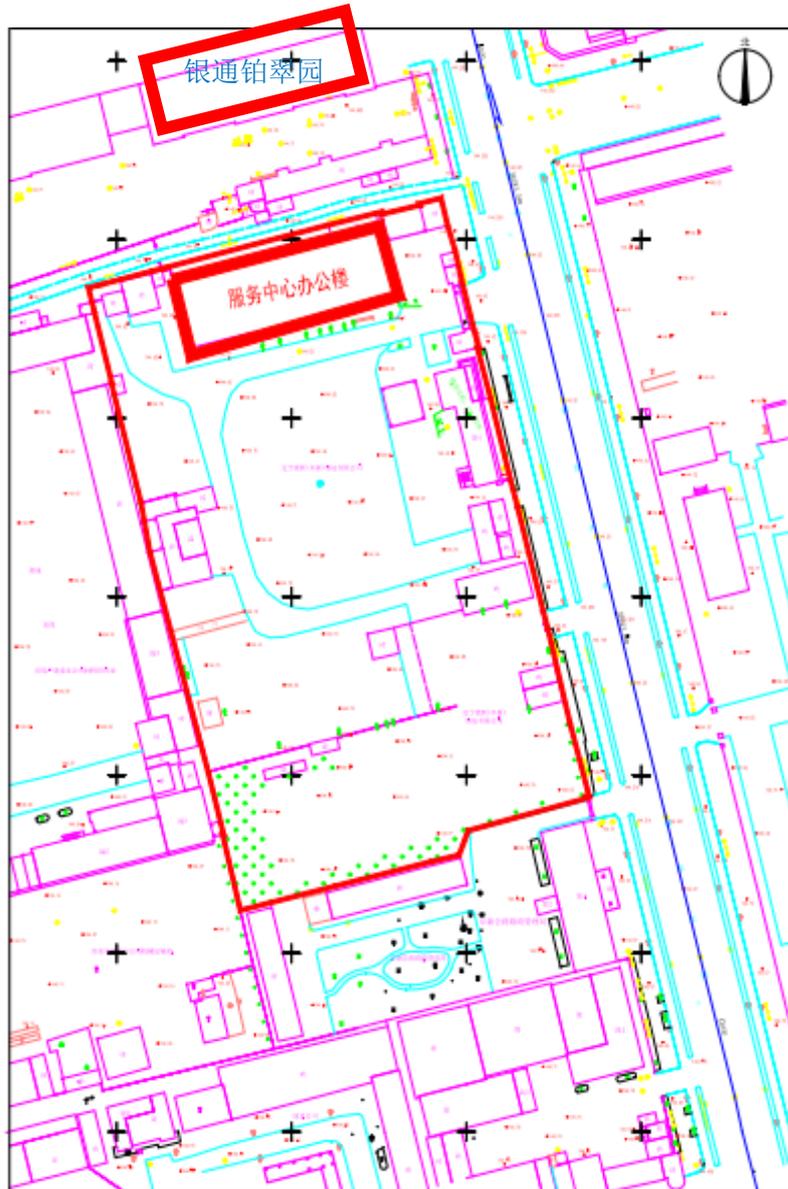


Figure 6-2 Relative location of Fuxin public transport service center office building and Yintong Baicuiyuan

① Current Situation

Only Yintong Bocuiyuan residential area is greatly affected by the project.

The sensitive part is Yintong Baicuiyuan residential community on the north (see 3.6.1 for introduction), and the location of each building is shown in Figure 6-3. The construction site of the bus service center is 60.7m away from residential buildings and 31.4m away from commercial outlets (shortest distance). The project is to demolish a brick concrete structure factory with an area of 1,200m², and to build a new

comprehensive bus service center in the original site. The comprehensive public transport service center has a construction area of 2,594m²(including 834 square meters of auxiliary production area and 1,760 square meters of maintenance plants).

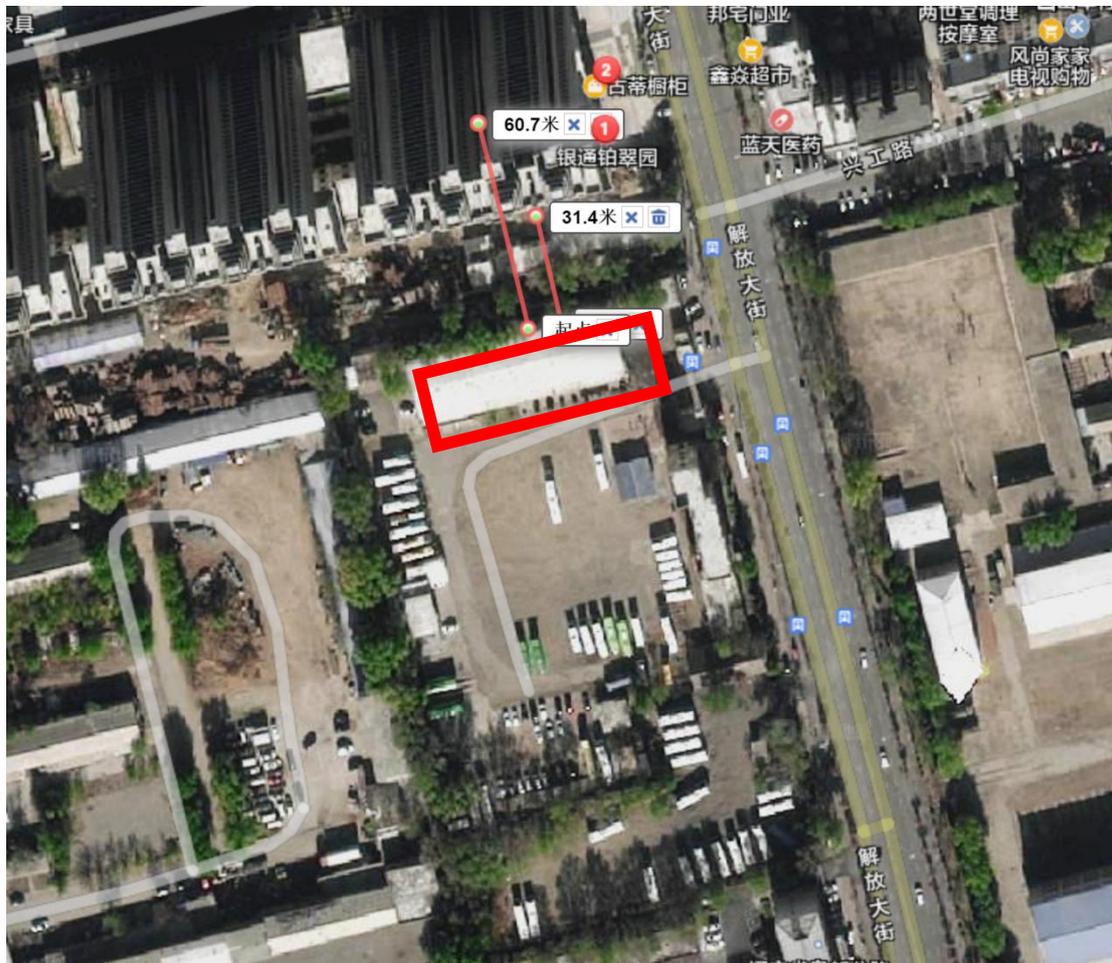


Figure 6-3 Schematic diagram of the distance between the proposed E-buses Depot and Yintong Baicuiyuan

Through on-site investigation, the situation is as follows:

- i There is one Path of between the bus service center and Yintong Baicuiyuan(see Fig. 6-4). Now this Path is fenced off by Yintong Baicuiyuan's constructors which is used to store construction materials (see Figure 6-5)



Figure 6-4 Planning Road



Figure 6-5 Yintong Baicuiyuan fence (October 2020)

ii On the north side of the road, there is a 3-story commercial store(see Figure 6-6), which is about 30 meters away from the boundary wall of the bus center. The staff of Fuxin sub- project office visited the Yintong Baicuiyuan sales office and learned that the commercial stores of Yintong Baicuiyuan were not sold. It is clear that the road in front of the Yintong Baicuiyuan commercial store has not been repaired, and the store has not been sold, and it does not have the conditions for opening.

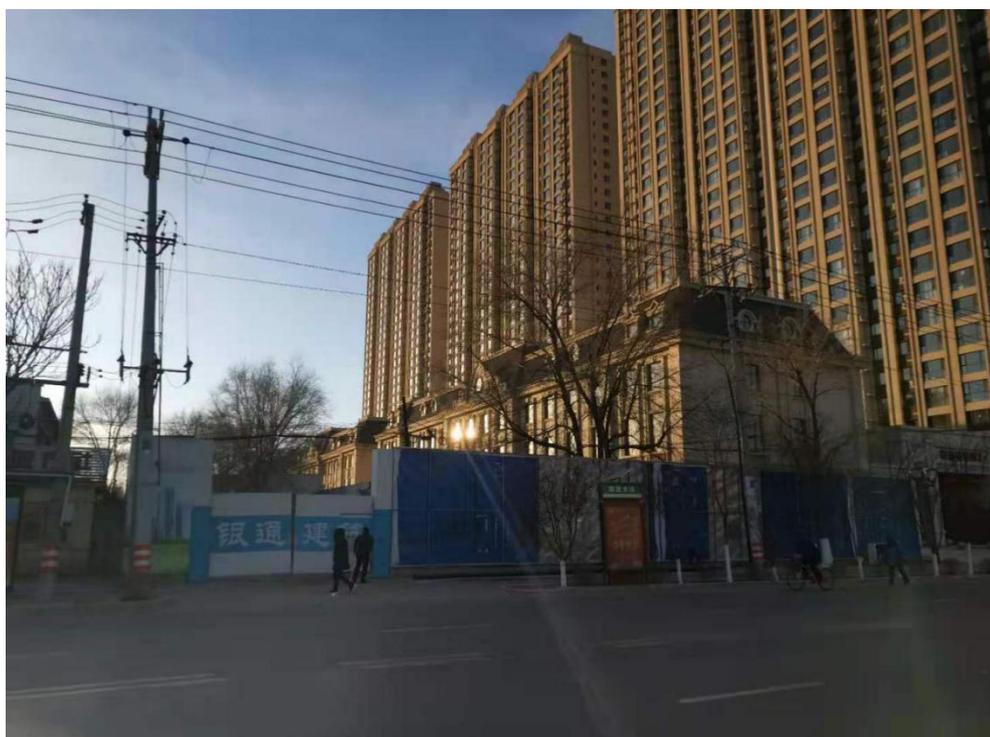


Figure 6-6 Current status of Yintong Platinum Cuiyuan outlets and residential buildings

iii The north side of the commercial store is a 33- storey residential building, about 60 meters away from the boundary wall of the bus center. About 140 households have moved into the building.

iv The building to be demolished in the Fuxin Bus Service Center Station is a one-story factory building. According to the staff of the station, the building was probably built in the 1980s (due to personnel changes, no one knows the specific construction date). It is a

brick concrete structure (Figure 6-7). In the process of dismantling the plant, there is no need to use large mechanical equipment.

vi Fuxin sub-project office has put up a project notice (Figure 6-8) at the entrance and exit of the park, so that the residents of Yintong Baicuiyuan can keep informed of the proposed service center in Fuxin. In the notice, the telephone number for public complaints, public Wechat account and mailbox were publicized, and the residents' opinions were asked for. So far, no complaint has been received from residents. Before construction, Fuxin Public Transport Company will make notices with strong visibility, which are not easy to tear off in obvious places outside the project site, and provide residents with project information and communication channels.



Figure 6-7 The plant to be demolished



Figure 6-8 Project Publicity

According to the current survey:

- i) During the construction period, the noise has no influence on the commercial stores temporarily;
- ii) It has a certain impact on the residents of Yintong Baicuiyuan residential buildings near the bus center.

② Noise Propagation Prediction

The sound level attenuation model of point source is used to predict and evaluate the noise of machinery and vehicles during the construction period.

i Noise prediction model

According to the "Technical Guidelines for Environmental Impact Assessment-Acoustic Environment", the basic formula for point sound source geometric divergence attenuation is adopted:

$$L_{p_r} = L_{p_0} - 20 \lg \frac{r}{r_0}$$

In the formula: L_{p_r} —Sound level A at r from sound source, dB (A) ;

L_{p_0} —Sound level A at r_0 from sound source, dB (A) ;

r —Distance between prediction point and noise source, m;

r_0 —Reference distance from noise source, m.

i i Noise prediction at plant boundary

Different construction methods and equipment will produce different noises, and the selection of construction methods and equipment depends on the construction party. Considering the worst-case scenario, the most noisy pile- driver is used when digging the foundation. According to the estimation of the engineering quantity of the Fuxin maintenance site, only one piling machine is needed to meet the construction needs, and it generates 110 dB(A) strong noise at 1 meter. Assuming that the pile driver is 10 meters away from the plant boundary (see Figure 6-9), the noise at the plant boundary

is $L_{p_{10}} = L_{p_1} - 20 \lg \frac{10}{1} = 110 - 20 = 90 \text{dB (A)}$.

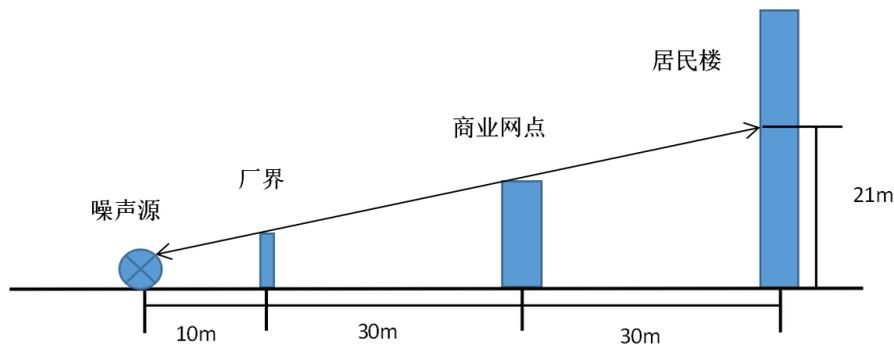


Figure 6-9 Schematic diagram of project location

The installation of at least 2m high sound insulation fence at the plant boundary has a significant effect on the noise reduction, especially the high-frequency noise. For example, for a sound insulation enclosure of a certain brand during the construction period (Fig. 6-12), the sound insulation capacity is 25-40db (A), and the noise reduction coefficient is

0.7-0.83. Assuming that the minimum sound insulation value is 25dB (A) after the installation of sound insulation enclosure, the noise at the plant boundary will be reduced to 65dB (A), meeting the relevant standards of emission standard for environmental noise at the boundary of construction site (GB 12523-2011). See table 6-7 for details.



Figure 6-10 Sound insulation fence recommended for construction site

Assuming that there are several machines and equipment working at the same time,

formula
$$L_{PT} = 10 \lg \left[\sum_{1}^n 10^{\frac{L_{pi}}{10}} \right]$$
 is used to calculate the synthetic sound pressure level.

According to the calculation, when the pile driver is running, no more than two sets of equipment over 100 dB (A) can work to ensure that the noise at the plant boundary is less than 70 dB (A) when the sound insulation enclosure is installed. Therefore, in the construction process, the number of high noise construction machines should not be used in order to reduce the superposition of noise sources.

iii Noise prediction of commercial stores

Under the condition that the noise level at the plant boundary is less than 70 dB (a), the noise level at the commercial outlets which are 30 m away from the plant boundary in the

north is as follows:
$$L_{p40} = L_{p10} - 20 \lg \frac{40}{10} \approx 70 - 12 = 58 \text{dB (A)}$$
. This noise level can meet the standard.

IV Noise prediction of residential buildings

According to the calculation, the residential building which is 60m away from the factory boundary has the highest noise of 72db (A) at the height of 21m (about 8th floor, see Figure 6-6). To ensure that the noise at this point is lower than 70dB (A), the noise source should not exceed 107dB (A), that is, the strongest noise source should be reduced by more than 3dB (A) through the noise reduction measures. It is easy to achieve this goal through the following measures. One is to use low noise mechanical equipment instead of high noise equipment. For example, using silent pile driver instead of traditional pile driver can reduce noise by 50-60db (A); fully enclosed screw air compressor with low noise is selected to replace piston air compressor, and hydraulic pick is used to replace air pick. The second measure is to install high-efficiency muffler on the mechanical power system and machine.

③ Conclusion

Through the above calculation, effective mitigation measures can effectively reduce the impact of noise on the surrounding residents during the process of demolition and construction.

After the noise control measures are taken, the noise transmitted to the windows of residents and to the front of commercial outlets can meet the noise control standard.

In addition, the commercial stores of Yintong Baicuiyuan are high buildings, and the height of the three -storey stores is almost the same as the height of the five- storey residential buildings. Therefore, the high buildings play a noise barrier role for the low-rise residential buildings behind them. In addition, in the construction process of Fuxin public transport service center, various noise reduction measures must be taken (see mitigation measures), and the construction time of demolition (8:00 a.m. - 5:00 p.m.) must be strictly followed. Night construction is prohibited in order to reduce disturbance to residents. Before starting the construction, Fuxin bus company will announce the mitigation measures in the area, and announce the complaints channels such as telephone numbers, official Wechat account and mailboxes to listen to the residents' opinions.

(4) Mitigation measures

It is suggested that developers should refer to the IFC's general EHS guidelines on project construction and demolition as well as the relevant requirements of domestic projects, and take necessary mitigation measures to reduce the negative impact of construction on the surrounding environment and construction personnel.

① During the construction process, the contractor shall strictly follow the relevant provisions in the emission standard of environmental noise at the boundary of construction site (GB 12523-2011) and implement the management measures for noise pollution prevention and control in Liaoning Province, so as to avoid the occurrence of construction disturbing residents. The noise level shall be closely monitored at the construction boundary.

② Contractor shall reasonably arrange the construction operation time, shorten the construction period as far as possible, arrange the activities that may produce high-intensity noise at the time of least impact in a day. Construction is prohibited at night.

③ The noise generated by construction machinery is often sudden, irregular, discontinuous and high-intensity. The Contractor should take reasonable arrangements for the operation time of construction machinery to alleviate and, reduce the number of high-noise construction machinery operating at the same time, and reduce the superimposed impact of noise sources as far as possible.

④ In the process of construction, considering the impact of transportation noise on the acoustic environment, the construction access road should avoid the relatively concentrated noise sensitive points.

During the transportation of materials, the transportation time should be reasonably arranged to avoid the transportation at night. At the same time, we should strengthen the management of transport vehicles, slow down and prohibit honking when passing through residential areas.

⑤ In the process of demolition, large-scale mechanical equipment such as hydraulic crusher will not be used, and small-scale machinery (air pick, cutting machine, impact drill, etc.) will be used for demolition.

⑥ Noise control device will be adopted. The sensitive receptors have to be isolated from heavy construction noise generated. This is possible by erecting reinforced 2 m tall GI sheet barrier around the area where heavy construction works is undertaken.

⑦ Monitoring during construction. Require the owner to indicate the complaint telephone at the construction site. Once the complaint is received, the project owner should contact the local environmental protection department immediately to deal with environmental disputes in time.

⑧ For the construction workers working near the high noise equipment, earplugs, earmuff and acoustic helmets can be used for personal protection.

⑨ For choosing construction equipment, the equipment with low noise, small vibration and low energy consumption should be selected first, and the high noise equipment cannot be used for too long time. Improve the maintenance of construction machinery to avoid the louder mechanical noise caused by poor performance of equipment.

After taking the above noise control measures, the noise generated by the project construction has little impact on the surrounding acoustic environment.

6.4.1.5 Impacts on Water and Mitigation Measures

(1) Water environment impact analysis

During the project construction, the main sources of wastewater are production wastewater, domestic sewage and surface runoff generated by rainfall. Further, the water demand will increase during construction phase for meeting out drinking and domestic water requirement of workers.

① Construction wastewater

Production wastewater mainly includes washing wastewater of sand and gravel materials and washing wastewater of mechanical equipment. The total construction area of Panjin Bus Service Center is 5910m², and the total construction area of Fuxin Bus Service Center is 4000m². According to the "Liaoning Province Urban Living and Public Water Quota" (revised in 2015), the water quota is 0.6m³/m². By the standard of 80% of the water entering the materials, the construction wastewater of Panjin Bus Service Center is about 709.2m³, and the construction wastewater of Fuxin Panjin Bus Service Center is about 480m³. The wastewater contains SS, COD and a small amount of petroleum, which can be recycled after sedimentation and oil separation treatment. A small amount of wastewater is discharged into the municipal pipe network through the sedimentation tank, which has little impact on the municipal drainage network and sewage treatment system.

② Domestic sewage of construction person

In this project, during the construction of Fuxin and Panjin bus comprehensive service centers, the main pollutants in domestic sewage produced by construction workers are COD, SS, NH₃-N, etc., and the estimated concentration values are 300mg / L, 200mg / L and 35mg / L respectively. The water consumption of construction personnel is calculated as 50L/person d, and the pollution discharge coefficient is 0.8. If the number of construction personnel of Fuxin Public Transport Center is calculated as 40, the domestic sewage discharge during the construction period is 1.6m³/d. The number of construction personnel of Panjin Liaodong Bay Public Transport Center is calculated as 60, and the domestic sewage discharge during the construction period is 2.4m³/d.

After collection, it is discharged into the municipal pipe network and discharged after being treated by the municipal sewage treatment plant.

③ During construction in rainy season, sediment and dust will flow into the nearby municipal pipelines along with the rainwater. The erosion of rainwater on the construction site may block the urban drainage network system and cause the increase of

suspended solids concentration in the rainwater drainage system.

(2) Mitigation measures

It is suggested to take the following mitigation measures to reduce the negative impact of construction on water environment:

① Set up sedimentation tank to treat construction wastewater. After treatment, construction wastewater should be reused in the project as much as possible, such as sprinkling dust suppression and material mixing.

② Reasonably arrange the construction time, shorten the construction period and avoid the rainy season construction as far as possible.

③ During the construction period, through strengthening management, building cistern, and ensuring that underground water gushing can be discharged after processing the GB18918-2002 standard of pollutants discharged from municipal sewage treatment plants, the first level A standard can be discharged.

6.4.1.6 Solid Waste and Mitigation Measures

(1) Impact analysis of solid waste

The solid waste during the construction period is mainly divided into construction waste and domestic waste of construction personnel. If these wastes are not disposed, they will pollute the local soil, air and water environment.

① Construction waste

In this project, the demolition area of Fuxin bus service center is about 1200m². The amount of demolition waste is estimated at 0.70m³/m², and the total amount of demolition waste is estimated as 840m³. The construction waste will be collected and

discharged to the construction waste landfill designated by the local environmental sanitation department for back filling of low lying areas only if the area is covered afterwards with a good quality layer of topsoil of sufficient thickness, leaving no significant impact on environment.

② Domestic waste of construction personnel

Garbage bins should be arranged at appropriate places on the construction site to collect the domestic garbage of construction personnel, which should be transported to the municipal waste landfill site in time after collection.

③ Hazardous waste

The hazardous waste would mainly arise from the maintenance of equipment which may include used engine oils, hydraulic fluids, waste fuel, spent mineral oil/cleaning fluids from mechanical machinery etc.

(2) Mitigation measures

It is suggested to take the following measures to avoid and reduce the negative impact of solid waste generated during construction on the environment:

① The waste building materials should be sorted and stored in a centralized way. The recyclable parts should be purchased by recyclers. The parts that cannot be recycled should be sent to the designated place for storage. It is forbidden to mix with domestic waste for disposal, and it is forbidden to discard them at will.

② The waste construction waste generated in the construction process of the project shall be cleared and transported by a qualified unit. Transport to the relevant construction site for consumption or transport to the designated construction waste earthwork storage site, and manage according to the "urban construction waste management regulations".

③ Domestic waste should be collected centrally at the construction site and transported to the municipal landfill site in time.

The contractor will ensure that hazardous wastes from construction activity and equipment are labeled, recorded, stored in impermeable containment and for periods not exceeding mandated periods and in a manner suitable for handling storage and transport. The contractor shall maintain a record of sale, transfer, storage of such waste and make these records available for inspection. The contractor shall get Authorized Recyclers to transport and dispose Hazardous Waste, under intimation to the Project Management Company.

After taking the above preventive measures, the environmental impact of solid waste during the construction period is small.

6.4.1.7 Health and Safety

Occupational H&S: The construction works shall be undertaken in accordance with all applicable legislation and Chinese statutory requirements and guidelines, as well as the OHS requirements in the IFC/WB EHS general guideline.

To prevent community H&S issues during construction, contractor needs to implement the traffic management plan during construction, access to buildings, awareness and information sharing.

WHO has declared COVID-19 as a pandemic which has affected entire world including China. In view of the prevailing COVID-19 pandemic, the Contractor and workers would need to take additional measures to avoid the spread of the disease and shall follow various guidelines/guidance notes issued by the national/state government, WHO, World Bank/IFC from time to time. As described in these guidelines, the Contractor shall undertake a COVID-19 risk assessment of project area and prepare a COVID-19 Response and Management Plan.

(1) Appoint someone to take charge of epidemic prevention and control at the construction site, including disinfection, publicity and education, and keep in contact with departments for epidemic prevention.

(2) When entering or leaving the construction site, the personnel's body temperature will be measured every day.

(3) The workers' body temperature will be measured twice every day.

(4) When workers have suspicious symptoms, they should report to the epidemic prevention department timely and truthfully.

(5) If workers have close contact with the confirmed cases, they should immediately contact the epidemic prevention department for concentrated observation.

The constructors should provide dormitories for workers, and the dormitories should meet the following requirements:

(1) Priority should be given to the original houses on the construction site as workers' dormitories. When there is no original houses or houses are insufficient, the labor camp should be built to be used as workers' dormitories.

(2) The labor camp should have the necessary living space, and the per capita living area should not be less than 2.5 square meters.

(3)The labor camp should satisfy workers' production and living.

(4)The labor should be safe. It should meet the requirements of fire protection and environmental sanitation, which is beneficial to workers' health.

(5)The labor must meet the requirements of ventilating, bright, moisture-proof and warm.

6.4.1.8 Chance Finds

Project is in urban areas and there may be possibilities that some artifacts could be found

during piling and excavation work.

Mitigation Measures:

All workers will undergo a briefing to ensure safeguarding of heritage resource and cultural/religious practices.

If cultural relics and historical sites are found during the construction process, immediately stop the construction to protect the site; and immediately report to the cultural relics department, and take measures according to the requirements of the cultural relics department; work can only be resumed after obtaining the consent of the cultural relics.

6.4.2 Impacts and Mitigations during Operation Phase

During the operation period, positive impacts include: Key positive benefits are i) reduced air pollution, ii) increased employment opportunities, iii) improved economy, iv) traffic congestion reduction, and v) reduced fuel consumption. The potential negative impacts of the operation stage include the waste water generated by the stations and depots, the garbage produced by the bus service centers, energy and water consumption, the health and safety issues, and the scrapped buses and batteries that need to be replaced. These impacts will be effectively mitigated by management plans good design.

6.4.2.1 Impact Analysis and Mitigation Measures of Ambient Air

The impact of the project operation period on the ambient air is mainly positive, because the vehicles are electric buses, and there is no exhaust gas generated during operation, which helps to reduce the exhaust emissions of fuel vehicles and improve the urban air quality.

Although the positive effect is significant, if we do not take effective environmental

protection measures, the oil fume and waste gas from depots and canteens will also have adverse effects on the environment.

(1) Influence of VOC on environment in depot and mitigation measures

① Influence of VOC on environment in depots

The painting operation in the depots of this project will have certain adverse effects on the air and workers' health.

The main occupational hazard of painting is inhalation of VOC. All kinds of paints are composed of film-forming materials (various resins), solvents, pigments, desiccants and additives, containing toluene, xylene and other harmful substances. Spraying paint without protection, the concentration of benzene in the air of the workplace is quite high, which is harmful to the hematopoietic organs of the workers.

The paint mist formed in spray painting also affects human health. Among them, toughening agents in nitrocellulose paint and alkyd paint are toxic. In the process of rust removal, the evaporation of acid mist has a strong stimulating effect on the eyes and respiratory mucosa.

② Mitigation measures

The influence range of spray painting on the air is mainly concentrated in the scope of parking and maintenance field, and it will not have a great impact on the regional ambient air. The following measures can be taken to alleviate the problem:

Make full use of protective equipment. Use work clothes and hats, work shoes, protective glasses, masks (gas masks), etc. It can prevent solvent gas from being inhaled into the lung and contact with skin. The exposed skin can be applied with protective paste such as medical Vaseline, and the hands can also be applied with it, and washed off after construction.

Strengthen natural ventilation and local mechanical ventilation. If possible, spray booth should be set up and equipped with mechanical ventilation equipment. Meanwhile, oil curtain should be used to remove paint mist to solve the harm of toxic substances and paint mist to human body.

In places where the air cannot be circulated, the construction personnel should use air supply type masks, carry out intermittent operation, strengthen labor protection, and they cannot wash hands with solvents containing benzene to reduce the impact of harmful gases on human body.

Under the above measures, the influence of organic solvent vapor generated by maintenance and painting on ambient air is acceptable.

(2) Lampblack and exhaust gas from canteen

The two bus service centers in the project are equipped with canteens, and the main source of air pollution is the high-temperature lampblack waste gas produced by the cooking stove in the kitchen. The main pollutants are oil, organic matter and pyrolysis products.

② Mitigation measures

It is suggested that natural gas should be used as the energy source, and lampblack exhaust facilities should be installed. After the lampblack purifier is used to meet the requirements of GB 18483-2001 "lampblack emission standard for catering industry", it should be discharged to the exhaust port on the roof.

At the same time, fast-growing tree species can be planted along the edge of the site boundary, and a green isolation belt with a certain width can be set up to prevent the spread of odor, reduce the impact of odor on the surrounding environment, and ensure that the odor at the boundary meets the requirements of class II standard of emission

standard for odor pollutants (GB 14554-93).

6.4.2.2 Noise Impact Analysis and Mitigation Measures

(1) Noise control standards

In order to protect surrounding residents from noise, besides requiring bus depots, charging stations, etc. to implement strict emission standards during the operation period, it is also necessary to ensure that the noise in residential areas cannot exceed the standard value.

The standard value is determined according to the "Acoustic Environmental Quality Standard" (GB3096-2008). Different noise standard values are adopted according to the area where the noise source is located (see Table 6-8).

Table 6-8 Acoustic environmental quality standards^{Note}

Acoustic environment functional area category		Noise standard (dB(A))	
		Daytime	Night
0 Class		50	40
1 Class		55	45
2 Class		60	50
3 Class		65	55
4 Class	4a Class	70	55
	4b Class	70	60

Note: Scope of application: this standard specifies the environmental noise limits and measurement methods for five types of environmental function zones. This standard applies to the assessment and management of acoustic environment quality. The "Acoustic Environmental Quality Standard" is an environmental standard, not an emission standard. Monitoring data can be used as a reference, but it cannot be used as a basis for law enforcement.

(2) Analysis on noise impact of electric bus

Because electric buses are driven by electricity, the noise during operation is far less than that of fuel vehicles and gas vehicles.

(3) Analysis on noise influence of charging station

The charging pile will generate heat energy during charging, and noise will be generated during equipment operation during heat dissipation. The charging pile belongs to the category of commercial service, and its noise standard can be implemented according to the emission standard of noise from social living environment (GB 22337-2008)(Table 6-9).

In this project, most charging piles are installed in the bus parking lot, which has a certain distance from the surrounding residential areas, so the noise impact is limited. For the charging piles less than 50 meters between the installation site and residential area, it is suggested to install sound insulation board and strengthen greening to reduce the impact of noise on Residents' life during the use.

Table 6-9 Noise emission limits at the boundary of social life noise emission sources^{Note}

Functional area category	NoisedB(A)	
	Daytime	Night
1	55	45
2	60	50
3	65	55
4	70	55

Note: Scope of application: this standard specifies the noise emission limits and measurement methods of equipment and facility boundary that cause environmental noise pollution. This standard applies to the management, evaluation and control of equipment and facilities that emit noise to the environment. "Social life noise emission source boundary noise emission limit" is the basis for law enforcement executives to conduct noise supervision.

(4) Noise impact analysis of bus service center

After the construction of the two bus service centers in the project, the noise emission of

vehicles at low speed and the equipment noise of detection and maintenance workshops are mainly generated.

The proposed Fuxin Public Transport Service Center is close to the main traffic lines. According to the "Acoustic Environmental Function Zone Classification" in the Acoustic Environmental Quality Standard (GB 3096-2008), the public transport service center area belongs to Class 4a Acoustic Environmental Function Zone. In accordance with the "Environmental Noise Emission Standards at the Boundary of Industrial Enterprises" (GB12348-2008), the noise cannot be higher than the value of the category 4 functional area limit (see Table 6-10).

The north side of the proposed Fuxin Public Transport Service Center is a two-lane road to be built, and a new residential area is adjacent to the road. Since there are no schools, hospitals, nursing homes and other key sensitive areas around, the bus service center is determined to be adjacent to the first class area. Refer to Article 8.3 of "Technical Specification for Division of Acoustic Environment Function Zones" (GB/T15190), the outer boundary of Class 4a Acoustic Environment Function Zone is within 50m. The implemented noise standard (dB(A)) is no more than 70 dB(A) during the day and no more than 55 dB(A) at night (see Table 6-8).

Panjin Public Transport Service Center is close to the urban expressway (according to GB/T50280), and there are no residential areas around it. However, considering the overall control of urban noise, it is implemented in accordance with the "Environmental Noise Emission Standards for Industrial Enterprises" (GB12348-2008) Limit emissions of category 4 functional zones (see Table 6-). The implemented noise standard (dB(A)) is no more than 70 dB(A) during the day and no more than 55 dB(A) at night (see Table 6-10).

It is suggested that the management should be strengthened, the speed of vehicles entering and leaving the site should be limited, and the detection work should be carried out indoors. The noise generating equipment such as water pump and distributor should be high-quality and low-noise equipment, and the noise equipment should be treated with

sound insulation and vibration reduction. At the same time, equipment maintenance should be strengthened to prevent the abnormal operation of equipment from producing excessive noise.

Table 6-10 Environmental noise emission limits at the boundary of industrial enterprises dB(A)

Functional area category	Daytime	Night
1	55	45
2	60	50
3	65	55
4	70	55

(5) Intelligent scheduling platform

Intelligent dispatching platform in the project operation period is conducive to the improvement of a faster traffic system, from the perspective of integrity and long-term, it has a positive impact on urban traffic noise control.

6.4.2.3 Water Environment Impact Analysis and Mitigation Measures

(1) Characteristics of wastewater quality

The main impact on the water environment will be the sewage generated by the bus service centers in Panjin and Fuxin.

According to the engineering analysis, the waste water generated during the operation period is mainly divided into two parts, one is the oily wastewater from vehicle maintenance and the other is the wastewater from staff office and living, mainly including canteen washing water, cleaning and sanitation drainage and toilet flushing water.

There are 25 employees during the operation period of Fuxin Bus Service Center. According to the "Liaoning Provincial Water Standards" (DB21T 1237—2015), the

average water consumption is 40L/(person d).30 drivers take a short break at the service center every day, and the average water consumption3L/(person d)). Bycalculating, the sewage discharge coefficient is 0.8, then the domestic sewage discharge is 0.872m ³d.

During the operation period, there are 40 employees, and 30 people take short breaks every day in Panjin Bus Service Center. The domestic sewage discharge is 1.325m ³d. The number of washing cars per day is about 60. According to the washing standard of 40 liters/vehicle, the vehicle washing wastewater is 2.4m ³d.

The main pollutants of vehicle washing wastewater are COD, BOD₅, petroleum, etc. The main pollutants in domestic sewage are COD, BOD₅, animal and vegetable oil, ammonia nitrogen, etc. By analogy with similar projects, the quality prediction of discharged sewage is shown in table 6-11.

Table 6-11 Prediction of wastewater discharge indicators during operation period

Sewage source	Predicted value of sewage index				
	Oily sewage from vehicle maintenance	pH	COD(mg/L)	BOD ₅ (mg/L)	Petroleum(mg/L)
7.8		425	127	40	
Waste water from washing vehicles	pH	COD(mg/L)	BOD ₅ (mg/L)	Petroleum(mg/L)	
	8.1	300	30	23.1	
Domestic sewage	pH	COD(mg/L)	BOD ₅ (mg/L)	Animal and vegetable oils(mg/L)	NH ₃ -N(mg/L)
	7.5~8.0	300	200	8	40

(2) Treatment and discharge of wastewater

Fuxin Bus Service Center only has domestic sewage. Under the Fuxin Bus Service Center, there is now a mature municipal drainage pipe network. The domestic sewage generated by the Fuxin Service Center can be concentrated to the urban sewage treatment

plant through the municipal drainage pipe network.

The domestic sewage generated during the operation of Panjin Bus Service Center will be collected by the urban sewage pipe network and then enters the urban sewage treatment plant.

The maintenance and car wash wastewater of Panjin Bus Service Center must be treated by the sewage treatment facilities or by purchasing and installing sewage treatment equipment to deal with it. It is recommended that after the sewage passes through the sewage treatment process, it meets the requirements of the GB/T18920-2002 "Urban Sewage Recycling and Urban Miscellaneous Water Quality" (water for greening, toilet flushing and vehicle washing), and it should be reused.

Sewage treatment facilities shall be designed and constructed by qualified units. Meanwhile, in order to ensure the treatment effect of the oil separating tank, the environmental sanitation department should be ordered to lay aside the waste oil regularly and salvage the sediment. The septic tank should be cleaned regularly to ensure its treatment effect.

After the above treatment, the wastewater generated by the project will not affect the surrounding surface water.

6.4.2.4 Environmental Impact Analysis and Mitigation Measures of Solid Waste

(1) Environmental impact analysis of solid waste

The solid waste during the operation period of the project mainly includes the domestic garbage on the bus during the operation, the domestic garbage from the bus service center and parking lot, and the solid waste generated by vehicle maintenance.

① Solid waste from vehicle maintenance

The solid waste of vehicle maintenance wastewater after evaporation and drying, which contains mineral oil, belongs to hazardous waste. It should be collected, stored and disposed in accordance with the relevant regulations of the state. It is strictly prohibited to mix domestic waste and construction waste.

According to estimates based on bus operating data in Panjin and Fuxin, electric bus batteries are replaced in about 8 years, storage battery will be replaced in about 3 to 4 years, and tires are replaced according to mileage and wear. The oil is changed according to the mileage and actual operating conditions. The estimated amount of solid waste generated by the two maintenance plants each year is shown in Table 6-12.

Table 6-12 Estimated value of solid waste generated annually¹

Classification	Waste battery	Waste tires	Waste oil (tons)	Number of maintenance vehicles per year
Panjin	50	600	1	120
Fuxin	142	342	3.3	285

Note: The data comes from Panjin and Fuxin bus companies.

Waste batteries, used batteries, waste tires, waste parts and other solid waste need licensed, professional and qualified agencies for recycling and proper disposal, so as to reduce the pollution of soil and surrounding water.

② Domestic waste

Calculated by the standard of 0.5 kg/d of fixed personnel and 0.1 kg/d of floating personnel, the amount of domestic waste during the operation period of the two bus service centers: 15.5kg/d in Fuxin and 23kg/d in Panjin. After being collected at designated points, all domestic wastes are cleared and disposed by local environmental sanitation department, which has little impact on the environment.

(2) Mitigation measures

The following measures should be taken to avoid the harm of solid waste to the environment:

①Waste batteries are recycled by vehicle manufacturers or disposed by qualified renewable resources companies.

In January 2018, the Ministry of Industry and Information Technology, the Ministry of Science and Technology, the Ministry of Environmental Protection, the Ministry of Transport, the Ministry of Commerce, the General Administration of Quality Supervision, Inspection and Quarantine, and the National Energy Administration jointly issued the "Interim Management of Recycling and Utilization of New Energy Vehicle Power Batteries" Measures" (Ministry of Industry and Information Technology Lianjie [2018] No. 43). The regulations require that "automobile manufacturers should establish power battery recycling channels to be responsible for the recovery of waste power batteries generated after the use and scrapping of new energy vehicles." In July 2018, the Ministry of Information Technology issued the "Interim Provisions on the Retrospective Management of New Energy Vehicle Recycling" (Announcement No. 35, 2018 of the Ministry of Industry and Information Technology of the People's Republic of China), which requires "the production, sales, use, and collect information throughout the entire process of scrapping, recycling, and utilization, and monitor the performance of recycling responsibilities by entities in each link." Electric vehicle manufacturers must establish a "traceability" system with battery manufacturers and their sales departments to ensure The battery is 100% recycled.

②Waste tires and spare parts are collected and recycled by qualified recycling units.

③Waste mineral oil and sediment should be timely skimmed and salvaged, collected in barrels and temporarily stored in independent rooms, and then they will timely be entrusted to relevant qualified units for clearing, transportation and disposal.

④The sludge produced by sewage treatment facilities should be collected and dehydrated

before being transported and disposed by the sanitation department.

⑤The domestic garbage generated by the project should be collected in a centralized way and then be regularly cleared and transported by the environmental sanitation department.

The above measures can ensure 100% disposal of all kinds of solid waste in the project.

6.5 Social Risk Analysis

The implementation of the project usually has a certain negative impact on the surrounding residents. These negative effects may become the root cause of aggravating social conflicts. The sensitive receptor is the Yintong Bocuiyuan in project influenced areas. How to identify the possible social risks caused by the negative impact of a project in advance and put forward the measures and suggestions to avoid and reduce the social risks is the focus of analysis and discussion in environmental and social assessment.

The sensitive receiver is the Yintong Bocuiyuan in project influenced areas.

6.5.1 Social Risks and Mitigation Measures before Construction

On the newly opened lines, there were no private or other companies operating, only taxis. After the buses of the newly opened lines of this project are operated, they will compete with taxis in the same area. In addition, buses have the competitive advantages of low fares and strong public service, which may affect the income of taxi operators. If the revenue of taxi operators drops a lot, the project will face the risk of being boycotted.

The survey found that the customers who take taxis are mainly young and middle-aged people with better economic conditions. Most of them pursue the comfort and convenience of travel. The investment in buses has little effect on the choice of travel modes for these passengers. Therefore, the impact on taxi operators is limited. In addition,

the bus company stated that it would give priority to accepting qualified taxi and their families to work in the bus company.

6.5.2 Social Risks and Mitigation Measures in Construction Period

The environmental impact during the construction period is short-term. See table 6-13 and table 6-14 for the analysis of environmental and social impact factors during the construction period.

See Table 6-15 for social risk mitigation measures during construction.

Table 6-13 Identification and analysis of environmental impact factors during the construction period

Environmental factors	Influencing factors	Environmental impact description
Land/Ecosystem	Temporary land occupation	Temporary land occupation destroys vegetation and changes land functions.
	Construction activity	The stacking of spoil and construction materials will bring certain negative impacts on urban ecology and landscape.
Water Environment	The life of a construction worker	Improper management of domestic sewage enters the water body and affects water quality.
	Construction water	Mud water produced by construction may affect the water body
Acoustic environment	Construction machinery	The impact of noise from construction machinery on sensitive points of acoustic environment near the work site
	transport vehicle	Noise impact of transportation vehicles on sensitive points along the line
	Device installation	Noise caused by equipment installation and construction
Air Environment	Construction excavation, construction material transportation	Dust from construction may cause air pollution in nearby areas

Table 6-14 Identification table of social risk factors during the construction period

No.	Risk category	Risk factor	Situation description
1	Environmental risk	Noise	<p>If no measures are taken to control the noise during the construction period, it may affect the quality of the residents' living quality and easily cause social risks such as petitions by the masses.</p> <hr/> <p>Risks caused by construction noise affecting surrounding commercial and residential areas.</p>
		Sewage	<p>Improper discharge and treatment of production and domestic wastewater during the construction period can easily cause adverse effects on the production and life of local residents</p>
		Solid Waste	<p>If the construction waste generated during the construction period and the domestic waste generated in the construction residential area are not disposed of in time, it will have a certain impact on the daily production and life of the surrounding people, and then it will trigger the unstable social mood of the people.</p>
		Air pollution	<p>Construction dust will have a certain impact on the landscape and environmental sanitation, and may cause complaints and disputes when the nearby residential areas are seriously polluted, which will trigger social stability risk events</p>
2	Health & Safety	Construction accident	Risks caused by construction accidents
3	Reputational risk	Media Orientation and Its Influence	<p>If the publicity and scope of the project construction are insufficient and the masses do not understand the construction of the project, it will easily cause the masses to oppose the project construction due to their ignorance of the project.</p>
			<p>In the process of project construction, if there are negative effects such as environmental disturbance, ecological deterioration, noise, etc., which cannot be dealt with in a timely manner, it may cause network "surrounding" and even induce mass incidents. Failure to pay attention to media guidance and take timely measures will induce potential social stability risk.</p>

Table 6-15 List of social risk mitigation measures during the construction period

No.	Risk factors	Main prevention and resolution measures	Implementation time and requirements	Responsible subject	Supervisory agency
1	Environmental impact	<ol style="list-style-type: none"> 1. Strictly require and supervise the civilized construction of the contractor to reduce disturbance to the people 2. Actively carry out environmental monitoring during the construction period, and deal with environmental problems in a timely manner. 3. Make a good construction design and strictly control the daily construction period. 4. Strictly implement environmental impact mitigation measures. 	<p>Time: all stages Claim:</p> <ol style="list-style-type: none"> 1. Strictly implement environmental protection measures and environmental protection projects. 2. Timely discover and solve environmental problems caused by project construction and operation. 3. Monitor according to the corresponding national standards 	Construction contractor, subproject office	Project City Environmental Protection Bureau
2	Project construction management	<ol style="list-style-type: none"> 1. Select qualified and capable construction and supervision units. 2. The contractor is required to have a strict and reasonable quality management system. 3. Regularly inspect the contractor and require the contractor to construct in a civilized manner. 4. Organize safety training before the start of construction, and regularly carry out safety education during the construction period to improve safety awareness. 	<p>Time: construction phase Requirements: Establish a management system and formulate plans</p>	Construction contractor, supervision company	Security functional department, sub-project office

Table 6-15 List of social risk mitigation measures during the construction period (cont.)

No.	Risk factors	Main prevention and resolution measures	Implementation time and requirements	Responsible subject	Supervisory agency
2	Project construction management	5. Develop safety emergency plans and conduct drills to ensure that unexpected situations can be dealt with in a timely and effective manner.	Time: construction phase Requirements: Establish a management system and formulate plans	Construction contractor, supervision company	Security functional department, sub-project office
3	Media opinion	<p>1. Strengthen the guidance of public opinion and pay attention to information disclosure and positive publicity reports.</p> <p>2. Encourage public participation and supervision, and jointly create a good public opinion environment.</p> <p>3. Give full play to the supervisory role of public opinion and make positive publicity reports.</p> <p>4. Conduct correct public opinion guidance on negative impacts</p> <p>5. Coordinate the publicity of the Bus Company and the news media, and introduce the basic situation of the project and the impact of operation and production to the residents after the start of construction. Answer the residents' questions about the project and listen to the residents' suggestions, so that everyone knows and has no doubts.</p>	<p>Time: the whole process</p> <p>Claim:</p> <p>Public opinion guidance, information disclosure, objective resolution, positive publicity</p>	Subproject office	The relevant departments of the territorial government

6.5.3 Social Risks and Mitigation Measures during Operation Period

Different from the construction period, the negative environmental impact in the operation period is long-term, and the environmental and social risk analysis is also long-term.

See table 6-16 and table 6-17 for the analysis of environmental and social impact factors during the operation period.

Table 6-16 Identification and analysis of environmental impact factors during the operation period

Environmental factors	Influencing factors	Environmental impact description
Water environment	Staff domestic water	Improper treatment will affect the water quality of surrounding water bodies
	Waste water from bus wash	Improper treatment will affect the water quality of surrounding water bodies
Solid waste	Domestic garbage	If not handled properly, it will pollute the environment
	Sludge from sewage treatment station	If the sludge of the sewage treatment station is improperly treated, it may affect the surrounding water body and cause bad smell
	Disused battery in bus	If the waste battery is not handled properly, it may affect the soil and water environment
	Solid waste generated in the repair shop	If the solid waste generated in the depot is not properly handled, it may affect the soil and water environment.
Acoustic environment	Vehicle noise and charging pile noise	If the distance is within 20 meters, and there are no barriers and noise reduction measures, it will affect the normal life of the residents.
Atmospheric environment	Fume from the canteen of the service center	Keeping untreated will affect local air quality

Table 6-17 Identification and analysis of social risk factors during the operation period

No.	Risk category	Risk factor	Situation description
1	Ecological environment risk	Sewage	<p>During the operation period, if the domestic sewage generated by employees is discharged and treated improperly, it may have an adverse impact on the livelihood of local residents</p> <hr/> <p>If the waste water generated in parking lots, bus washes, and depots is not treated, it will adversely affect the production and life of local residents.</p>
		Solid Waste	<p>Domestic garbage generated during the operation period, sludge from sewage treatment stations, discarded batteries from buses, and solid waste from maintenance workshops, if not processed in time or improperly processed, will have a certain impact on the daily production and life of the surrounding people.</p>
2	Project operation risk	Equipment Failure	Risks caused by equipment failure
3	Community health and safety risks	Fire at the charging station	A fire in an electric bus charging station will bring community health and safety risks.
4	sexual harassment	Bad male	Women are at risk of being sexually harassed when they take the bus.
5	digital gap for elders and disables	Smart payment, ride	The use of WeChat payment and mobile APP to ride the car brings inconvenience to the elderly and the disabled.
6	Public opinion risk	Media Orientation and Its Influence	Failure to pay attention to media guidance and take timely measures will induce potential social stability risk factors

Social risk mitigation measures during the operation period(see Table6-18).

Table 6-18 List of social risk mitigation measures during the operation period

No.	Risk factors	Main prevention and resolution measures	Implementation time and requirements	Responsible subject	Supervisory agency
1	Environmental impact	During operation, various measures shall be implemented in accordance with the specific requirements of the environmental management plan.	Time: Operational stage Requirements: Monitoring according to the corresponding national standards	Bus Company	Project City Environmental Protection Bureau
2	Project operation	<ol style="list-style-type: none"> 1. Fully implement the "Safety Production Law" and strengthen institutionalized, standardized and scientific safety management; 2. Establish a safety inspection system to prevent operation accidents; 3. Establish an emergency rescue system to enhance emergency response capabilities; 4. Establish an accident handling mechanism and implement a system of accountability; 5. The command center (computer room) where smart equipment and software are installed must take anti-static measures to prevent static electricity from harming equipment and people; 6. Equipped with automatic fire alarm system and emergency broadcasting system, all personnel can be notified in time when there is an emergency; 7. Set up evacuation signs in the station and office area to ensure safe passage; 8. Set up emergency lighting at main passages and entrances; 	Time: Operation period Requirement: Establish management system and make plan	Bus Company	Local transportation authorities

Table 6-18 List of social risk mitigation measures during the operation period (cont.)

No.	Risk factors	Main prevention and resolution measures	Implementation time and requirements	Responsible subject	Supervisory agency
2	Project operation	9. The metal shell, metal base, cable protection tube and all metal brackets of all electrical equipment are connected with the grounding device, and are equipped with safety grounding, safety short circuit protection, and over current protection devices to ensure the safety of electricity.	Time: Operation period Requirement: Establish management system and make plan	Bus Company	Local transportation authorities
3	Community health and safety risks	A fire in an e-bus charging station will bring community health and safety risks. Charge in strict accordance with operating procedures and take necessary measures (see Table 9-1) to reduce this risk.	Time: Operation period Requirement: Establish management system and make plan	Bus Company	Fire department
4	sexual harassment	The newly purchased electric buses of the bus company are equipped with monitoring equipment, which can effectively prevent the occurrence of sexual harassment, provide a safe riding environment, and protect women's rights.	Time: Operation period Requirement: Ensure good performance of monitoring equipment	Bus Company	Public security bureau
5	digital gap for elders and disables	1. Retain traditional services by retaining manual services and cash payments. 2. Retain valid and free bus ride certificates such as the Respect for the Elderly Card, the Disabled Person's Card, etc., to ensure the inclusive service.	Time: Operation period Requirements: Guarantee the convenience of the elderly and the disabled	Bus Company	Local transportation authorities
6	Media opinion	1. Give full play to the supervisory role of public opinion and make positive publicity reports; 2. Conduct correct public opinion guidance on negative influences.	Time: the whole process Requirements: public opinion guidance, information disclosure, objective resolution, positive publicity	Bus Company	Relevant departments of the project city government

6.5.4 Social Risk Analysis before and after Taking Mitigation Measures

This assessment adopts qualitative judgment to evaluate the probability and degree of various social contradictions that may be triggered by the project, and evaluates the impact of the project with the risk level of the project, and ultimately determines the risk level of the project.

The risk level is divided into five grades: significant, major, moderate, minor, minimal, and the criterion of specific degree are shown in table 6-19.

Table 6-19 Risk Degree Judgment Table

Risk level	Situation description	Nature of risk
significant	The possibility of occurrence is large and the social impact and loss are large. The impact and loss are unacceptable. Active and effective preventive measures must be taken.	Unacceptable
major	The possibility is large, or the social impact and loss are large. The impact and loss are acceptable, and certain preventive and mitigating measures need to be taken.	Conditional acceptance
moderate	The possibility is not large, or the social impact and loss are not large, and generally it does not affect the implementation of the project, and certain preventive measures should be taken.	Tolerable
minor	The possibility is small, or the social impact and loss are small, and it does not affect the implementation of the project.	Can bear
Minimal	The possibility is small, and the social impact and loss are small, and the impact on the project is small	Negligible

6.5.4.1 Pre-mitigation Risk Level Determination

Before mitigation measures are taken, the risk of negative environmental and social impacts is defined as the pre-mitigation risk.

The qualitative method is used to further analyze, predict and estimate each major risk factor. Forecast and estimate the possible risk events, Analyze the possibility of risk

events. Estimate the probability of occurrence. Analyze the impact degree (consequence), and judge the risk level, as shown in table 6-20. It is determined that there are three general and one small single factor risks in the project.

Table 6-20 Summary of pre-mitigation risks

No.	Risk factors	Risk probability	Influence significance	Risk level
1	Environmental impact	Medium	Moderate	Moderate
2	Project construction risk	Low	Major	Moderate
3	Project operation risk	Low	Major	Moderate
4	Social risk	Low	Minor	Minor

According to the analysis and judgement, the total risk of the project contains 3 risk factors which belong to a tolerable extent, and The number 1series are risk factors that can be assumed to the extent. The figure of the pre-mitigation risk factor is shown in Figure 6-13.

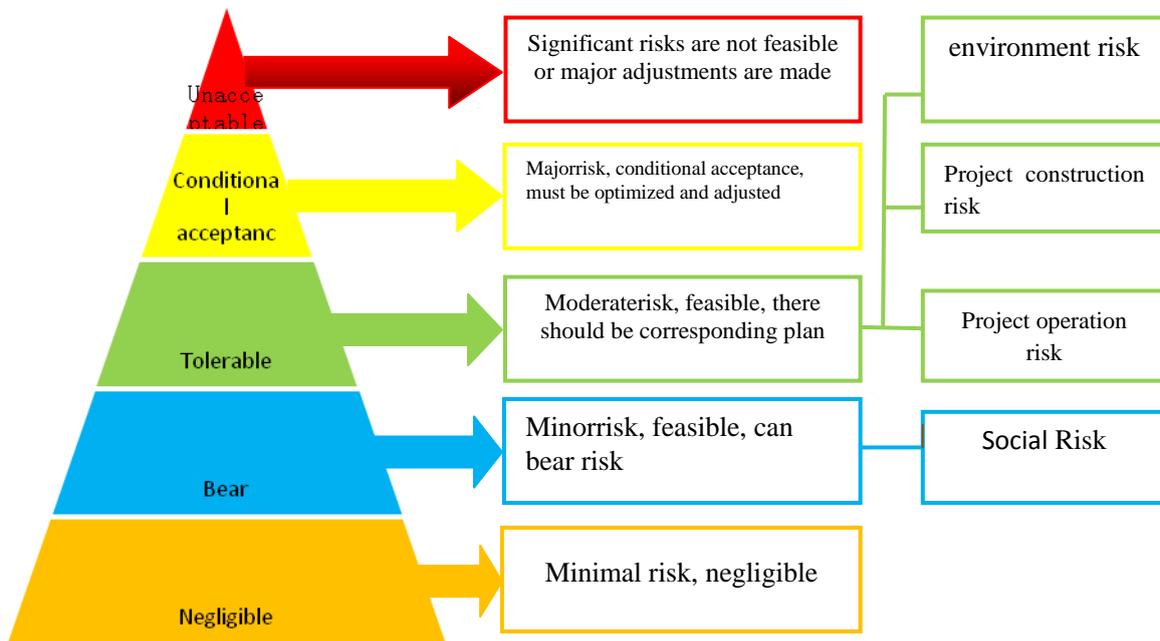


Figure 6-11 Nature of pre-mitigation risk factors

After verification, the pre-mitigation risk level of the project is moderate.

6.5.4.2 Residual Risk Assessment

After the corresponding countermeasures as well as the emergency plan are implemented

in place, the occurrence probability and influence degree of the project risk will obviously decrease, and the remaining risk is the residual risk. The expected residual risk level after taking measures is small.

Table 6-21 Summary of levels of residual risk factors

No.	Risk factors	Risk probability	Influence level	Risk level
1	environmental impact	Low	Minor	Minor
2	Project construction risk	Low	Moderate	Minor
3	Project operation risk	Low	Moderate	Minor
4	Social risk	Low	Moderate	Minimal

Through comprehensive analysis, it is considered that the pre-mitigation environmental and social stability risk level of the project is the general level. After taking preventive and resolving measures and supporting emergency plans, the expected residual risk level is small. Therefore, the implementation of the project has little negative impact on the environment and society.

6.6 Gender Analysis in Project Areas

6.6.1 The development situations of Women in Project Areas

Promoting women's development and gender equity is the foundation of building a harmonious society in China. China promulgated “the Outline of Chinese Women's Development (2011-2020)” in 2011 to promote the development of women.

6.6.1.1 Women's Education Review

The gender equity in education will allow different genders to have the same opportunity to share various resources in social economy, politics and so on. Therefore, it is often regarded as the bottom line of the social equity. The 2019 statistical monitoring report of “the Outline of Chinese Women's Development (2011-2020)” shows that more than half of Chinese women receive higher education. There were 1.448 million female students receiving postgraduate education in 2019. 15.679 million and 3.923 million female students received education in general college and adult college, accounting for 51.7%

and 58.7% respectively.

The education level of female teachers in Liaoning Province is shown in table 6-22.

Table 6-22 Distribution of education level over 6 years old (2019)¹

Education level	Male	Female	Total	Percentage of women
No Schooling	202	409	611	66.9
Primary Education	2844	3465	6309	54.9
Junior Middle School Education	7475	6990	14465	48.3
Senior Middle school Education	2053	1940	3993	48.6
Secondary vocational school Education	822	737	1559	47.3
Post-secondary Education	1469	1408	2877	48.9
College Education	1303	1169	2472	47.3
Postgraduate Education	104	123	227	54.2
Total number of People at the age of 6 and above	16272	16241	32513	49.95

Note1: The Statistics of sampling survey on the change of national population in 2019

6.6.1.2 Employment Situation of Women

Nowadays, women's equal employment right is an important symbol of the realization of equality between men and women and the progress of social civilization. Among China's 1.4 billion people, women account for about half of the country's population. They are the indispensable backbone of social and economic development. In 2019, the Ministry of Human Resources and Social Security and other nine departments issued “the Notice on Further Standardizing Recruitment Process and Promoting women's employment”, which specifies six kinds of sex discrimination behaviors that cannot be implemented, and provides strong support for ensuring women's equal right to employment.

The tables show the proportion of women in various industries in the project areas, of which women occupy a larger proportion in education, health and social work (Table

6-23 to Table 6-28).

Table 6-23 Proportion of female employees in legal entities in Liaoning Province (2018)^{1,2,3}

Industry	Total (Ten thousand people)	Number of women (Ten thousand people)	%
Mining	27.39	6.01	21.94
Manufacturing	234.02	74.97	32.04
Electricity, heat, gas and water production and supply industry	19.09	4.61	24.15
Construction business	85.14	14.46	16.98
Wholesale and retail	80.63	37.28	46.24
Transportation, storage and postal services	46.04	10.89	23.65
Accommodation and catering	11.42	6.42	56.22
Information transmission, software and information technology services	24.25	10.52	43.38
Financial business	58.74	35.25	60.01
Real estate business	31.16	13.14	42.17
Leasing and commercial services	49.03	17.77	36.24
Scientific research and technology services	21.82	7.69	35.24
Water conservancy, environment and public facilities management	10.80	3.89	36.02
Residential services, maintenance and other services	8.41	3.31	39.36
Education	61.23	40.60	66.31
Health and social work	39.00	27.07	69.41
Culture, sports and entertainment	8.70	3.99	45.86
Public administration, social security and social organizations	81.24	30.30	37.30
Total	902.16	349.37	38.73

Note: 1. The data come from “the announcement of the fourth national economic census of Liaoning Province”.

2. The total number includes legal entities engaged in agriculture, forestry, animal husbandry, fishery and auxiliary activities.

3. The legal entities in the table do not include the entity managed by the State Railway Administration and China Railway Corporation, as well as the units supervised by the CIRC (formerly CIRC) and the CSRC.

Table 6-24 Proportion of female employees in legal entities in Panjin (2018)^{1,2,3}

Industry	Total (Ten thousand people)	Number of women (Ten thousand people)	%
Mining	90397	33018	36.53
Manufacturing	66298	19709	29.73
Electricity, heat, gas and water production and supply industry	6135	1889	30.79
Construction business	38129	7782	20.41
Wholesale and retail	24160	10818	44.78
Transportation, storage and postal services	11373	3205	28.18
Accommodation and catering	3218	1927	59.88
Information transmission, software and information technology services	4021	1589	39.52
Financial business	7007	3698	52.78
Real estate business	12667	5638	44.51
Leasing and commercial services	10924	4114	37.66
Scientific research and technology services	6575	2321	35.30
Water conservancy, environment and public facilities management	10023	4039	40.30
Residential services, maintenance and other services	2244	982	43.76
Education	18502	12858	69.50
Health and social work	10290	7589	73.75
Culture, sports and entertainment	1875	877	46.77
Public administration, social security and social organizations	38147	15105	39.60
Total	363675	137525	37.82

Note: 1. The data come from “The announcement of the fourth national economic census of Panjin”.

2. The total number includes legal entities engaged in agriculture, forestry, animal husbandry, fishery and auxiliary activities.

3. The legal entities in the table do not include the entity managed by the State Railway Administration and China Railway Corporation, as well as the units supervised by the CIRC (formerly CIRC) and the CSRC.

Table 6-25 Proportion of female employees in legal entities in Yingkou (2018)^{1,2,3}

Industry	Total (Ten thousand people)	Number of women (Ten thousand people)	%
Mining	8152	1986	24.36
Manufacturing	144040	39718	27.57
Electricity, heat, gas and water production and supply industry	7261	1924	26.50
Construction business	35131	5583	15.89
Wholesale and retail	34566	16610	48.05
Transportation, storage and postal services	35479	7946	22.40
Accommodation and catering	6951	4062	58.44
Information transmission, software and information technology services	6064	2736	45.12
Financial business	10489	5500	52.44
Real estate business	8847	3835	43.35
Leasing and commercial services	21774	4647	21.34
Scientific research and technology services	5151	1757	34.11
Water conservancy, environment and public facilities management	3140	1169	37.23
Residential services, maintenance and other services	2374	964	40.61
Education	25577	17940	70.14
Health and social work	18684	12855	68.80
Culture, sports and entertainment	2553	1291	50.57
Public administration, social security and social organizations	50417	19106	37.90
Total	428147	150191	35.08

Note: 1. The data come from “The announcement of the fourth national economic census of Yingkou”.

2. The total number includes legal entities engaged in agriculture, forestry, animal husbandry, fishery and auxiliary activities.

3. The legal entities in the table do not include the entity managed by the State Railway Administration and China Railway Corporation, as well as the units supervised by the CIRC (formerly CIRC) and the CSRC.

Table 6-26 Proportion of female employees in legal entities in Jinzou (2018)^{1,2,3}

Industry	Total (Ten thousand people)	Number of women (Ten thousand people)	%
Mining	2894	341	11.78
Manufacturing	78587	24045	30.60
Electricity, heat, gas and water production and supply industry	9066	2361	26.04
Construction business	39410	7566	19.20
Wholesale and retail	27126	13933	51.36
Transportation, storage and postal services	15247	4193	27.50
Accommodation and catering	3900	2483	63.67
Information transmission, software and information technology services	4308	1814	42.11
Financial business	17504	9395	53.67
Real estate business	11154	5061	45.37
Leasing and commercial services	11799	4272	36.21
Scientific research and technology services	8485	3238	38.16
Water conservancy, environment and public facilities management	4812	1731	35.97
Residential services, maintenance and other services	5070	1807	35.64
Education	36387	23668	65.05
Health and social work	23346	15427	66.08
Culture, sports and entertainment	4577	2189	47.83
Public administration, social security and social organizations	58374	20293	34.76
Total	367912	150191	40.82

Note: 1. The data come from “The announcement of the fourth national economic census of Jinzou”.

2.The total number includes legal entities engaged in agriculture, forestry, animal husbandry, fishery and auxiliary activities.

3.The legal entities in the table do not include the entity managed by the State Railway Administration and China Railway Corporation, as well as the units supervised by the CIRC (formerly CIRC) and the CSRC.

Table 6-27 Proportion of female employees in legal entities in Huludao (2018)^{1,2,3}

Industry	Total (Ten thousand people)	Number of women (Ten thousand people)	%
Mining	2894	341	11.78
Manufacturing	78587	24045	30.60
Electricity, heat, gas and water production and supply industry	9066	2361	26.04
Construction business	39410	7566	19.20
Wholesale and retail	27126	13933	51.36
Transportation, storage and postal services	15247	4193	27.50
Accommodation and catering	3900	2483	63.67
Information transmission, software and information technology services	4308	1814	42.11
Financial business	17504	9395	53.67
Real estate business	11154	5061	45.37
Leasing and commercial services	11799	4272	36.21
Scientific research and technology services	8485	3238	38.16
Water conservancy, environment and public facilities management	4812	1731	35.97
Residential services, maintenance and other services	5070	1807	35.64
Education	36387	23668	65.05
Health and social work	23346	15427	66.08
Culture, sports and entertainment	4577	2189	47.83
Public administration, social security and social organizations	58374	20293	34.76
Total	367912	150191	40.82

Note: 1. The data come from “The announcement of the fourth national economic census of Jinzhou”.

2.The total number includes legal entities engaged in agriculture, forestry, animal husbandry, fishery and auxiliary activities.

3.The legal entities in the table do not include the entity managed by the State Railway Administration and China Railway Corporation, as well as the units supervised by the CIRC (formerly CIRC) and the CSRC.

Table 6-28 Proportion of female employees in legal entities in Fuxin (2018)^{1,2,3}

Industry	Total (Ten thousand people)	Number of women (Ten thousand people)	%
Mining	17586	2132	12.12
Manufacturing	41780	14546	34.82
Electricity, heat, gas and water production and supply industry	8054	1601	19.88
Construction business	21228	3396	16.00
Wholesale and retail	19822	9473	47.79
Transportation, storage and postal services	4309	1295	30.05
Accommodation and catering	2312	1326	57.35
Information transmission, software and information technology services	3178	1403	44.15
Financial business	6067	2960	48.79
Real estate business	5657	2438	43.10
Leasing and commercial services	5952	2127	35.74
Scientific research and technology services	3280	1142	34.82
Water conservancy, environment and public facilities management	2590	936	36.14
Residential services, maintenance and other services	1935	787	40.67
Education	26521	17527	66.09
Health and social work	15553	10780	69.31
Culture, sports and entertainment	2245	1037	46.19
Public administration, social security and social organizations	47593	20016	42.06
Total	239762	95928	40.01

Note: 1. The data come from “The announcement of the fourth national economic census of Fuxin”.

2. The total number includes legal entities engaged in agriculture, forestry, animal husbandry, fishery and auxiliary activities.

3. The legal entities in the table do not include the entity managed by the State Railway Administration and China Railway Corporation, as well as the units supervised by the CIRC (formerly CIRC) and the CSRC.

6.6.2 Impacts Analysis on Women

6.6.2.1 Positive Impacts

(1) It can improve the quality of local women's life

The project can improve the local air quality, riding environment, and the quality of local women's life.

(2) It helps to improve the socio-economic status of women

The project can provide temporary jobs in the construction process and fixed jobs during the operation, which provide some employment opportunities for women (See Table 5-5), such as IC sellers, intelligent monitoring room staff, etc.. The employment will help women to improve their ability and their social and economic status.

(3) The project can provide safer and more convenient travel environment for women

The project can increase bus lines and the number of buses, improve the bus safety, reduce waiting time, and provide a safer and more convenient travel environment for women.

(4) Electric vehicles replace fuel vehicles, which reduces air pollution, and has a beneficial impact on women's health.

6.6.2.2 Negative Impacts

The projects' negative impacts on women are mainly the air pollution and noise pollution caused by construction, but these impacts are short-term and controllable. The women who attended the forum even thought that the negative impacts were negligible.

6.6.3 The Needs of Women's Development

In order to gather the information on the status of women's development and their project participation in five subproject areas of Liaoning Province, a seminar was held and in-depth interviews were conducted in the field survey. 10 thematic symposiums were held, including 4 women's forums and one-on-one interviews with 5 women. A total of 60 women participated in seminars and one-on-one interviews. See Table 6-29

for women's participation in the forum.

Table 6-29 List of Women's Participation in the Forum

No.	Date	location	Number of people	Responsible agency
1	September 17, 2020	Yingkou Bus Company Meeting Room	7	Subproject Office, Evaluation Working Group
2	September 22, 2020	Fuxin Bus Company Meeting Room	8	Subproject Office, Evaluation Working Group
3	September 27, 2020	Panjin Bus Company Meeting Room	15	Subproject Office, Evaluation Working Group
4	September 30, 2020	Jinzhou Bus Company Meeting Room	13	Subproject Office, Evaluation Working Group
5	September 29, 2020	HuludaoBus Company Meeting Room	12	Subproject Office, Evaluation Working Group

The proportion of women who participated in the conferences and interviews and who supported the construction of the project has reached 100%. The female drivers of the bus company were full of expectations for the implementation of the project. They believed that the new electric buses would provide a good working environment and are easy for drivers to drive and also save energy. They are looking forward to driving the new electric buses as soon as possible. In addition, women have the following needs:

- (1) Replace the old buses and improve the bus condition.
- (2) Increase the number of buses, reduce the waiting time and shorten the interval time during the morning and evening rush hours.
- (3) Extend the bus operation time in summer.

The bus companies said that after the project is put into operation, positions suitable for women, such as the Intelligent Public Transportation Management System Center, will give priority to women if they recruit new employees.

If new employees are recruited, the proportion of female employees recruited by each bus company to the number of recruits for this position can reach: 40% in Jinzhou, 50% in Huludao, 70% in Panjin, 60% in Yingkou, and Fuxin 40%, in jobs such as intelligent public transportation management system center, IC card salesperson, cleaning, etc.

7 Stakeholder Consultation and Information Disclosure

7.1 Stakeholder Analysis Matrix

Analysis matrix of stakeholders is a useful tool to conclude and compare the different stakeholders according to their correlation with the project, their characters, and effect. And it is used to analyze the stake of main stakeholders in the project (direct benefit, indirect benefit, directly affected, indirectly affected), roles, attitudes, and degree of influence.

Table 7-1 Analysis Matrix of Main Stakeholders

Stakeholders	And project Interest relations	Roles	Attitude	Degree of influence
Government of project Cities	Indirect	Organize, coordinate	Support	High
LUCRPMC and other government agencies	Indirect	Organize, coordinate	Support	High
Owner (bus companies in each project city)	Direct	Implement	Support	High
Surrounding residents affected during construction	Indirect	Affected	Support, worry	Middle
Surrounding residents affected during operation	Indirect	Affected	Support, worry	Middle
Bus passengers in project cities	Direct	Beneficiary	Support	Low
Special groups (Especially elderly, children and disabled)	Direct	Beneficiary	Support	Low

No visually impaired persons (such as blind persons and persons with severely impaired eyesight) were found in Yintong Parkland.

7.2 Consultation Timeline

June 2019- July 2021. See table 7-2 and table 7-4 ~ table 7-8 for details.

Table 7-2 Consultation timeline

Type	Date	Location	Content	Responsible agency
Notification and publicity of project related information	September 2020	Bus stations, communities, websites, etc. of each project city	Information disclosure	Subproject Office, Assessment Team
Public Consultation	September 2020- October 2020	Meeting rooms of bus companies in each project city	Information disclosure, introduction of the project, explain the significance and content of public participation	Subproject Office, Assessment Team
FGDs	September 2020- July 2021	Meeting rooms of bus companies in each project city	Eleven focus discussions were held with 99 participants, including 60 women. Collect public opinions, expectations and their main concerns on public transport projects.	Assessment Team
One-on-One Interview	September 2020- October 2020	Meeting rooms and offices of bus companies in each project city	13 people from 5 project cities were interviewed individually. In-depth understanding of project information.	Assessment Team
Field survey	September 2020- October 2020	Sites where each project city plans to install charging piles, the sites where the bus service center is planned to be built	Check the current situation of these sites and surrounding areas, and predict the impact of project implementation on residents and environment.	Assessment Team
Questionnaire	June 2019- September 2019	Project cities	Public opinion	Bus Company

7.3 Participatory Stakeholder Consultations in Project Area

7.3.1 Consultation Objectives

Collect the public opinions, expectations as well as their focuses on the transport projects.

7.3.2 Scope of the Survey

The person being investigated, which are in the project involved areas, includes all residents who have the abilities to judge independently, as well as those related personnel from Bus Company, moreover, also person involve residents around the supporting facilities. This environmental and social assessment paid special attention to the following groups of people: the poor, women, the elderly and children; besides, stakeholders such as the project entities are also in the scope of investigation during the process of the project.

7.3.3 Methodology of the Survey

This survey adopts four methods (table 7-3): public forums, focus group discussion, individual interview and on-site inspection. Figure 7-1 shows the working site photo.

Table 7-3 Methodology of the survey

Methods		City				
		Jinzhou	Panjin	Fuxin	Huludao	Yingkou
Public Consultation	Times	1	1	1	1	1
	Number of people	23	22	16	27	20
FGDs	Groups	2	3	2	2	2
	Number of people	18	28	12	25	16
One-on-One Interview	Number of people	3	1	4	2	2



Figure 7-1 Work site

In this FGDs, special attention was paid to women's opinions and needs for the project (see Figure7- 2).



Figure 7-2 FGDs with Females

7.3.4 Public Participation Activities Organized by Sub-Projects Cities

In order to truly and accurately reflect the problems existing in the sub-cities' public transport systems, the bus companies in each project city have organized several public participation activities in order to better design the project to maximize economic, environmental and social benefits. Activities include seminars, conference discussions, questionnaire surveys, etc. (see Table 7-4 ~ Table 7-8).

Table 7-4 List of public participation in Jinzhou

No.	Type of Participation	Date	Location	Participants	Participating	Content Organization
1	Project publicity	Jun. 2019	Jinzhou Daily	Citizens of the city	AIB project information publicity	Bus Company
2	Individual interview	Jun. 2019	Construction location of project charging station	Surrounding residents	Suggestions for the AIB Project	Bus Company
3	Questionnaire	Jun. 2019	Residential area around the project charging station	Surrounding residents	Residents' attitude towards the AIB project	Bus Company
4	Questionnaire	Jun. 2019	Municipal Development and Reform Commission, Natural Resources Bureau, Ecological Environment Bureau and other departments	Staff member	Stakeholders' attitudes towards AIB projects	Bus Company

Table 7-4 List of public participation in Jinzhou(cont.)

No.	Type of Participation	Date	Location	Participants	Participating	Content Organization
5	forum	Jul. 2019	Bus Company meeting room	Related leaders of SASAC, staff and residents of the streets of Linghe District and Songshan New District	Special meeting on social risks of AIB projects, collecting opinions from stakeholders	Bus Company
6	Seminar	Aug. 2020	Bus Company meeting room	The leadership team of the Bus Company and the feasibility study report preparation unit Dr. Li	Optimize project design based on the opinions of stakeholders	Bus Company
7	Information disclosure	Sep. 2020	Around the project charging station construction site	Subproject office	AIB project information publicity	Bus Company
8	Seminar	Sep. 2020	Bus Company meeting room	The leadership of the Bus Company and the leadership of the Municipal Development and Reform Commission	Discuss project content	Bus Company

Table 7-5 List of public participation in Yingkou

No.	Type of Participation	Date	Location	Participants	Participating	Content Organization
1	Questionnaire	Sep. 2019	Part of the community	Yingkou Subproject Office and residents	Questionnaire survey on social stability risks of AIIB projects	Bus Company
2	Individual interview	Aug. 2020	Residents around the place where charging piles are planned to be built	Yingkou Subproject Office and residents around the charging pile of the project	Collect opinions from surrounding residents after the questionnaire is sent	Bus Company
3	Information disclosure	Sep. 2020	Bus stop kiosk	Yingkou Subproject Office	Paste the contents of the announcement publicity project in some bus stop	Bus Company
4	Research and individual interviews	Sep. 2020	Yingkou City Ecological Environment Bureau	Yingkou Subproject Office	Solicit the opinions of the environmental protection department on the project and seek relevant data.	Bus Company
5	Questionnaire	Sep. 2020	bus stop	passenger	Bus satisfaction and public demand	Bus Company
6	Seminar	Sep. 2020	Small meeting room of Bus Company	Yingkou Subproject Office	Seminar on whether the project content meets public needs	Bus Company

Table 7-6 List of public participation in Huludao

No.	Type of Participation	Date	Location	Participants	Participating	Content Organization
1	Seminar	Aug. 2019	Bus Company meeting room	Heads of relevant departments of the Bus Company, The company that prepared the feasibility study report	Discussion project content	Bus Company
2	Investigate on the bus	Sep. 2019	Huludao City Bus	Passenger, The company that prepared the feasibility study report	Preliminary data research (including the collection of passenger flow data and public opinions and suggestions on public transportation)	Bus Company
3	Individual interview	Oct. 2019	Construction location of charging station	Surrounding residents	Public demand for the project	Bus Company
4	Questionnaire	Nov. 2019	bus stop	passenger	Bus satisfaction and public demand	Bus Company
5	Seminar	Aug. 2020	Huyue Group Headquarters	Leaders, principals, design institutes of Huyue Group and Public Transport Company	Project content discussion and revision suggestions	HuyueGroup, Bus Company
6	Information disclosure	Sep. 2020	Construction location of charging station	Bus Company, surrounding residents	AIB project information publicity	Bus Company

Table 7-7 List of public participation in Fuxin

No.	Type of Participation	Date	Location	Participants	Participating	Content Organization
1	Seminar	May 2019	Fuxin Development and Reform Commission	Relevant personnel of Fuxin Development and Reform Commission, relevant personnel of the company	Discuss the necessity of project construction	Fuxin Development and Reform Commission
2	Questionnaire	Jun. 2019	Bus station, dispatching room, maintenance station	Passengers, drivers, bus workers	Survey on public transport satisfaction and public demand	Bus Company
3	Seminar	Jul. 2019	Fuxin Finance Bureau	Finance Bureau, third-party evaluation agency, company related personnel	Discuss the feasibility of project construction	Fuxin Finance Bureau
4	Seminar	Jul. 2019	Government meeting room	12 responsible departments, including development and reform, finance, transportation, etc.	Responsibilities of stakeholders	Fuxin City Government
5	Seminar	May 2019	Group meeting room	Group, company, design institute	Designed project content and public transport needs	Bus Company
6	Seminar	Sep. 2019	Bus Company meeting room	Company, design institute	The degree of agreement between the design content of the project and the needs of the public	Bus Company
7	Seminar	Aug. 2020	Group meeting room	Group, company, design institute	Optimization of project construction content and project progress	HuyueGroup

Table 7-8 List of public participation in Panjin

No.	Type of Participation	Date	Location	Participants	Participating	Content Organization
1	Seminar	May 2019	Bus Company meeting room	Bus Company employee	Discuss the specific content of the AIIB loan project	Bus Company
2	Seminar	May 2019	Panjin City Development and Reform Commission	Related personnel of Panjin Development and Reform Commission, Company related personnel	Discuss the necessity of project construction	Panjin City Development and Reform Commission
3	Questionnaire	Sep. 2019	Railway station, Xinglongtai District Government Station, Drilling Market Station,	Passengers, citizens	Bus satisfaction, travel mode choice, public demand, other suggestions	The Bus Company commissions a third party
4	Seminar	Apr. 2020	Passenger Transport Group Meeting Room	Group members, related personnel of the Bus Company	Discuss the specific content of the project	Bus Company
5	Individual interview	May 2020	Bus Company meeting room	Residents around the project implementation site	Project feasibility	Bus Company
6	Seminar	Jun. 2020	Liaodong Bay Management Committee	Relevant personnel of Liaodong Bay Management Committee, relevant personnel of public transportation company	Discuss the feasibility of parking lot construction	Bus Company
7	WeChat public account	Sep. 2020	Citizens of the city	Citizen	Put forward reasonable suggestions for public transportation	Bus Company

In order to understand the impact of the construction of the Liaodong Bay Parking Plant on the surrounding residents and their wishes, on July 25, 2021, a symposium of residents representatives of the Yudai Mingzhu Community was held in Panjin City. A total of 9 residents participated in the symposium. The residents participating in the meeting all supported the implementation of the project. They expressed their enthusiastic expectations for the project. The implementation of the project will make their travel more convenient. They hope that the project will be implemented as soon as possible.

7.4 Key Findings

7.4.1 Questionnaire Survey Results

(1) Questionnaire survey results

Yingkou, Fuxin, Panjin, Huludao, and Jinzhou bus companies completed the questionnaire survey. Investigated the public's attitude towards public transport. The following is a summary of the survey results.

Table 7-9 Age structure of respondents

City Age	Yingkou		Fuxin		Panjin		Huludao	
	Numbers	%	Numbers	%	Numbers	%	Numbers	%
6-14	5	4.17	3	2.50	3	6	5	4.17
15-19	40	33.33	13	10.83	15	30	20	16.66
20-49	60	50.00	42	35.00	18	36	30	25.00
50-59	10	8.33	30	25.00	8	16	35	29.17
Over 59 years old	5	4.17	32	26.67	6	12	30	25.00
Total	120	100	120	100	50	100	120	100

Table 7-10 Statistics on the walking time from home to the bus station

City Time (minute)	Yingkou		Fuxin		Panjin		Huludao	
	numbers	%	numbers	%	numbers	%	numbers	%
<6	7	5.83	24	20.00	15	30	32	26.67
6-10	50	41.67	55	45.83	20	40	48	40.00
11-15	44	36.6	20	16.67	9	18	18	15.00
16-20	14	11.67	16	13.33	5	10	16	13.33
>20	5	4.17	5	4.17	1	2	6	5.00
Total	120	100	120	100	50	100	120	100

Table 7-11 Waiting Time Statistics Table

City Time (minute)	Yingkou		Fuxin		Panjin		Huludao	
	numbers	%	numbers	%	numbers	%	numbers	%
<6	10	8.33	26	21.67	30	60	26	21.67
6-10	50	41.67	52	43.33	13	26	48	40.00
11-15	40	33.33	20	16.67	7	14	24	20.00
16-20	10	8.33	15	12.50	0	0	12	10.00
>20	10	8.33	7	5.83	0	0	10	8.33
Total	120	100	120	100	50	100	120	100

Table 7-12 Statistics of the time from the last bus stop to walk to work

City Time (minute)	Yingkou		Fuxin		Panjin		Huludao	
	numbers	%	numbers	%	numbers	%	numbers	%
<6	8	6.67	24	20.00	14	28	31	25.84
6-10	54	45.00	55	45.83	26	52	48	40.00
11-15	40	33.33	20	16.67	8	16	16	13.33
16-20	13	10.83	16	13.33	2	4	18	15.00
>20	5	4.17	5	4.17	0	0	7	5.83
Total	120	100	120	100	50	100	120	100

Table 7-13 Residents' attitudes towards the project

City	Yingkou		Fuxin		Panjin		Huludao	
	numbers	%	numbers	%	numbers	%	numbers	%
Very supportive	80	66.67	194	97	47	94	196	98
General support	40	33.33	4	2	3	6	4	2
Not support	0	0	2	1	0	0	0	0
Total	120	100	200	100	50	100	200	100

Table 7-14 Statistics of the impact of the project on economic and social development

City	Yingkou		Fuxin		Panjin		Huludao	
	numbers	%	numbers	%	numbers	%	numbers	%
Favorable	80	66.67	182	91	50	100	178	89
Unfavorable	30	25.00	6	3	0	0	6	3
Do not know	10	8.33	12	6	0	0	16	8
Total	120	100	200	100	50	100	200	100

Table 7-15 Statistics of main problems in buses

City	Yingkou		Fuxin		Panjin		Huludao	
	numbers	%	numbers	%	numbers	%	numbers	%
Too crowded	20	16.67	15	12.50	36	72	18	15.00
Not driving on time	49	40.83	38	31.67	5	10	36	30.00
Wait too long	21	17.49	20	16.67	6	12	24	20.00
High fare	20	16.67	12	10.00	0	0	9	7.50
Poor service attitude	5	4.17	4	3.33	1	2	6	5.00
Inconvenient	5	4.17	3	2.50	2	4	4	3.33
Other	0	0	28	23.33	0	0	23	19.17
Total	120	100	120	100	50	100	120	100

Table 7-16 Statistics of Public Transport Satisfaction Survey

City	Yingkou		Fuxin		Panjin		Huludao	
	numbers	%	numbers	%	numbers	%	numbers	%
Very satisfied	20	16.67	3	2.5	33	66	5	4
satisfaction	42	35.00	81	67.5	8	16	72	57.6
Quite satisfied	40	33.33	21	17.5	2	4	24	19.2
General	10	8.33	11	9.17	6	12	19	15.2
Not satisfied	5	4.17	4	3.33	1	2	5	4
Very dissatisfied	3	2.5	0	0	0	0	0	0
Total	120	100	120	100	50	100	120	100

Jinzhou Bus Company conducted 1,000 questionnaire surveys, and the survey results are as follows:

Table 7-17 Natural conditions of the interviewees in Jinzhou

Gender	Male		Female	
		623		377
%	62.30		37.70	
Age	12-20	21-30	31-40	Over 40years old
	762	147	53	38
%	76.20	14.70	5.30	3.80

Table 7-18 Questionnaire statistical results of Jinzhou Bus Company

Evaluation	Very dissatisfied	Less satisfied	Generally satisfied	Quite satisfied	Very satisfied
The first and last train time is accurate	0.20%	5.70%	22.30%	49.60%	22.20%
Reasonable bus stops and convenient transfer	0.50%	2.60%	25.70%	42.90%	28.30%
Easy to recharge and pay for bus IC card	0.40%	5.30%	21.30%	42.70%	30.30%
In general, your opinion on Jinzhou's bus service	0.30%	5.70%	18.90%	42.70%	32.40%

(2) Questionnaire survey conclusion

Table 7-19 Questionnaire survey statistics (%)

City	Jinzhou	Panjin	Huludao	Fuxin	Yingkou
Residents' satisfaction with public transportation	86	86	80.8	87.5	85
Resident support rate for the project	—	100	100	100	100
Project is beneficial to economic development	—	100	89	91	66.67
It takes more than 15 minutes to walk from home to the bus station	—	17.5	18.33	12	15.84
It takes more than 15 minutes to walk from the last bus stop to the workplace	—	4	20.83	12	15
Waiting time is greater than 15 minutes	—	0	18.33	18.33	16.66

Judging from the results of the questionnaire survey, most residents believe that the construction of the project is beneficial to economic development. Residents support the project.

The results of the questionnaire survey showed that “too crowded in the bus, not driving on time, and waiting time too long” ranked among the top three problems with public transportation services in various places. A considerable number of people need to walk more than 15 minutes to reach the bus station from home or work. The convenience of public transportation services and the satisfaction of public transportation need to be improved.

7.4.2 Stakeholder's Attitude towards the Project

(1)The attitude of the local government

The support of the local government will guarantee the success of the project.

The government has dual position and effect: the first one is to fulfill the function of public management to manage and regulate the social investment; the second one is to bear the responsibility of public investment, and provide public service and production to public. The government plays a dual role in Liaoning Green Smart Public Transport Demonstration Project as “the promoters of urban development” and “servers to citizens” as well.

First, the implementation of the project through AIIB’s loan, will reduce the pressure of government investment in infrastructure, and speed up urban development;

Second, project implementation will give priorities to develop bus system, meet the need of citizen’s daily travel and construct a comfortable city to live in with a convenient travel;

Third, project implementation can lead residents to drive green, solve problems such as traffic congestion and environment pollution to realize energy and greenhouse reductions;

Fourth, project implementation can realize the intelligent traffic management, strengthen traffic safety, and realize travelers’ haring of the information and date about traffic.

(2)The attitude of the implementation organizations

The content of implementation is one of their work and they hope to take this opportunity to make improvement from two aspects, institution construction and service ability.

The project implementing agency (the Bus Company) established a project office in order to better implement the project (Referred to as Subproject Office) . The subproject office staff hope to get experience and improve their abilities.

First, the implementation brings many opportunities to the staff of subproject office, such as promotion, showing talents, etc. so they hope their leaders can offer full support to them, as well as the coordination of other agencies.

Second, subproject office staff hope for the success of the construction, which will be the achievement of main leaders and staff in the subproject office,

Third, the staff of subproject office hope the leaders pay attention to them. At the same time, they hope to simplify the procedure in order to speed up the project process, reduce the costs, get loan as soon as possible and complete the tasks given by leaders.

(3) Attitude and participation lever of major stakeholders in the project

A project must benefit and win the trust of the people. Only with support and participation of the people can the project be successful. In the construction and operation of public transport projects, the main interest groups are affected most. We must fully consider their attitude and participation level in the project, make them participate in the design, decision-making, construction, operation and management of the project in various ways, strive for their support and provide a strong public foundation for the project construction.

(4) Attitude and support degree of different organizations or departments to the project

The project was not only approved by the local government, but also supported by different local organizations or departments. See table 7-20 for details.

Table 7-20 Stakeholder attitude towards the project

Stakeholders	Attitudes	Accept abilities	Supports and cooperation
The government of project cities	Positive attitude; They have asked the Bus Company to complete the preparations for the project as soon as possible and start construction as soon as possible.	Good adaptation	Consider the project's components, fund raising, policy making and so on, according to the social economic development.
LUCRPMC	Positive attitude; They have asked these bus companies to complete the preparations for the application project as soon as possible.	Good adaptation	Strengthen the communication between the government agencies and other related agencies, to coordinate the relationship between the agencies.

Table 7-20 Stakeholder attitude towards the project (cont.)

Stakeholders	Attitudes	Accept abilities	Supports and cooperation
Other government agencies	Positive attitude; Actively cooperate to complete the preparations for the project.	Good adaptation	According to the function of different departments, they should cooperate in the project involving the participation in the project design, providing comments and suggestions.
Bus Company	Positive attitude; Spare no effort to assist consulting experts to complete the investigation, hope to complete the preparatory work as soon as possible; Go about the construction as soon as possible.	Good adaptation	From the perspective of institutional demand, they should put forward the content of the project and its construction after the project has been approved.
The people travelling by public transportation	Positive attitude; Ask the project implementation agencies to start the construction as soon as possible	Good adaptation	Through the public participation channels, they can actively participate in the design of the project and to provide good advice
Special crowds	Positive attitude; Ask the project implementation agencies to start the construction as soon as possible	Good adaptation	Through the public participation channels, they can actively participate in the design of the project and to provide good advice

7.4.3 Requirements of Main Stakeholders

(1) Residents' demand for the project

The residents' requirement of the project is to meet their daily travel need. Their specific requirements of the project areas follows:

First, optimize traffic lines; bus service can connect enterprises, shopping center, hospitals, schools, etc. with each other, to be convenient for daily travel of work, study and life;

Second, improve bus infrastructure to improve the comfort of buses and to improve travel environment;

Third, improve the punctuality, schedule grid frequency reasonably, to improve the serve level;

Fourth, ensure smooth and safe travel environment by the construction of intelligent information system.

(2)VulnerableGroups

Vulnerable groups involved minorities, elderly, children, disabled, women, poor people, etc.

Minorities in the project cities live together with Han Nationalities for a long time. Therefore, their language customs and life styles are highly assimilated with the Han nationality. There is no sensitive spot needed special concentration Children are often accompanied by adults when travelling, and are not paid exclusive attention.

① The needs of the poor

First, we hope to give priority to employment opportunities, From the survey results of the forum, it is found that most of the poor households hope that the project construction can provide them with some jobs and increase their income sources. The families of the poor groups are not only poor, some of them are also disabled, so they are in urgent need of suitable job. It is better to give priority to the poor groups in recruitment, so as to help the family and increase the family income.

Second, we hope to give some discount on the ticket price.

② The needs of the disabled

The disabled people in Panjin City who were interviewed hope to change their current disability certificate into IC card with chip. They reflected that all disabled people in

Panjin City can take the bus free of charge as long as they have a disability certificate. Driven by interests, someone forged a disability certificate. Some disabled people have only slight disabilities (such as broken fingers), and they can't even find that they are disabled at all. This brings certain difficulties to bus drivers in distinguishing whether their disability certificates are true or not. At the same time, the interests of the real disabled are also affected.

③ The needs of the elderly

They mainly focus on safety issues and hope to adopt low pedal buses.

7.4.4 Problems of Public Transportation

A total of 10 FGDs and 13 one-on-one interviews were organized. The interviewees generally believed that the public transportation in the sub-projects cities has the following problems:

There are some problems, such as low coverage of public transportation, few vehicles, long departure interval, old vehicles, serious noise and exhaust pollution, and failure to timely obtain information of vehicles or routes.

In recent years, it has been a significant improvement to the public transportation in the sub-Projects cities and the public are quite satisfied with the overall bus services. Nevertheless, with the urban development and the increasing public demand, public transportation cannot fully meet the demand of the travelling of local residents. During the interviews, the public have raised many issues. The mainly problems of the Project cities are as follows:

(1) Some routes are insufficient in bus service or experiencing traffic jam, causing long intervals between services.

People have to wait the bus for a long time because of the frequency and hours of the bus service. Some buses could not operate normally in raining days because of their poor condition. Small size buses would not leave the stop on time until enough passengers were loaded.

Fuxin's No.18 Road, leading to Tazigou, is a place for residents, especially the elderly, to climb mountains for exercise and leisure. There are few buses, and sometimes they have to wait for an hour.

Route 23 bus in Yingkou city has a long time interval, even as long as 20mins sometimes. There is a big market on the 23 line, and it will take longer to wait for the bus because of the traffic jams on the market day.

Less public buses of Route 15 in Panjin city, Route 9 in Huludao city, and Route 118 in Jinzhou city lead to long time intervals.

(2) There are still some bus vehicles which are old and in poor conditions.

Bad vehicle conditions lead to lower riding comfort and driving speed, at the same time, the safety is not guaranteed.

Some buses are in bad conditions, such as Route 5 in Yingkou city, Route 2 in Fuxin city, Route 2、 Route 6 and Route 30 in Panjin city, Route 16 in Huludao city and Route 208 Jinzhou city buses .

(3) Bus vehicle exhaust causes heavy pollution.

According to the residents, some buses vehicles are not environmentally friendly, such as buses of Route 131 in Jinzhou city, Route 9 in Huludao city, Route 16 in Fuxin city emitting black smoke exhaust.

(4) Due to the poor management, other vehicles occupy bus lanes.

Vehicles such as private cars, especially taxis often use bus lanes, which hinders the role the bus lanes should play.

Low-income residents have made suggestions:

(1) Too early off-duty time of buses

There are a small number of buses that pick up too early. These buses generally end running between 6:30 and 7:00, bringing trouble to citizens' travel in the evening.

(2) High ticket price

Low income residents mainly rely on buses to work. 2 RMB ticket price for each time is expensive for them, and the government has no transport subsidies for the low income residents.

7.4.5 Public Suggestion

During the survey, the residents have expressed a high interests for participation, and they have proposed many suggestions.

(1) Bus lines should be increased and bus network should be improved in order to provide convenience for residents.

(2) To replace old buses for safety and transport capacity. It is suggested that buses with PWD friendly and eco-friendly features should be encouraged.

(3) Bus operation frequencies should be increased especially during the rush hours. Management should be reinforced in order to curb traffic jam and shorten intervals between services.

(4) The departure time for the first bus and last bus as well as the time for operation should be adjusted according to the actual situation.

The departure time for first buses and last buses of some routes should be adjusted, which means that morning buses offer services at earlier time and evening buses at later time. In term of the buses with short operation time, it is suggested that operation hours should be extended, especially in summer. The first bus had better starts at 5:30am, and the last bus at 10 pm.

(5) Construction should not be noisy. Must take measures to reduce the noise and prohibit constructing at night.

(6) Public transport belongs to public welfare, so the government should spend more money on it, or provide more political support.

Bus drivers have proposed that:

(1) Bus lanes on main roads should be increased. Moreover, the management of bus lanes should be strengthened, ensuring that they are used properly to actually reflect the bus

priority.

(2)The use of bus IC card for senior residents should be limited, which means that it shouldn't be used during rush hours. To take effective measures to guide the elderly for their bus-riding time, in particular, to avoid the rush hours when they take the bus in a group. However, to provide unbiased access, this will not be adopted.

7.4.6 Handling Public Suggestions

During the process of survey, residents showed great enthusiasm for participation and put forward many suggestions and opinions. At the same time, the relevant departments of various cities attach great importance to the main problems and opinions raised by the public, carefully study them, and give solutions to them (see table 7-21).

Table 7-21 Handling of public comments

No.	Suggestion	Measurements to be taken
1	Bus lines should be increased and bus network should be improved in order to provide convenience for residents.	Partially adopted. Some bus routes can be added after the project is implemented. Combined with public transportation and urban construction planning, the public transportation network will be improved gradually.
2	To replace old buses for safety and transport capacity. It is suggested that buses with lower steps and eco-friendly features should be encouraged.	Has been adopted. In this project, safe, environmentally friendly and comfortable electric buses will be purchased
3	Busoperation frequencies should be increased especially during the rush hours. Management should be reinforced in order to curb traffic jam and shorten intervals between services.	Has been adopted. After the implementation of the project, new buses were added, which can be partially resolved
4	The departure time for the first bus and last bus as well as the time for operation should be adjusted according to the actual situation.	Has been adopted. Adjust appropriately according to the season and demand.

Table 7-21 Handling of public comments (cont.)

No.	Suggestion	Measurements to be taken
5	Construction should not be noisy. Must take measures to reduce the noise and prohibit constructing at night.	Has been adopted. Strengthen construction site management, take measures to reduce the impact, and eliminate the phenomenon of disturbing residents such as night construction.
6	Public transport belongs to public welfare, so the government should spend more money on it, or provide more political support.	Reflect to relevant departments
7	Bus lanes on main roads should be increased. Moreover, the management of bus lanes should be strengthened, ensuring that they are used properly to actually reflect the bus priority.	Reflect to relevant departments
8	The use of bus IC card for senior residents should be limited, which means that it shouldn't be used during rush hours. To take effective measures to guide the elderly for their bus-riding time, in particular, to avoid the rush hours when they take the bus in a group.	Unable to adopt. It can only guide the elderly to travel off-peak when they do not necessarily to travel.

7.5 Information Disclosure

Different project cities adopt different ways of information disclosure and publicize the project information.

Yingkou City adopts the way of public notice.

Official WeChat public account is in Fuxin. The official account is very popular among residents. It is accepted by the general public. Fuxin adopts the WeChat public account as publicity method.

Panjin adopted public announcements such as notices, official WeChat public account and so on.

Huludao adopted the method of public notice.

Jinzhou adopted the method of public notice.

Figure 7-3 shows the photos of the information disclosure sites of each project city.

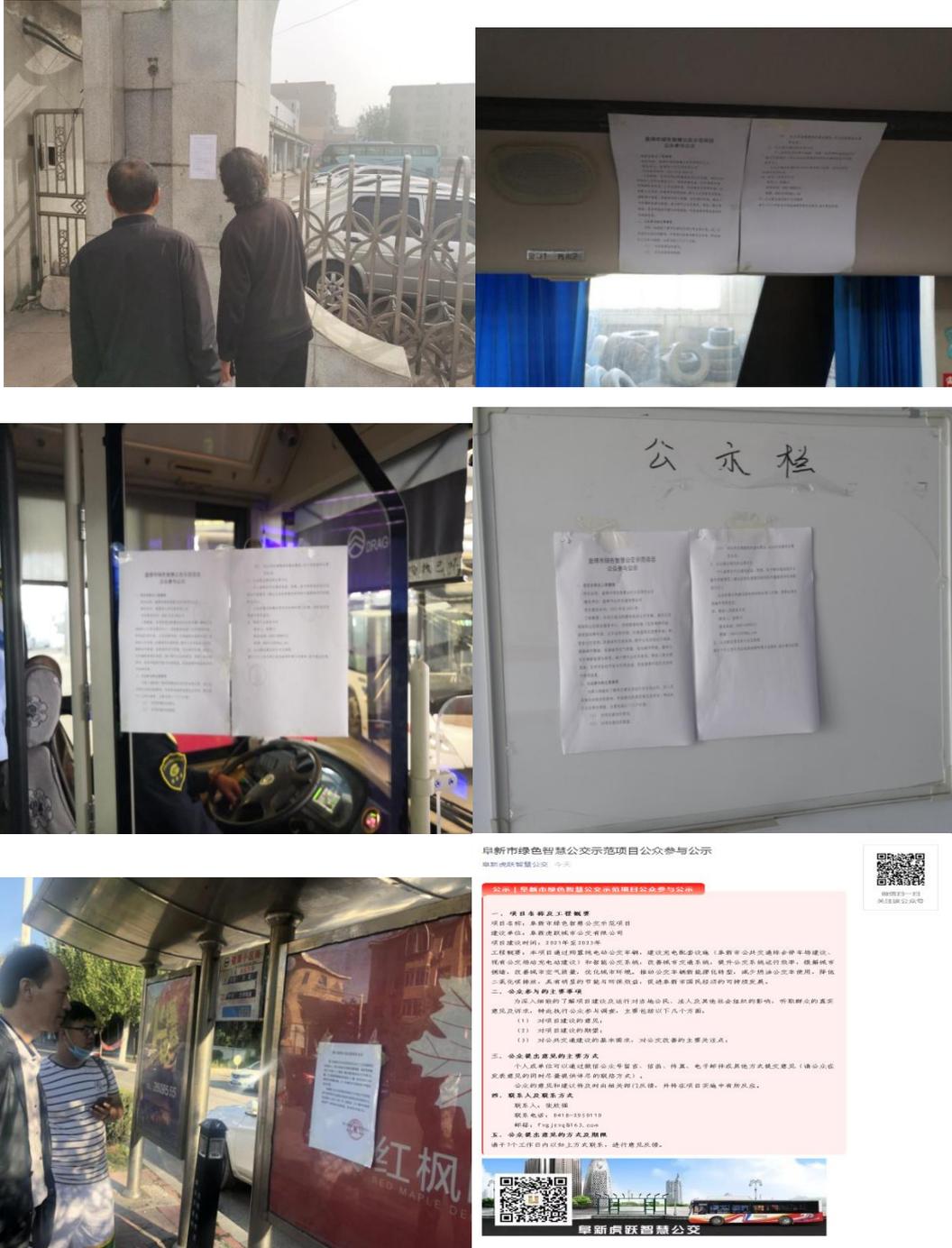


Figure 7-3 Project Information disclosure

The project city has provided the feedback telephone number and the mailbox for collecting opinions for the public. After the publicity of the project information, it has attracted the public's attention and put forward suggestions enthusiastically. For example, Panjin citizens reflect their opinions and demands on public transport to the sub-project office through email (see Figure 7-4 and Figure 7-5).

From July 2-8, 2021, the Provincial Project Office and the municipal public transport companies have publicized the environmental and social assessment report of this project through their official websites or public accounts.

---原始邮件---

发件人: "简单点"<zcq615@qq.com>
发送时间: 2020年9月26日(周六) 晚上11:09
收件人: "364111201"<364111201@qq.com>;
主题: 关于盘锦市绿色智慧公交示范项目建设的几点建议

兴隆台区蓝色康桥小区, 作为盘锦市最大的人口最多的社区, 目前只有一条公交线路(27路), 无法满足该地区居民的正常出行需求, 例如没有通往实验中学及宝石花医院、盘锦市中心医院等重要地区的公交线路, 也没有通往火车站、万达等地区的公交线路。针对这点, 特提出以下几条建议:

- 1、建议将22路延长至康桥地区。
 - 2、目前17路由于绕康桥外部行驶, 经常就是空车跑, 非常浪费, 建议将17路改路线, 从康桥K区南门往西继续行驶至蓝色康桥F区北门, 并在康桥F区北门设置站点, 这样由于穿梭于康桥内部可大大提高客流量。
 - 3、目前27路路线较短, 建议适当延长路线, 例如可向南延长至总部生态城地区。
 - 4、建议在康桥内部向南开通通往万达、田家地区、向北开通通往盘山(火车站)方向的公交线路。
- 另外, 针对蓝色康桥地区人口密度大、车多交通拥堵严重、停车困难等突出问题, 建议在此地区增建停车场(例如可将蓝色康桥F区东侧水沟填埋后改造为停车场)。

Figure 7-4 Panjin citizens reflect their opinions and demands on public transport through e-mail(1)

---原始邮件---

发件人: "29468995"<29468995@qq.com>
发送时间: 2020年9月26日(周六) 晚上7:33
收件人: "364111201"<364111201@qq.com>;
主题: 公交线路

以前由于个人承包线路的影响, 乘客不能在同一站换乘, 给乘客出行带来不便。现今个人承包的线路逐渐取消, 线路应该进行科学调整, 以方便乘客乘车出行。
取代个人承包的公交线路, 除了应该进行调整外, 还应该延长。比如, 22路应该从康桥公园发车, 延长到火车站终点为好。

市民: 王光儒
13898728985

Figure 7-5 Panjin citizens reflect their opinions and demands on public transport through e-mail(2)

7.6 Stakeholder Consultation

7.6.1 Stakeholder Consultation Plan

According to the implementation characteristics of the project and the work framework of the AIIB, the stakeholder consultation phase of the project can be divided into three stages, which are carried out in the initial evaluation phase, implementation (construction) phase, and completion phase of each sub-project (Table 7-22).

Table 7-22 Consultation plan and implementation

Consultation period	Project Stage		Implementing agency	The main content of the Consultation	progress status
Preliminary assessment 2019-2021	Pre-construction	Project proposal stage	Bus Company, design company	(1) Determine the social risks of the project	Completed
		Project feasibility study stage		(2) Solicit their views on the preliminary design plan.	Completed
		Project design stage			Planning
Implementation phase 2022-2024	Construction stage	Project construction preparation stage	Bus Company	(1) Monitoring the implementation of the project;	Planning
		Project construction phase		(2) To further understand the needs and opinions of stakeholders.	
		Project completion stage			
Completion stage After 2025	Operation phase		Bus Company	(1) Determine whether the expected goal of investment is achieved; (2) Investigate the stakeholders' satisfaction with the project.	Planning

Clarifying the stage of project stakeholder consultation and its main content is the key to effective implementation of stakeholder consultation.

(1) Initial evaluation phase

It is carried out before the construction of the project, through stakeholder consultation to judge and predict whether the target of the project to be implemented is correct and whether it meets the needs of the public. Stakeholder consultations at this stage can reduce the social risks of the project and play an important role in ensuring the smooth implementation of the project and achieving the set goals.

Involving stakeholders in the early stages of the project will enable them to see project construction as something closely related to them. This will naturally lead to the establishment of a harmonious and cooperative relationship between the government and stakeholders. Stakeholders will adopt an attitude of understanding and support in the process of project construction and operation, so that the project will obtain good economic and environmental benefits while also obtaining stable social benefits.

In the first stage, the purposes of negotiation should be to obtain basic information on the needs, problems and difficulties of stakeholders in public transportation construction, and to obtain general views and suggestions of stakeholders on key issues of project construction. Collect information to improve the design of the project.

The main tasks of stakeholder negotiation at this stage are:

- ① Determine the stakeholder groups of the project, that is, determine the scope of stakeholders, and lay the foundation for deeper stakeholder negotiation in the later stage.
- ② Understand the basic needs of stakeholders, collect concerns about public transportation construction, absorb the opinions of stakeholders, and improve project planning.
- ③ Understand the stakeholder's attitude towards the project and the possible impact on the project, especially whether the stakeholder supports the project construction.
- ④ Solicit their opinions on the preliminary design plan, and reach a consensus after consultation to improve and modify the design plan.

⑤Analyze the possibility and extent of stakeholder participation in the project and propose detailed measures and plans to promote stakeholder participation in the project.

(2)Implementation (construction) stage

It is carried out in the mid-term of the project implementation. It evaluates the completed work through stakeholder consultation. It is a kind of supervision of the project. It has a supervisory effect on ensuring the quality of the project and on making the project develop in the established direction. The main purpose of stakeholder consultation at this stage is to monitor and evaluate the implementation of the project. The relevant government departments make mid-term adjustments to the project plan based on the results of stakeholder consultation and the collected data on the positive and negative impacts of the project.

The main tasks of stakeholder negotiation at this stage are as follows:

①Let stakeholders know and grasp the status of the project in a timely manner to facilitate the supervision of the project work.

②Monitor the implementation of the project, and evaluate the achievement of the mid-term goals based on the expected goals of the project, summarize the experience and lessons in the project implementation process, put forward the direction of efforts for the later project management, and provide the decision-making basis for the next project management.

③Understand and feed back the first stakeholder consultation.

Stakeholders' attitudes towards the questions raised in the first survey and their reflections in the project design

④Further understand the needs of stakeholders, their concerns and opinions on the project, and use this as the basis for mid-term adjustment of the project construction plan to make the project goals and project construction plan more practical and feasible.

⑤Stakeholders' satisfaction and opinions on project implementation.

⑥Provide information and guidance for stakeholder consultation.

(3) Completion stage

The stakeholder negotiation at the completion stage of the project is conducted after the end of the project. It is a review of the entire process of the project. When the project of each project is completed, the role of stakeholder consultation should be fully utilized, and a comprehensive evaluation of the project should be made. This is conducive to the participation of stakeholders in the maintenance of the newly built facilities. Ensuring the sustainability of the project is also conducive to strengthening the supervision of the project.

The main tasks of stakeholder negotiation at this stage areas follows:

- ① Determine whether the expected investment goals are achieved;
- ② Investigate the stakeholders' satisfaction with the project;
- ③ Summarize the experience and lessons of stakeholder consultation, and provide suggestions for improving the level of stakeholder consultation in the future through timely and effective information feedback;
- ④ Predict the possible problems in the management project by means of stakeholder consultation, put forward suggestions for improvement, and provide the basis for their decision-making by providing feedback information to managers, so as to improve the social, environmental and economic benefits of project.

7.6.2 Public Consultation Plan

In the preparation phase of the loan, it is necessary to collect public opinions and improve the project design to lay the foundation for the project to determine the largest environmental and social benefits.

During the loan implementation phase, the environmental and social management plan was immediately implemented, and the implementation of the environmental management plan should also be monitored and supervised. Therefore, feedback from the public is very important and an effective handling mechanism which needs to be established, including: properly handling related complaints in order to minimize any

unintentional or unforeseen adverse environmental and social impacts, mitigation and improvement measures must be taken for any adverse environmental and social impacts, and environmental management plans should be revised.

Therefore, whether it is the preparation period of the project or the construction period, the public consultation plan has always been one of the focuses of social environmental management.

Public consultation and investigation methods can use five methods: public seminars, focus group discussions, individual interviews, questionnaire surveys and on-site surveys.

(1) Open forum (Open seminars)

The purpose of this method is to establish a dialogue mechanism between the government, project units, communities and residents, so that they have the opportunity to gather together to exchange opinions and viewpoints, and discuss project issues face to face. This is also one of the methods for relevant departments to introduce the project to the public.

Participants in the public forum should be those who can master or understand the project, and they are those who master or understand the status quo of public transportation and other key figures, including project construction personnel, subproject office staff, government staff, project designers, and all levels of the public.

The main tasks of the "Open forum" are as follows:

① Provide an opportunity to introduce the project to the public.

The government and relevant departments can use public forums to explain and promote the project to the public.

② Provide a communication platform between the government and the public

By bringing them together, opportunities are created to exchange opinions and discuss project issues face to face.

③ Cultivate the awareness of public participation.

(2) Focus group discussion

The focus group discussion method is used as the main tool to obtain the public's various needs, problems, expectations and suggestions for the project, and collect qualitative information in the preliminary stage.

The main tasks of the focus group discussion areas follows:

- ①Collect the problems in public transportation construction.
- ②Understand that the project can meet the basic conditions for public satisfaction.
- ③Follow the public's thoughts on the implementation of the project, and listen to the opinions and suggestions of different social classes and groups, especially those with special needs (such as the elderly, the poor and the disabled, etc.).
- ④Understand the problems that the public urgently needs to solve, and collect the main concerns of the public.

Focus group discussion is the main method to understand the basic problems of public transportation, obtain basic information on the needs of residents for the project, and collect qualitative data. In this process, it is necessary to collect the attitudes and suggestions of different groups of people, especially specific groups of people, about the project, so the people participating in the forum should be representative. The general public who are required to participate in the forum include the following groups:

The first is that the majority of the public must come from the areas directly affected by the project, as well as the indirect beneficiaries.

The second is that the public has a relatively broad representation.

Choose the public with different characteristics. They are required to be the direct beneficiaries and impaired people of future project implementation.

The third is the disadvantaged group.

Among the vulnerable groups, there must be representatives of the elderly, the poor and the disabled.

(3) Individual interview

Individual interviews are a method of obtaining data and information through free conversation between the investigator and the interviewee. In this method, both the investigator and the interviewee interact directly, and the entire interview process is flexible and controllable, and it can explore broader and further questions, so the data and information obtained are rich.

The main tasks of individual interviews areas follows:

- ①Get in-depth information of the project
- ②Provide supplement to the content of the focus forum

Individual interviewees should be people who are able to master or understand the project, those who master or understand the status of project implementation, and those who master or understand the status quo of public transportation, including project constructors (workers), contractors, traffic managers, project designer. In addition to the above-mentioned personnel, there are also special members of the public, such as disabled persons with limited mobility.

(4) Questionnaire

Questionnaire is the most commonly used survey method. The advantage of questionnaire is that they can directly solicit opinions from a wide range of people with minimal input, but their disadvantages are also obvious. For example, sometimes the questionnaire design is unscientific. The proportion of people surveyed is unreasonable, and the public opinions collected are not specific. Therefore, the questionnaire survey, as a necessary method of stakeholder consultation, cannot be conducted in isolation, but it should be used as an auxiliary method for focus group discussions and individual interviews, and it can be used to verify the results of focus group discussions and individual interviews. The questionnaire covers a wide range of areas. On the one hand, you can obtain the materials needed for research, and on the other hand, it can be used as a means of project promotion.

The main tasks of the questionnaire areas follows:

① Confirm the results of public forums, focus interviews and individual focus interviews.

② Obtain quantitative analysis data.

The public consultation plan of this project is shown in Table 7-23.

Table 7-23 List of Consultation Plans

Project Stage	Activities	Information disclosure methods	Consultation Methods	Implementing agency	Participants	Planned issues
Pre-construction and Design	Project basic information disclosure, Collect residents' opinions	News media, posting notices, online announcements	Open seminars, focus interviews, individual interviews, on-site inspections	Subproject office, consulting agency	Residents, sub-project offices, bus companies, consulting agencies	Disclosure of basic project information; Determine the stakeholder groups of the project; Understand the attitude of stakeholders towards the project; Understand the basic needs of stakeholders, absorb their opinions, and improve project planning; Answer questions from residents
	Preliminary design proposal consultation	Online publicity, posting notices	Open seminars, focus interview, individual interview, questionnaire, on-site inspection	Subproject office, design company, consulting agency	Residents, sub-project offices, bus companies, consulting agencies	Encourage residents to put forward their own opinions and suggestions on related design during the program design process; After the preliminary design of the plan, the plan will be publicized on the project site, and residents' opinions and suggestions will be collected
Construction	Construction information disclosure	Posting notices, hanging slogans, broadcasting, etc.	Individual interview, on-site inspection	Sub-project office, construction contractor	Residents, Sub-project office, construction contractor	Public construction time and schedule; Distribution of construction sites; contractor liaison and contact information, etc.; Safety issues that residents need to pay attention to

Table 7-23 List of Consultation Plans (cont.)

Project Stage	Activities	Information disclosure methods	Consultation Methods	Implementing agency	Participants	Planned issues
Construction	Reduce construction impact	Posting notices, hanging slogans, broadcasting, etc.	Individual interview, on-site inspection	Sub-project office, construction contractor, consulting agency	Residents, Sub-project office, construction contractor	The main impact of construction; The implementation of dust reduction and noise reduction measures; Collect opinions and suggestions from residents
	Announce complaints and appeal channels	TV, radio, posters, internet, etc.	Open seminars, focus interviews, individual interviews, on-site inspections	Subproject office, relevant government departments	Sub-project office, resident volunteers, representatives of the National People's Congress, representatives of the Environmental Protection Bureau, community officials	Collect and solve residents' problems
Completion	Survey on the degree of achievement of project objectives	Announcement, Internet	Open seminars, focus interviews, individual interviews, on-site inspections	Subproject office, consultancy	Residents, sub-project offices, bus companies, consulting agencies	Collect opinions from residents, assess the completion of project objectives, and determine whether the project is successful

8 Grievance Redress Mechanism

8.1 Objectives of Grievance Redress Mechanism

The objectives of the grievance redress mechanism (GRM) are:

- (1) To cultivate the public participation consciousness, strengthen the public legal concept, and safeguard the legitimate rights and interests of the public;
- (2) To correct the improper behaviors that have occurred or caused harm or loss; and
- (3) To ensure that the project is carried out according to the predetermined goal and build a harmonious society.

8.2 Grievance Redress Mechanism

GRM can restrain the project implementers, make them stop the behaviors that have adverse effects on the environment and society, and protect the public's environmental and social rights from infringement. The appeal remedy mechanism is an important way to supervise and guide the Bus Company to fulfill their environmental and social responsibilities.

8.2.1 Principles

In order to implement the redress successfully, the following principles must be followed:

- (1) The principle of equal treatment: the principle of equal treatment of all complainants. All the complainants should be treated equally when filing or participating in any form of complaint, and no discrimination or privilege shall be granted to any complainants.
- (2) The principle of time limit: once the complainants file a complaint, the relevant institutions must accept and enter the appeal procedure promptly.
- (3) The principle of confidentiality: in order to prevent retaliation and protect the rights and interests of the complainants, the name of the complainants should be kept

confidential.

8.2.2 Organizations for Accepting Complaints

(1) The original complaint receiving body

At present, various project cities have organizations to collect citizens' complaints

① All cities have a public hotline (mayor's public telephone)

② Each city has its own special petition department

These institutions are able to accept all kinds of complaints from the public, including complaints against the project.

③ The organization that the bus company accepts citizens' opinions and suggestions

Each of the five bus companies has a dedicated department for receiving opinions and suggestions from citizens. These departments also accept complaints from citizens on this project (see Table 8-1).

Table 8-1 Existing Appeal Department of Bus Company

City	Department	Number of personnel	Telephone
Jinzhou	Operation Service Center	7	0416-2896123
Panjin	Letters and visits reception room	6	0427-6590114
Fuxin	Operation Department Service Quality Management	1	0418-2950110
Huludao	Customer Service	7	0429-2670000
Yingkou	Customer Service	8	0417-2830000

(2) A special agency setup for this project

In order to have a functioning GRM, the sub-project offices of each city designate personnel to receive and handle the grievances (see Table 8-2).

Table 8-2 Telephone list of full-time staff

City	Company	Name	Telephone
Jinzhou	Jinzhou Public Transport Co., Ltd	Yu Haibin	0416-2896276
Panjin	Panjin Passenger Transport Group Co., Ltd	Zhang Jingchuan	0427-6590114
Fuxin	Fuxin Huyue City Bus Co., Ltd	Zhang Xinqiang	0418-3986111
Huludao	Huludao Urban Public Transport Co., Ltd	Lang Fulin	0429-2670000
Yingkou	Yingkou Transportation Group Co., Ltd	Liu Bin	0417-2830000

8.3 Composition of GRC

In the process of project preparation, construction and operation and combined with the current situation of residents' complaints and complaints in the project areas, the subprojects cities have established various and effective complaint channels in order to timely understand and solve the impact and problems brought by the project to stakeholders, and ensure the residents' demand for information disclosure and participation as widely as possible.

At present, the administrative complaint center has been set up in many provinces and cities in China. The public will appeal to the administrative Complaint Center for the problems and dissatisfaction encountered in the process of project implementation. In addition, the complaint telephone set up in project cities provide more convenient channels for the public to appeal and report.

Project Level:Telephone and email used by the sub-project offices

Now subproject office have assigned full-time personnel to collect residents' opinions, including complaints. The complaint telephone numbers and email addresses of the subproject office have been publicized at the same time when the project information is disclosed, so as to ensure the smooth grievance and redress channel (see table 8-1).

In order to fully record the complaints of the affected people and the handling of related problems, the project management office has developed a recording form to record the complaint handling (see table 8-2).

Table 8-2 Complaint handling record

Description of the complainants (e.g. gender, age, whether they are disabled or not)			
Name and contact information of the complainants (provided voluntarily)			
Content of complaint			
Required solutions			
Time	Specific date	Recorder (Signature)	
Processing results	Brief description of the problem:		
	Investigation situation:		
	Proposed solution:		
	Coordination results and Time:		
	Actual handling situation:		
<p>Note: 1. The recorder shall truthfully record the contents and requirements of the complainants; 2. The appeal process should not be disturbed or obstructed; 3. The proposed solution shall reply to the complainants within the prescribed time.</p>			
Operator (signature)			

Publicity should be carried out through various channels, so that the public can fully understand the appeal channel, make clear the way of redress, and solve disputes in a timely manner.

Other grievance channels include:

- ① Existing public Hotlines in various cities (open calls of mayors)
- ② The special petition departments in each city
- ③ Existing online complaint channels in various cities

For example: Jinzhou environmental petition and complaint center, Jinzhou convenience network information reporting and complaint center, Panjin online information reporting and complaint center, Fuxin citizen complaint center, Huludao Environmental Protection Bureau complaint hotline, Yingkou Minxin network complaint center.

The Complaint channels will be open to all public, including vulnerable groups such as women. Any affected person can appeal through the telephone, letter, email and other media. Before the project starts, the contact person (contractor, environmental management personnel, etc.) of each complaint acceptance link will be identified. The specific contact information (such as phone number, address, email address, etc.) will be published on the information bar of the construction site or on the local government's website.

GRM for workers should be established as early as possible to function no later than construction commencement.

8.4 Role of GRC and Processes for Filing Cases

8.4.1 Function of Appeal Procedure

The protection of the appellant's rights and interests is embodied in the procedure.

The appeal handling procedure is the core link of the whole appeal system. Only by constructing a complaint handling procedure that is conducive to supervision, can the legal rights of the complainant be fully respected and a rational decision can be made

8.4.2 Procedures and Timelines

In order to ensure that the affected people can appeal to all aspects of the project, the following appeal procedures have been established:

Stage 1. If residents in the project area suffer any rights violations during the project implementation stage, they can report to the sub-project office, and the sub-project office will directly seek the contractor to negotiate and resolve.

Stage 2, if the complainants are dissatisfied with the decision of stage 1, the complainants can appeal to the Bus Company after receiving the decision, and the Bus Company should make a decision to deal with the complaint within one week.

Stage 3, if the complainer is dissatisfied with the decision of stage 2, the complainant can appeal to the environmental protection department of the project city after receiving the decision. The environmental protection department will make a decision to handle the appeal within 2 weeks.

Stage 4, if the complainant is still not satisfied with the decision, he may, after receiving the decision, appeal to the administrative organ with jurisdiction for arbitration in accordance with the administrative procedure law of the People's Republic of China.

Stage 5: If still dissatisfied with the arbitration decision, complainant can file a suit in a civil court in accordance with the Civil Procedure Law after receiving the arbitration decision.

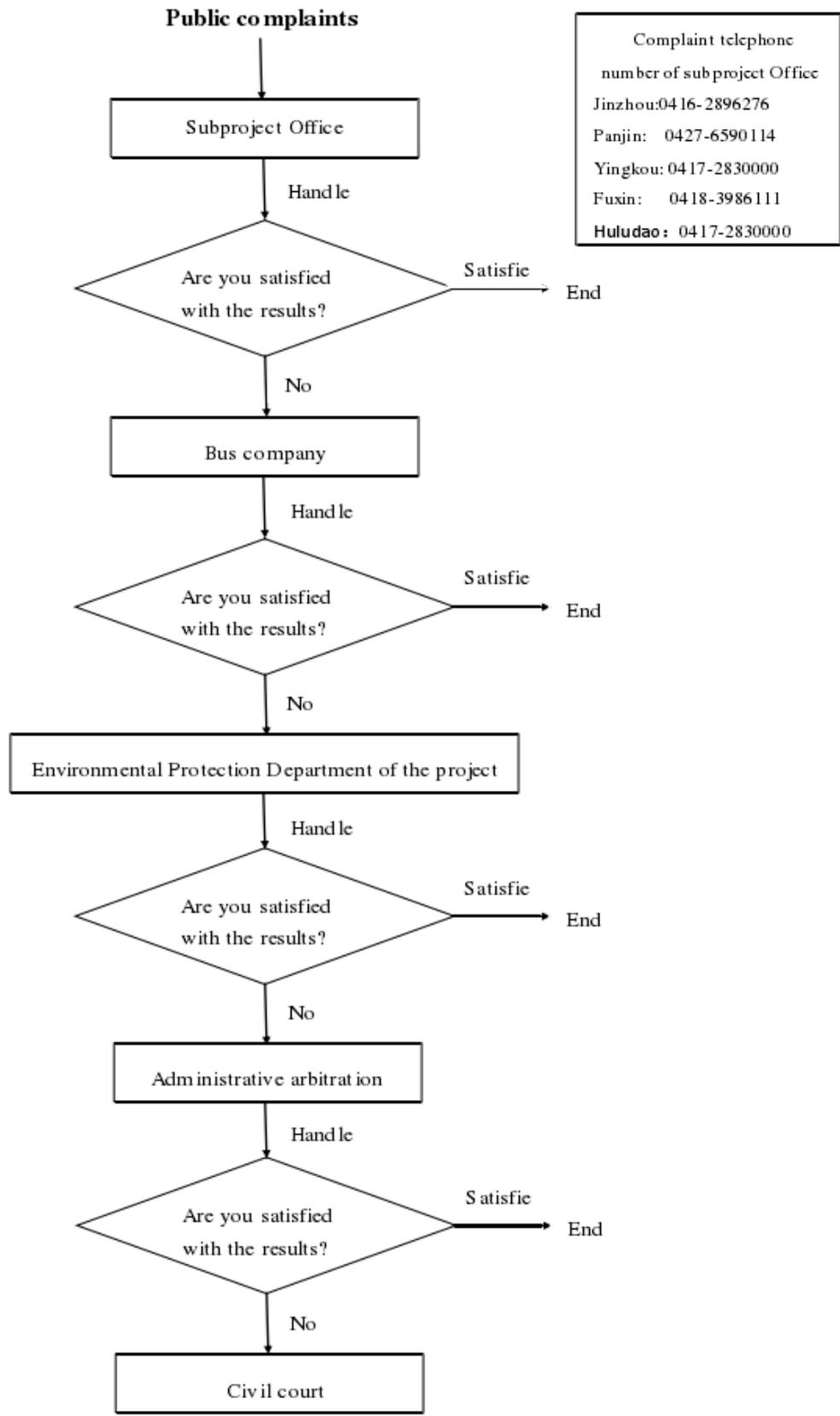


Figure 8-1 Appeal flow chart

The Project-affected People's Mechanism (PPM) has been established by AIIB to provide an opportunity for the independent and impartial review of submissions from Project-affected people who believe they have been or are likely to be adversely affected by the AIIB's failure to implement its ESP in case when their concerns cannot be addressed satisfactorily through the Project-level GRM or the processes of the AIIB's Management. For information on the Project-affected People's

Mechanism, please visit:

[https://www.aiib.org/en/policies-strategies/operational-policies/policy-on\[1\]the-project-affected-mechanism.htm](https://www.aiib.org/en/policies-strategies/operational-policies/policy-on[1]the-project-affected-mechanism.htm)”

9 Environmental and Social Management Plan

The design should minimize the environmental pollution problems caused by construction and traffic safety issues; reduce the negative impact of the project through public participation and listening to public opinion, so it is necessary to formulate a social management plan for the project.

9.1 Objectives of ESMP

In view of the inevitable environmental impacts of the project, the purpose of the environmental and social management plan is to formulate a set of technically feasible and operable environmental mitigation measures to minimize the negative environmental impacts brought by the project, while enhancing the positive impact and benefits.

At the same time, as a guiding document, the plan has the following functions:

(1) Clarify environmental mitigation measures.

On the basis of detailed on-site verification and confirmation of environmental protection targets, effective environmental mitigation measures are proposed.

(2) Provide guidance documents for environmental management.

This environmental management plan, after being reviewed by the Asian Infrastructure Investment Bank, will be provided as an environmental protection document to contractors, operating units and other relevant units during the pre-construction, construction and operation periods.

(3) Clarify the responsibilities and roles of related units.

The responsibilities and roles of relevant functional departments and management agencies in environmental and social management have been clarified.

(4) Propose an environmental monitoring plan during the pre-construction, construction and operation periods.

In order to ensure the effective implementation of environmental mitigation measures and early treatment of unforeseen or unexpected environmental problems, the

environmental management scheme proposes an environmental monitoring plan during the pre-construction, construction and operation periods.

(5) Clarify the environmental management obligations of all relevant parties.

Clarify the implementation and supervision responsibilities of relevant parties on environmental impact mitigation measures and environmental monitoring plans during the construction and operation periods of the project.

9.2 Inclusion of ESMP in Contract Documents

To ensure the implementation of the environmental and social management plan, an environmental and social management plan must be included in the contract. This ESMP is an attachment to the contract document of the project contractor and forms part of the AIIB loan agreement document.

If there is a discrepancy between China's environmental regulations and the environmental and social management plan, the engineering activities of Liaoning Green and Smart Public Transport Demonstration Project loaned by the AIIB will be implemented in accordance with the most stringent requirements.

9.3 ESMP

Based on full consultation and discussion with the LUCRPMC, Bus Company implementing agencies, relevant agencies, and residents in the project areas, a practical environmental and social management plan has been formulated for mitigating the project's adverse impacts.

The main responsibility of implementing environmental and social management plan is project owners. According to the environmental and social management plan implementation requires and combine the functions division of project-related institutions, project owners can own or entrust relevant agencies all or partly responsible for implementing the project of social management plan.

9.3.1 Related Institutional or Organizational Arrangements

In order to ensure the smooth progress of the project's environmental and social

management work and achieve the expected results, in the project implementation process, a set of top-to-bottom organizations must be set up for environmental and social action planning, implementation, coordination and monitoring.

Starting from August 2020, in order to ensure the completion of project preparations and the smooth implementation of the project, the bus companies in the project cities have successively established project management agencies-subproject offices. And in the sub-project office, a qualified full-time staff is arranged to be responsible for environmental and social management.

The environmental and social management agencies of the AIIB loaned Liaoning Green Smart Public Transport Demonstration Project are the LUCRPMC and the Subproject Office. The Environmental Protection Bureau of the project city is responsible for local environmental monitoring.

The responsibilities of each agency are as follows:

(1)LUCRPMC

It is the general implementing agency of this project. Specific responsibilities are as follows:

- ①Responsible for implementing and implementing the requirements of the relevant environmental and social management documents of the AIIB project;
- ②Responsible for guiding the formulation of the project's environmental and social management plan;
- ③Responsible for communication and coordination with the AIIB;
- ④Responsible for regularly reporting the progress of the environmental and social management plan to the AIIB;
- ⑤Responsible for entrusting environmental and social consultation experts to complete the formulation of environmental and social management plans
- ⑥Responsible for entrusting the social monitoring agency to monitor and evaluate the project's environmental and social management plan;
- ⑦Responsible for supervising the implementation of the project's environmental and

social management plan.

⑧Responsible for organizing and completing environmental and social management capacity building training

(2) Project implementing agency (bus companies in each project city):

①Responsible for the coordination between environmental and social consultation experts and interviewed stakeholders;

②Participating in the investigation of the environmental and social impact of the project;

③Responsible for implementing the project's environmental and social management plan;

④Responsible for regularly reporting the progress of the environmental and social management plan to the LUCRPMC;

⑤Responsible for organizing employee technical safety training.

(3) Environmental protection bureau of each project city:

Responsible for environmental quality monitoring during construction and operation periods.

(4)The Responsibilities of Contractors:

① Implement and monitor the environmental mitigation measures in accordance with the requirements of the environmental management and monitoring plan;

②Provide safe and comfortable accommodation for workers;

③Implement preventive measures for COVID-19 pandemic.

9.3.2 Measures to Reduce Negative Impacts and Risks

The measures to reduce negative impacts and risks are shown in Table 9-1.

Table 9-1: Mitigation measures during project pre-construction, construction and operation period

Environment/ Society content	Main activities	Main influence	Mitigation measures	Implementing agency	Supervisory agency
Pre-construction					
Society	Information disclosure and public participation	Social stability	<p>(1) Use multiple channels to publicize project-related information.</p> <p>(2) Propaganda through multiple ways enables the public to fully understand the appeal channels, and the channels for relief appeal,. Manage to resolve disputes in a timely manner.</p> <p>(3)In the early stage of project construction (the state of preliminary design), consultations with the public should be organized. The details of the designing plan should be carefully discussed with the public, and the designing plan should be improved based on public opinions.</p>	Bus company, Consulting company	Subproject
	Traffic Management	Social Security	<p>(1) Drivers must have driver’s licenses.</p> <p>(2) The transportation plan of the construction material shall be consulted with traffic management authorities to avoid traffic jams</p> <p>(3) Incorporation of community safety considerations into traffic management, especially at locations such as Yintong Bocuiyuan where buildings are close to the construction site</p> <p>(4) All vehicles must conform to traffic laws. On municipal roads, the maximum speed cannot exceed 50 km/h</p> <p>(5)Continuous driving time shall not exceed 4 hours, and driving time shall not exceed 8 hours per working day</p>	contractor	Subproject
	labor camp	Worker health	<p>The constructors should provide dormitories for workers. The dormitory should have the necessary living space, and the per capita living area should not be less than 2.5 square meters.</p>	contractor	Subproject

Environment/ Society content	Main activities	Main influence	Mitigation measures	Implementing agency	Supervisory agency
The Construction Period					
Project management	Contractor Management	Affect project implementation	<p>(1)Integration of EHS contractor management into broader project management, procurement, human resources, legal, and financial management.</p> <p>(2)“Prevention through design”: assessment of what prime contractor does versus what subcontractors do; contractor prequalification (when, if, and for what); use of information technology tools (identification cards and tracking and reporting systems for personnel and training).</p> <p>(3)Contractor management incorporates “adaptive management” to monitor and adapt over time; integration with sustainable procurement approach or concepts.</p> <p>(4)Training and quality control plans.</p>	Contractor	Engineering supervision, Subproject office
Society surroundings	COVID-19 response	Damage to the body, severely leading to death	<p>(1)Taking cognizance of situation at time of mobilization, the Contractor shall undertake a COVID-19 risk assessment of project area and prepare a COVID-19 Response and Management Plan (C-R&MP).</p> <p>(2)The preparation of C-R&MP shall consider guidance of PRC, other guidelines of WHO, International Labour Organization, International Financial Corporation and World Bank’s interim guidance note etc.</p>	Contractor	Engineering supervision, Subproject office
	Construction activity	Interference with social life	<p>(1) Set up an information bulletin board on the construction site, which contains the project profile, construction schedule, feedback and complaint hotline; at the same time indicating the contact person and contact information of the contractor and the supervision company, and the environmental protection hotline of the local environmental protection bureau;</p> <p>(2) The lighting lamp should be installed at an appropriate height, and the lighting direction should ensure that it will not cause inconvenience to nearby residents;</p> <p>(3) Strictly limit the scope of construction work, and it is strictly forbidden to expand the scope of construction land;</p> <p>(4) Strengthen employee safety education, civilized construction, and eliminate brutal construction behavior.</p>	Contractor	Engineering supervision, Subproject office

Environment/ Society content	Main activities	Main influence	Mitigation measures	Implementing agency	Supervisory agency
	Site cleaning, Construction excavation	Impact on public facilities	<p>(1) Construction activities will require a lot of water and electricity. Therefore, the contractor should contact relevant departments to connect pipelines and set up temporary pipelines. For areas with low electricity and water, water and power supply pipelines should be installed in advance to prevent temporary water and power cuts, which will affect the normal water supply and power supply of residential, commercial and government agencies in the area;</p> <p>(2) If cultural relics are found during construction, earthwork excavation must be stopped immediately and reported to the cultural relics protection department in time. Excavation work shall not be resumed before the identification of cultural relics has been completed and the necessary protection measures have been taken.</p>	Contractor	Engineering supervision, Subproject office
Occupational Health And safety	Site cleaning, transportation	Impact on occupational and community health and safety	<p>(1) Adopt isolation walls, safety fences, safety warning lights and signposts for the construction site;</p> <p>(2) If the construction poses a danger to the carriageway or sidewalk outside the fence, special personnel should be assigned to conduct on-site command and management;</p> <p>Safe passage for pedestrians with proper fall protection and signage will be planned.</p> <p>(3) Warning signs should be set up in the place where there are road damage or other hidden dangers in time</p> <p>(4) To specify the number and length of shifts for each worker.</p> <p>(5) Workers will be provided appropriate hand gloves and personal protective equipment (PPE).</p> <p>(6) Try to avoid manual handling of heavy objects</p> <p>(7) Operate construction vehicles must obey instructions. Drive them, at specified locations of designated road sections.</p> <p>(8) Construction vehicles must not stop randomly, and must avoid obstructing the traffic on the construction site.</p>	Contractor	Engineering supervision, Subproject office

Environment/ Society content	Main activities	Main influence	Mitigation measures	Implementing agency	Supervisory agency
Occupational Health And safety	Working at height	Harm to workers on site	<p>(1) Skilled workers working at height or doing hot work will be required to seek permission from site</p> <p>(2) Where a site boundary adjoins roads, streets or other areas accessible to the public, hoarding should be provided along the entire length except for a site entrance or exit.,</p> <p>(3) When it is rainy, or has heavy fog, or wind above grade 6, high-altitude operations should be prohibited</p> <p>(4) Safety net should be used around the working platform at high altitude to prevent people from falling</p>	Contractor	Engineering supervision, Subproject office
Occupational Health and safety	Use cranes, excavators and other equipment	Harms to workers on site.	<p>(1) when working with excavators, cranes, etc., a safe distance should be established around them.</p> <p>(2) When it is rainy, or has heavy fog or wind above grade 6, stop lifting operations.</p> <p>(3) During crane operation, to be sure that no one stays, works or passes under the boom and heavy objects</p>	Contractor	Engineering supervision, Subproject office
Urban ecology and landscape	Construction site cleaning and excavation	Impact on urban ecology and landscape	<p>(1) Minimize the occupation of land, vegetation and roads during the construction process to reduce the adverse impact on the ecological environment due to construction;</p> <p>(2) Measures such as anti-soaking, anti-scouring, and prevention of soil erosion should be taken for the pile of earthwork excavated temporarily;</p> <p>(3) Do a good job in the reasonable allocation of excavation and filling of earth. Protective measures should be taken at the spoil stacking point to avoid excavation and filling of earth during the rainfall period to prevent rain erosion from causing soil erosion and blocking drainage pipes;</p> <p>(4) During the construction process, care should be taken to protect vegetation such as trees and green spaces in adjacent areas.</p> <p>(5) Bird nest survey before tree felling;</p>	Contractor	Engineering supervision, Subproject office

Environment/ Society content	Main activities	Main influence	Mitigation measures	Implementing agency	Supervisory agency
Urban ecology and landscape	Cleaning up the site construction excavation and construction; Workers' lives in construction camp	The impact of construction waste on urban landscape	(1) Implement a good site cleaning system and strictly prohibit the random discharge of all kinds of garbage; (2) Strictly control the use of materials, minimize the remaining materials, and properly store the remaining materials; (3) Unusable building materials and domestic waste are transported to landfill for disposal.	Contractor	Engineering supervision, Subproject office
Air quality	Site cleaning, excavation engineering, material handling; Mechanical vehicle volume, transportation vehicle work	Dust and exhaust gas affect the lives of surrounding residents	(1) Build a fence with a height of 2.0-3.0m around the construction area; (2) Sprinkle water in the construction area in time to reduce dust, and stop operations in windy weather; (3) Clear and transport construction waste in time, and water should be used during the loading and unloading of earth and stone; (4) Select construction machinery and transportation tools that meet the national health protection standards to ensure that their exhaust gas emissions meet the relevant national standards; (5) The materials that are prone to dust, such as sand and gravel stacked on the construction site, should be stacked in a centralized manner. (6) When the vehicle leaves the construction site, it must be washed, no mud shall be carried on the road, and no leakage or spillage shall be allowed along the way. Contractor will provide a wash pit or a wheel washing and/or vehicle cleaning facility at the exits from construction sites. At such facility, high-pressure water jets will be directed at the wheels of vehicles to remove all spoil and dirt. (7) Earth-moving trucks and construction material transport vehicles should be covered with thatch cloth, canopy or other measures to prevent spills in accordance with the regulations. The load should not be over-filled to ensure that they are not scattered during transportation; and the running route and time of the transportation vehicles should be planned, as far as possible avoid driving in sensitive areas such as prosperous areas, concentrated traffic areas and residential houses; the dirt that has been spilled on the road during transportation should be cleaned up in time to reduce dust during operation.	Contractor	Engineering supervision, Subproject office

Environment/ Society content	Main activities	Main influence	Mitigation measures	Implementing agency	Supervisory agency
Noise	Construction and demolition activities; Operation of diesel generator sets; Construction vehicle transportation; Piling, compaction	Affect the production and life of surrounding residents	<p>(1) Strengthen the maintenance and maintenance of various construction equipment and minimize the intensity of noise sources.</p> <p>(2) Reasonably arrange the construction time and site, and shorten the construction period as much as possible. Avoid using high-noise construction machinery such as milling machines, excavators, and generators in the same area at the same time. For individual construction sites with serious impacts, temporary sound insulation enclosures or sound-absorbing sound barriers shall be adopted.</p> <p>(3) Construction machinery with strong noise will stop operating at night (22:00-8:00).</p> <p>(4) Attention should be paid to reasonably arrange the transportation time of construction materials. When there are tracts of residential buildings within 50m around the construction site, transportation of building materials on the sidewalk at night shall be prohibited. For roads that must be transported at night, there should be no-horn and speed limit signs, and the speed of vehicles should be less than 30km/h when passing at night.</p> <p>(5) Wherever baseline noise already exceeds the standards, only 3dB(A) of noise increase is allowed.</p> <p>(6) The sensitive receptors (workers & external parties, if applicable) have to be isolated from heavy construction noise generated. This is possible by erecting reinforced 2 m tall GI sheet barrier around the area where heavy construction works is undertaken.</p> <p>(7) Workers working inside or near construction equipment should be provided with proper PPEs like ear plugs / muffs</p> <p>(8) Information dissemination to local residents about the nature and duration of intended activities including the construction method, probable effects, quality control measures and precautions prior to commencement and kept updated as to changes in the management and mitigation plan.</p> <p>(9) Enclose especially noisy activities if above the noise limits and employ transportable noise screens between noise sources and identified noise sensitive areas for the duration of noisy construction activities.</p>	Contractor	Engineering supervision, Subproject office

Environment/ Society content	Main activities	Main influence	Mitigation measures	Implementing agency	Supervisory agency
Wastewater	Construction wastewater; Domestic water for construction workers	The impact of construction wastewater and domestic sewage on urban ecology and landscape	<p>(1) Set up a sedimentation tank to treat construction wastewater. After treatment, the construction wastewater should be reused in the project as much as possible, such as sprinkling water for dust suppression and material mixing.</p> <p>(2) Reasonably arrange construction time, shorten construction period, and avoid construction in rainy season as much as possible.</p> <p>(3) Strengthen management during project construction. If there is underground water gushing, it is necessary to build a reservoir, and ensure that the ground gushing water can be discharged only after it reaches the level A standard of GB18918-2002 "Emission Standard of Pollutants for Urban Sewage Treatment Plants"</p> <p>(4) Contractor to collect the groundwater baseline data prior to construction. Disposal in compliance with applicable regulatory requirements. Groundwater quality monitoring. Water abstracted must be measured/ recorded periodically. After Construction, Contractor will conduct groundwater analysis and be obliged to reinstate the used sites no worse than the conditions of pre-construction.</p> <p>(5) Construction domestic sewage is discharged into the municipal pipe network.</p>	Contractor	Engineering supervision, Subproject office
Solid Waste	Site cleaning, construction demolition, site excavation and construction; Workers' lives in construction camps	The impact of generated construction waste and construction workers' domestic waste on the urban environmental landscape and surrounding environment	<p>(1) Building waste should be sorted and stored in a centralized manner. The recyclable parts should be collected by licensed recyclers, and the parts that cannot be recycled should be sent to the designated place for stacking treatment. Mixed disposal with domestic waste and random disposal are prohibited.</p> <p>(2) The construction waste generated during the construction of the project should be cleared and transported by a qualified unit, transported to the designated construction waste storage site, and managed in accordance with the "Urban Construction Waste Management Regulations".</p> <p>(3) Domestic waste should be collected at the construction site and transported to municipal waste landfill in time.</p>	Contractor	Engineering supervision, Subproject office

Environment/ Society content	Main activities	Main influence	Mitigation measures	Implementing agency	Supervisory agency
Operation period					
Ambient air	Spray paint	The impact of painting operations on the health of maintenance workers and the impact of the air in the yard	<p>(1) Fully use protective equipment. Using work clothes, work shoes, protective glasses, masks (anti-virus masks), etc. Which can prevent solvent gas from being inhaled into the lungs and contact with the skin. You can apply protective pastes such as medical petroleum jelly to bare skin, or apply it on your hands, and wash it off after application.</p> <p>(2) Strengthen natural ventilation and local mechanical ventilation. If conditions permit, paint spray booths should be set up and equipped with mechanical ventilation equipment. It is recommended to use oil curtains to remove paint mist at the same time to solve the harm of toxic substances and paint mist to the human body.</p> <p>(3) In places where the air cannot circulate, the construction personnel should use air-supply masks, implement intermittent operations, strengthen labor protection, and they cannot wash hands with solvents containing benzene to reduce the impact of harmful gases on the human body.</p>	Bus Company	Project City Environmental Protection Bureau
	Canteen cooking	The oily smoke produced when the stove is working	<p>(1) It is recommended to use natural gas as an energy source.</p> <p>(2) Install oil fume extraction facilities. After the oil fume purifier is processed to meet the requirements of GB18483-2001 "Emission Standard for Cooking Fume", it will be discharged through exhaust pipes at an exhaust port 1.5m above the roof.</p>	Bus Company	Project City Environmental Protection Bureau
Noise	E-buses operation	Impact on the lives of surrounding residents	<p>(1) No horns passing route with identified sensitive receptors</p> <p>(2) It is forbidden to sound the whistle when electric bus entering and leaving the bus parking lot or the maintenance factory</p> <p>(3) Inspection of motor vehicles is prohibited at night.</p>	Bus Company	Project City Environmental Protection Bureau

Environment/ Society content	Main activities	Main influence	Mitigation measures	Implementing agency	Supervisory agency
Waste water	Operation of repair workshops, bus washes, and bus service centers	The impact of domestic sewage generated from vehicle maintenance, scrubbing waste water and employee office on urban ecology and environment	<p>(1)Waste water of maintenance and bus washing must be reused or discharged after being treated by a sewage treatment process. No direct discharge to the municipal sewer system;</p> <p>(2)Sewage treatment facilities should be designed and constructed by qualified units. The wastewater will be pretreated to meet regulatory requirements before being disposed in municipal sewer system. At the same time, in order to ensure the effect of grease trap treatment, the sanitation department should be entrusted to regularly skim waste oil and salvage sediment;</p> <p>(3) The septic tank should be cleaned regularly to ensure its treatment effect;</p> <p>(4) Domestic sewage is collected through the urban sewage pipe network and then enters the urban sewage treatment plant.</p> <p>(5)Oil spilled in Depot should be trapped in oil and grease trap and disposed to authorized collectors so as to avoid any underground/ surface water contamination.</p>	Bus Company	Project City Environment al Protection Bureau
Solid Waste	Solid waste generated during vehicle maintenance	The waste generated in the process of bus maintenance and scrapping will affect the surrounding environment if not handled properly	<p>(1) All waste tires, waste parts, etc. are collected and recycled by a qualified recycling unit.</p> <p>(2) Waste mineral oil and sediment generated in vehicle cleaning, grease trap, and sedimentation tanks should be promptly removed and salvaged, collected in barrels and temporarily stored in a separate room, and then promptly entrusted to relevant qualified units for removal and disposal.</p> <p>(3) The sludge generated by sewage treatment facilities should be collected and dehydrated, and then entrusted to the sanitation department for removal and disposal.</p>	Bus Company	Project City Environment al Protection Bureau

Environment/ Society content	Main activities	Main influence	Mitigation measures	Implementing agency	Supervisory agency
Solid Waste	Domestic garbage is generated by the station staff	Affect environmental health	The domestic garbage is collected by the municipal sanitation and transported to the landfill for disposal.	Bus Company	Project City Environmental Protection Bureau
	Used batteries	Improper handling affects the environment	Used batteries are recycled by the vehicle manufacturers or handed over to a qualified renewable resource company for dismantling. Record shall be well maintained. The recycled battery can be used for stationary applications after terminating their useful life on electric buses.	Bus Company	Project City Environmental Protection Bureau
H&S	Fire	Lack of equipment	For the electric bus charging station, the fire-fighting facilities should be equipped with fire extinguishers according to the light hazard level according to the requirements of GB50966-2014 "Code for Design of Electric Vehicle Charging Stations". According to GB50140 "Code for Design of Fire Extinguishers for Buildings", electric vehicle charging stations belong to Class E fire sites, and their maximum protection distance and minimum configuration criteria for single fire extinguishers should not be lower than those for Class A fires.	Bus Company	Fire Stations
	normal operation and maintenance	Physical injury, disease	(1)CCTV system will be installed for local and centralized monitor of operation. (2)In view of the potential hazards from system failure resulting to accidents, both on- site and off-site emergency measures will be implemented. (3)Emergency team, ambulance, contact number and hospital should be available. Emergency response plan should be implemented during operation periods.	Bus Company	Project City Human Resources and Social Security Bureau

9.3.3 Environmental and Social Management Implementation Plan

According to the social management plan of the project, the project develops a implementation plan and arrangements, see Table9-2.

Table 9-2 Project Environmental and Social Management Implementation Plan

No.	Contents	Implementation time	Primary responsibility institutional
1	Implementation of Environmental Management Plan	The entire process (2022-2024)	LUCRPMC, each subproject Office, the Municipal Environmental Protection Bureau
2	Information disclosure and public participation	The entire process (2022-2024)	LUCRPMC, each subproject Office
3	Internal monitoring and evaluation of environmental and social management plans	Once a year in the project implementation period (2022-2024)	LUCRPMC, Office of the subproject, monitoring bodies

9.3.4 Social Management Plan Focusing on Women's Rights

This project pays special attention to the impact of project implementation and operation on women groups, and has formulated a social management plan that focuses on women's rights and interests, as shown in Table 9-3.

In jobs such as intelligent public transportation management system center, IC card salesperson, cleaning, etc. if new employees are recruited, the proportion of female employees recruited by each bus company to the number of recruits for this position can reach: 40% in Jinzhou, 50% in Huludao, 70% in Panjin, 60% in Yingkou, and Fuxin 40%.

Table 9-3 Social Management Plans Concerning Women's Rights

No.	Action content	Target population	Implementing agency	Implementation time	Concrete action	Monitoring indicators	
1	Promote women's participation in projects	Women affected by the project	Subproject office, design unit, construction contractor	September 2020-December 2022	The needs and suggestions of women should be considered in the project design stage	Number, frequency and suggestions of participants in seminars and interviews at each stage of the project	The proportion of women reaches more than 50%
2	Protect the legal rights of women	Women affected by the project	Construction contractor	September 2022-December 2024	During project implementation, it should ensure that non-skilled jobs are given priority to vulnerable groups including women	Number of women employed in non-technical positions in project implementation	Women in cleaning and canteen cook positions account for no less than 40%
3	Women's labor skills training and employment	Women affected by the project	Bus Company	June 2022-December 2024	During project operation, it should ensure that technical and non-skilled jobs are provided to vulnerable groups including women	Number of women employed in technical and non-skilled positions in project operations	In jobs such as intelligent public transportation management system center, IC card salesperson, cleaning, etc., women account for no less than 40%

9.3.5 Performance Indicators

(1) Environmental indicators

The main environmental indicators examined in this project are shown in Table 9-4.

Table 9-4 Environmental performance indicators

Index	Sewage treatment compliance rate	Recycling rate of used batteries	Recycling rate of used tires	Noise
Construction Period	100%	—	—	Meet the requirements of the environmental noise emission standard for construction sites (GB 12523-2011)
Operation period	100%	100%	100%	Meet the requirements of the environmental noise emission standard GB 12348-2008 for industrial enterprises

(2) Social indicators

Table 9-5 Residents' satisfaction with public transportation (%)

City	Jinzhou	Panjin	Huludao	Fuxin	Yingkou
Base value of bus satisfaction	86	86	80.8	87.5	85
Bus satisfaction target value	91	90	91	92	90
Women's satisfaction target value	91	90	91	92	90

9.4 Monitoring and Evaluation

9.4.1 Monitoring Organization

Monitoring and evaluation is an important link to ensure that the project is implemented in accordance with the project objectives and that the environmental and social management plan can be emphasized and implemented. It is also an important error correction mechanism and participation mechanism for the project. To this end, the project has established a monitoring and evaluation mechanism, including internal monitoring and external monitoring and evaluation.

The internal monitoring of the environmental and social management plan will be

undertaken by the LUCRPMC and subproject offices and shall be conducted by qualified E&S specialists. They monitor and evaluate the progress of the project, the implementation of the environmental and social management plan, the progress of the information disclosure and public participation plan, the use of project funds, and the implementation of rules and regulations.

In the content of internal environmental monitoring, the content involving accurate data determination will be carried out by qualified environmental monitoring companies and supported by the information provided by the monitoring stations of the local environmental protection bureau. The ES performance will be documented in the ES monitoring reports to be submitted to AIIB on regular basis. Environmental monitoring can also be carried out regularly by local environmental authorities.

9.4.2 Monitoring Plan and Contents

9.4.2.1 Monitoring the Implementation of the Environmental Management Plan

(1) Monitoring content

- ① To analyze and compare the severity of actual and predicted environmental impacts;
- ② To focus on tracking the implementation of environmental protection measures and compliance with laws and regulations;
- ③ To evaluate the overall effectiveness of environmental mitigation measures
- ④ To determine whether the project environmental management plan needs to be adjusted.

(2) Internal Monitoring plan:

Environmental monitoring includes two phases: the construction period and the operation period. The purpose is to grasp the pollution dynamics of the proposed project in a comprehensive and timely manner, and to understand the degree of environmental quality change, the scope of impact and the environmental quality dynamics during the operation period of the project construction area, feedback information to the competent department in time, and provide a scientific basis for the environmental management of

the project.

According to the characteristics of this project, environmental internal monitoring plans are formulated according to the construction period and operation period, as shown in Table 9-6. Environmental data testing should be commissioned by a company with corresponding qualifications.

The air and noise data will be collected as baseline data before constructing the project. There is no water body within 200 meters of the project site, so the monitoring plan doesn't include projects on water body monitoring.

Table 9-6 Environmental internal monitoring plan

Project Stage	Monitoring object	Monitoring factor	Monitoring point	Monitoring frequency	Implementing agency	Supervisory agency	Executive standard	
							Quality Standard	Emission Standards
Pre-construction	Air	TSP、PM _{2.5}	Boundary of the construction site of Panjin and Fuxin Public Transport Service Center	Once, the environmental baseline value collected before construction	Qualified environmental monitoring agency	Subproject office	"Ambient Air Quality Standard" (GB3095-1996)	"Comprehensive Emission Standard of Air Pollutants" (GB16297-1996)
	Noise	LAeq(dB)	1m around the boundary of the construction site of Panjin and Fuxin Public Transport Service Center	Once, the environmental baseline value collected before construction	Qualified environmental monitoring agency	Subproject office	"Acoustic Environmental Quality Standard" (GB3096-2008)	"Noise Limits at the Boundary of Construction Sites" (GB12523-2011)
Construction	Air	TSP、PM _{2.5}	Boundary of the construction site of Panjin and Fuxin Public Transport Service Center	Determine the monitoring frequency according to the actual situation on site and residents' requirements	Qualified environmental monitoring agency	Subproject office	"Ambient Air Quality Standard" (GB3095-1996)	"Comprehensive Emission Standard of Air Pollutants" (GB16297-1996)
	Noise	LAeq(dB)	1m around the boundary of the construction site of Panjin and Fuxin Public Transport Service Center	Determine the monitoring frequency according to the actual situation on site and residents' requirements	Qualified environmental monitoring agency	Subproject office	"Acoustic Environmental Quality Standard" (GB3096-2008)	"Noise Limits at the Boundary of Construction Sites" (GB12523-2011)
Operation	Discharge water from Panjin bus wash	SS、COD、pH、Petro	Panjin bus wash plant sewage treatment equipment drainage outlet	2 period/year, 2 days/period, 1 time/day (if the project city environmental protection bureau has regulations, implement the local environmental protection bureau monitoring frequency regulations)	Qualified environmental monitoring agency	Subproject office	—	"Integrated Wastewater Discharge Standard" (GB8978-1996)

9.4.2.2 Monitoring the Implementation of the Social Management Plan

(1) Monitoring content:

①According to the social monitoring and evaluation indicators determined by the social management plan, the implementation of the social management plan will be tracked, monitored and evaluated;

②The monitoring unit analyses and assess the social impact of the actual project and the extent to meet the needs of target groups based on the findings of tracking and monitoring

③Focusing on tracking various implementation that mitigating or have negatively affect on the program, timely submission measures to remove barriers to achieve social objectives of the project, if necessary, proposed adjustment programs

④Identify and analyze the existing social problems and social risks during the implementation process in the project, and propose corrective measures and improvement suggestions

(2) Internal Monitoring plan

The time period and frequency of internal monitoring will be determined by the LUCRPMC and Subproject Office based on the project progress and actual conditions. The internal monitoring plan is listed in Table 9-7.

Table 9-7Internal monitoring plan

Monitoring time	Monitoring content	Responsible agency	Supervisory agency
June 2022 December 2022	1. The implementation of the environmental and social management plan will be evaluated; 2. The effectiveness of mitigation measures will be verified; 3. Public opinions will be collected to determine whether mitigation measures need to be adjusted;	LUCRPMC and Subproject Office	AIIB

Table 9-7 Internal monitoring plan¹(cont.)

Monitoring time	Monitoring content	Responsible agency	Supervisory agency
June 2022 December 2022	4. Further understand the needs and opinions of stakeholders, and provide opinions and suggestions on the mid-term adjustment of the project.	LUCRPMC and Subproject Office	AIIB
June 2023 December 2023 June 2024	1. The implementation of the environmental and social management plan will be monitored; 2. The experience and lessons in the project implementation process will be summarized to provide decision-making basis for later project management; 3. Stakeholders' satisfaction and opinions on project implementation will be collected.	LUCRPMC and Subproject Office	AIIB
December 2024 (Completed)	1. Evaluate the completion of performance indicators ; 2. Evaluate the achievement of project objectives ; 3. Residents' evaluation of the project and sustainable development.	LUCRPMC and Subproject Office	AIIB

Note1: The specific monitoring time can be adjusted according to the actual progress of the project

9.5 Implementation budget and capacity building of ESMP

9.5.1 ESMP Budget

The environmental protection activities of each project city belong to engineering measures. Therefore, they should be carried out by the project construction entities and operation entities, and the expense of those activities should be a part of the project cost. It is estimated that \$70000 will be invested (data from the general report). The costs in the environmental management plan are mainly used for environmental and social management during the construction and operation periods that mainly includes

environmental monitoring costs, personnel training costs, and environmental and social consulting costs.

Table 9-8 Cost estimates (Ten thousand CNY)

Category	Jinzhou	Yingkou	Fuxin	Panjin	Huludao
Training fee*	1.4	1.4	1.4	1.9	1.4
Domestic study and inspection fee	5	5	5	5	5
Environmental and social consulting fees, external monitoring fees	20	20	20	20	20
Environmental internal monitoring fee	1	1	5	5	1
Subtotal	27.4	27.4	31.4	31.9	27.4
Total	145.5				

*Details in Table 9-9

9.5.2 Capacity Building

9.5.2.1 Environmental and Social Management Capacity Building Training

According to the survey, institutional capacity, working conditions and equipment configuration of the project is more complete, professional staff's quality level is high, they have preparation for similar project, construction and operation of the national experience. Give the project belongs to the World Bank loan project, the relevant personnel need to be familiarity with the mode of operation for AIIB projects, especially in relation to social and security requirements and adequately compare with domestic experience, so they need further study and training for relevant business policy requirements.

See Table 9-9 for the training plan for environmental and social management capacity building.

Table 9-9 Environmental and Social Management Capacity Building Training Plan¹

Training periods	Training topics	Training objects	Training contents	Times	The term (Day/time)	Number of people	Cost (CNY/person/day)	Total cost (Ten thousand CNY)
Construction Period	Social policies and regulations	Sub-project office, construction contractor	1 The content of public participation involved in China's environmental protection laws and regulations 2 Laws of the People's Republic of China on the Protection of Women's Rights and Interests 3 Special regulations on labor protection for female employees 4 AIIB Social Management Framework Content	1	1	20	500	1.0
	Environmental policies and regulations	Sub-project office, construction contractor	1 Environmental protection laws and regulations 2 Environmental policies and plans 3 Contents of the AIIB Environmental Management Framework	1	1	20	500	1.0

Table 9-9 Environmental and Social Management Capacity Building Training Plan¹

(cont. 1)

Training periods	Training topics	Training objects	Training contents	Times	The term (Day/time)	Number of people	Cost (CNY/person/day)	Total cost (Ten thousand CNY)
Construction Period	Implementation and adjustment of environmental and social management plans	Sub-project office, contractor	1 Environmental management responsibilities during project construction 2 The main tasks and contents of environmental management during the construction period of the project 3 Public participation during the construction period 4 Internal monitoring of environmental and social management	1	1	20	500	1.0
	Emergency solving	Contractor	Emergency plans and measures	1	1	20	500	1.0
	Appeals and dispute resolution	Sub-project office, contractor	Collection, processing and feedback of residents' opinions	1	1	20	500	1.0
	Environmental and Social Consultation	Sub-project office	Negotiation methods, contents, stakeholder negotiation	1	1	20	500	1.0

Table 9-9 Environmental and Social Management Capacity Building Training Plan¹(cont. 2)

Training periods	Training topics	Training objects	Training contents	Times	The term (Day/time)	Number of people	Cost (CNY/person/day)	Total cost (Ten thousand CNY)
Operation period	Environmental monitoring inspection, reports	Panjin Bus Company	1 Inspection of environmental protection facilities, environmental quality monitoring, preparation of reports 2 Environmental safety rules and regulations	2	1	5	500	0.5
	Environmental and social management measures	Bus Company	Environmental and social management plan during operation	1	1	10	500	0.5
	Public participation during operation	Bus Company	1 Public participation methods during the operation period 2 Collection, processing, and feedback of public opinions	1	1	10	500	0.5
Total				10	-	145	-	7.5

Note1: In the proposed plan, the LUCRPMC and the Bus Company can adjust the content and frequency of training according to actual needs

9.5.2.2 Project Management Execution Ability and Production Technology Safety Training

Project management execution ability is the guarantee to ensure the smooth implementation and success of this project. The LUCRPMC has organized or planned to complete such training.

Necessary technical safety training is the basis for preventing production accidents during the operation period and a prerequisite for ensuring the sustainable development of the project. Such training will be organized and completed by the project implementation unit (Bus Company).

See Table 9-11 for the training plan.

For the production and technical safety training of personnel in this project, a training team will be jointly established by the project's winning bidder and representatives of the Bus Company to communicate and formulate training content, training outlines, training plans, and training targets. After the training is completed, the training team will evaluate the effectiveness of the staff training.

The bid-winning unit of the project will assign qualified technicians to provide free training to the employees of the Bus Company, including vehicle use and maintenance, charging and other equipment use and maintenance. The Bus Company can arrange for employees to track the development and commissioning of the learning system throughout the process.

(1) Training purposes

The bid-winning unit of the project will provide comprehensive training. In order to enable the employees of the Bus Company and its subsidiaries to effectively use the pure electric vehicles, charging equipment, smart terminals and application systems procured by this project, Develop detailed training plans, and offer different levels of user training courses according to the user's experience level and job nature and it needs to be equipped with sufficient training staff to ensure the effectiveness and quality of training.

(2) Training objects

The winning bidder will develop a targeted training plan based on the training objectives of this project. The project will provide full training services for no less than 300 people. The main targets of the training include managers and related functional personnel. Strive to train a group of technical backbones with theoretical knowledge and practical experience for the Bus Company to become qualified managers, technical backbones, maintenance personnel, dispatchers and drivers. All personnel participating in the training will be able to operate independently.

(3) Training content

Personnel training is mainly divided into two types: technical training and application training.

The target of technical training mainly includes vehicles, equipment maintenance, data maintenance personnel, software and hardware platform maintenance personnel, and application system maintenance personnel. The training content is mainly for training related hardware equipment and application system platform of this project.

The target of application training is mainly application operators of vehicles, charging equipment, and information systems. The training content is mainly for the operation and use of the application system, etc., to help application operators to become familiar with and master the various functions of the system as soon as possible, and be able to use them proficiently.

9.6 Monitoring and Evaluation Report

In the project implementation period (2022 to 2024), during construction phase, submit semi-annual environmental and social management plan implementation monitoring report

Table 9-10 Project management execution ability and technical safety training schedule

Training categories	Training objects	Training contents	Training periods	Training institutions	Training methods	Training Locations	The number of participants	Implementation status
Project management	Project managers	AIB project management, monitoring and reporting system	Jan. 2022-Dec. 2024	LUCRPMC	Face-to-face lectures	LUCRPMC	30	Plan
	Bus driver, IC card seller	the trainings for the staff about gender equality and barrier free concept and service attitude towards the disabled/elders.	Jul.2022-Aug.2024	Bus company	Face-to-face lectures	Bus company	All people involved	Plan
Technical operation	Vehicle and equipment maintenance personnel, data maintenance personnel, software and hardware platform maintenance personnel, application system maintenance personnel	Vehicle maintenance, smart equipment maintenance	Jul.2022-Aug.2024	Contractor, Bus Company	Face-to-face lectures	Supplier or manufacturer	200	Plan
	Drivers, chargers, Information system operating workers	Operation and use of vehicles and application systems	Jul.2022-Aug.2024	Contractor, Bus Company	Face-to-face lectures	Supplier or manufacturer	800	Plan

10 Conclusions and Suggestions

10.1 Conclusions

(1)The construction of the project will improve the public transportation condition and promote sustainable development of local economy. The project has received support from residents and related departments.

Due to the rapid development of social economy and continuous promotion of urbanization process, the congestion problem of transportation is more serious, which not only affects residents' life and livelihood and exerts negative influence on attracting investment but also causes the restriction of the economic development in the city. The construction of project not only can improve residents' living environment and life quality, but also can relieve traffic congestion, improve investment environment greatly, and play an active role in promoting sustainable development of local economy. The evaluation conclusion is shown in table 10-1.

Table 10-1 Summary Table of Environmental and Social Evaluation

No.	Content of social evaluation		Evaluation conclusion
1	Analysis of social adaptability	Policy compliance	High compliance
2		The degree of compliance with social needs	High compliance
3		Degree of support from different stakeholders	High level of support
4	Analysis of social impact	Impact on regional economic development	Promoting economic development
5		Impact on social development	Promoting social development
6		Impact on natural environment	conserve energy ,reduce emissions
7		Impact on Residents' Employment	Promoting employment
8		Impact on social security and stability	Conducive to security and stability

Table 10-1 Summary Table of Environmental and Social Evaluation (cont.)

No.	Content of social evaluation		Evaluation conclusion
9	Analysis of social impact	Impact on the quality of local residents' life	Improve the quality of life
10		Impact on vulnerable groups	Increase employment rate
11		Negative impact	Less negative impact
12	Evaluation of social justice		Embody the principle of fairness and justice
13	Evaluation and Social risk assessment		Less risk

(2) The negative impact of the project on residents' lives will be mainly the impact of air pollution and noise pollution on residents' lives during construction, and these effects are short-term and controllable. After mitigation measures are taken, these effects will be within an acceptable range.

(3) The main negative impact of the project on the environment will include noise, sewage, construction waste and construction dust during the construction phase, as well as wastewater from bus wash, sludge, waste batteries, waste tires and scrap buses during the operation phase. There are economically and technically feasible mitigation measures to eliminate or mitigate these environmental impacts. After measures are taken, these negative effects will not hinder the implementation of the project.

(4) Residents' expectations for public transportation are:

Improve the public transportation network, increase the number of buses, extend the operation time, reasonably set the bus stops, build or maintain the supporting facilities and renew old bus vehicles in order to provide residents the comfortable bus services.

10.2 Suggestions

(1) In the early stage of project construction (the state of preliminary design), consultations with the public should be organized with a focus of areas with predicted impacts, such as Yintong Bocuiyuan. The details of the designing plan should be carefully discussed with the public, and the designing plan should be improved based on public opinions.

(2) During project implementation, it is recommended to strengthen the management of project implementation. Mitigation measures should be strictly implemented, and the construction will not affect residents

(3) Relevant information on the project must be publicized and displayed comprehensively. The survey indicates that some residents did not know anything about the project initially. They got to know it only on the site of survey. Therefore, the opinions or suggestions based on their short time thinking may not be comprehensive or objective.

(4) Relevant departments should regularly release information about the project so that the public can understand the situation and put forward their own opinions and suggestions.

(5) It is better that the information are made open early and the open state should be long enough to make more public acquire the project related information and understand the related issues of the project.

(6) Establish an environmental information feedback platform to realize the public's right to participate in investment projects, eliminate the public's doubts and confusion about whether there are environmental problems in investment projects from the root, and better ensure the implementation of investment projects.

Annex

1 List of participants in the forum and survey photos

亚投行贷款辽宁绿色智慧公交项目公众参与调查

地点: 营口. 座谈 2020. 9. 17

序号	姓名	性别	年龄	职业/单位	联系方式	备注
	徐岩	女	32	新兴社区	13041703175	
	苑丽华	女	76	新兴社区	13041706337	
	刘兴远	男	56	新兴社区	15841796324	
	吴桂荣	女	76	新兴社区	18604179584	
	李新平	女	64	新兴社区	13654172493	
	赵淑芬	女	19	学生	18340756366	
	刘宁宁	男	38	驾驶员	13841700702	

亚投行贷款辽宁绿色智慧公交项目公众参与调查

地点: 营口 2020. 9. 17

序号	姓名	性别	年龄	职业/单位	联系方式	备注
	刘斌	男	43	营口交运集团办公室	13504170888	
	谢玉军	男	56	公路局党委书记	13332311122	
	王福平	女	36	营口交运集团办公室	15641771677	
	孙刚	男	38	营口交运集团营运部长	13704174301	
	吴桂荣	男	49	营口交运集团服务有限公司	18604171453	
	李军	男	51	营口交运集团服务有限公司	15641770678	
	李岩松	男	44	营口交运集团综合保障部	15641770456	
	刘福军	男	25	营口交运集团综合保障部	15641770177	
	刘琳	女	32	营口交运集团办公室	15841796269	

亚投行贷款辽宁绿色智慧公交项目公众参与调查

地点: 阜新

2020.9.22

序号	姓名	性别	年龄	职业/单位	联系方式	备注
	孔丹	男	33	阜新虎跃公交公司	15004180401	
	李强	男	38	阜新虎跃公交公司	18504188078	
	李强	男	30	阜新虎跃城市公交	18941843213	
		男	53	阜新市南环公交	15841800118	
	梁明	女	31	阜新公交总公司	15841843322	
	李明静	女	40	阜新虎跃城市公交有限公司	18504188068	
	梁君	女	37	阜新虎跃城市公交有限公司	13464819178	
	李珊	女	42	阜新虎跃城市公交	13941870544	

亚投行贷款辽宁绿色智慧公交项目公众参与调查

地点: 阜新 座谈会 (女性)

2020.9.22

序号	姓名	性别	年龄	职业/单位	联系方式	备注
1.	潘佳欢	女	27		13941890705	
2.	杜国荣	女	40		18201858230	
3.	王妍	女	28		18341855195	
4.	周娜	女	38		15042505011	

亚投行贷款辽宁绿色智慧公交项目公众参与调查

地点: 盘岭

2020.9.27

序号	姓名	性别	年龄	职业/单位	联系方式	备注
1	陈卫华	女	49		13311265527	
2	刘	男	44	无	18742531888	我
3	张维峰	男	51		13909878425	
4	张浩	女	42		13020762217	
5	张亚娟	女	47		1594276211	
6	杨海	男	42		15241750388	
7	李东	男			1528428670	

亚投行贷款辽宁绿色智慧公交项目公众参与调查

地点: 盘岭

2020.9.27

序号	姓名	性别	年龄	职业/单位	联系方式	备注
	姜晨	男	30	司机	16624503323	
	李宝辉	男	40	司机	18242737500	

亚投行贷款辽宁绿色智慧公交项目公众参与调查

地点: 盘锦

2020.9.27

序号	姓名	性别	年龄	职业/单位	联系方式	备注
1	刘新	女	30			
2	韩琳琳	女	35			
3	曲超	女	27			
4	刘玉平	女	30			
5	贾杨杨	女	38			

亚投行贷款辽宁绿色智慧公交项目公众参与调查

地点: 盘锦

2020.9.27

序号	姓名	性别	年龄	职业/单位	联系方式	备注
1	刘英	女				
2	张艳梅	女				
3	张宇	女				
4	韩楠	女				
5	张文惠	女				
6	黄雪松	女				
7	崔莹	女				

亚投行贷款辽宁绿色智慧公交项目公众参与调查

1/1

地点:

序号	姓名	性别	年龄	职业/单位	联系方式	备注
	姜琳	女	24		18641625626	
	梅名凤	女	46		15674669002	
	王红英	女	46		15640673811	
	黄鑫	男	39		18640661857	
	张宇	男	39			
	程宇	男	27			
	张力军	男	62		13238944670	
	马艳霞	女	38		18640669151	
	李强	男	38		13081290107	

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54

亚投行贷款辽宁绿色智慧公交项目公众参与调查

1/1

地点:

序号	姓名	性别	年龄	职业/单位	联系方式	备注
	孙嘉	女	36			
	冯银环	女	40			
	曹一梅	女	44			
	张丹	女	40			
	宁磊	女	34			
	刘丽	女	36			
	魏明兰	女	47			
	柳琳	女	42			
	马艳霞	女	38			

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亚投行贷款辽宁绿色智慧公交项目公众参与调查

胡

地点:

序号	姓名	性别	年龄	职业/单位	联系方式	备注
	孙卓	男	24	公交公司	15442440420	
	马凤秋	男	52	个体	16566768029	
	陈健	男	46	公交公司	15243967001	
	刘金子	男	61	个体	15604296582	
	柳兵	男	56	个体	15040917445	
	于志军	男	51	公交公司	18840995678	
	梁策	男	39	公交公司	15542905669	
	李柏	男	41	公交公司	13130257993	

男8

亚投行贷款辽宁绿色智慧公交项目公众参与调查

胡

地点:

序号	姓名	性别	年龄	职业/单位	联系方式	备注
	赵永江	男	45	公交公司	15042972122	
	谭秀梅	女	37	公交公司	15104927957	
	刘丽娟	女	47	公交公司	15509896658	
	李伟	男	44	公交公司	13332346785	
	杨祥	男	40	公交公司	15241926270	
	王霞	女	40	公交公司三义场运营管理	15566707440	
	刘引红	女	52	社会退休	15642818781	
	张瑞旭	男	29	个体	13591854004	
	纪世	男	30	个体	17898806262	

男5
女4

亚投行贷款辽宁绿色智慧公交项目公众参与调查

第

地点:

序号	姓名	性别	年龄	职业/单位	联系方式	备注
	于丹	女	39			
	马兰	女	29			
	朱妍	女	45			
	于逸	女	40			
	刘国红	女	52			
	刘丽莉	女	47			
	张秀莹	女	37			
	张永伟	女	49			

女

参会人员签到表

时间:

地点:

姓名	性别	年龄	职业	联系电话	备注(残疾人、贫困户)
陈元	女	29	工人	1313094499	
王古林	女	60	工人	15842748391	
杨建	男	47		15942766668	
王芳	女	48	职员	13909875000	
李东	男	48	无	13134278670	
陈霞松	女	51	退休	13130926666	
郝伟	女	49		15724362350	
史长山	男	50		18342337377	
朱莹	男	61	退休	13704082263	



FGDs



One-on-One Interview



Field Surveys

2 Project approval documents

国家发展和改革委员会 财 政 部 文件

发改外资〔2020〕1984号

国家发展改革委 财政部关于印发 我国利用亚洲基础设施投资银行贷款 2020-2021年备选项目规划的通知

辽宁省、河南省、广西壮族自治区发展改革委、财政厅：

我国利用亚洲基础设施投资银行（以下简称“亚投行”）贷款2020-2021年备选项目规划已经国务院批准，现印发给你们，并就有关事项通知如下：

一、请有关省（区）发展改革委指导和督促项目单位完善项目建设方案，更好发挥项目在推动改革发展上的创新示范作用，落实好国内配套资金，明确贷款偿还责任，及时完成可行性研究

— 1 —

报告审批和项目资金申请报告报送。请有关省（区）财政厅做好地方政府债务风险监测和防范，落实贷款偿还和担保安排，严格执行资金、债务管理相关规定，做好项目对外谈判工作。

二、请有关省（区）发展改革委、财政厅加强协调配合，衔接好国内项目、资金管理程序与亚投行准备程序，确保项目如期谈判签约。

三、请有关省（区）发展改革委、财政厅于每季度末分别向国家发展改革委外资司、财政部国际财金合作司书面报告项目准备情况，包括项目进展、存在问题和下一步工作安排等。如遇重大问题，亦请及时报告。



2020年12月31日

我国利用亚投行贷款2020-2021年备选项目规划

贷款金额单位：亿美元

序号	项目名称	贷款额	主要建设内容	备注
(一)	跨境互联互通基础设施建设 2项	4.5		
1	广西崇左边境互联互通改善项目	3.0	建设崇靖高速（内屯互通）至硕龙口岸高速公路、德天至硕龙公路项目等。	
2	郑州国际陆港多式联运物流枢纽体系建设项目	1.5	建设郑州国际陆港多式联运集疏中心二期、汽车整车进口口岸二期、保税物流中心及中欧多式联运综合服务信息平台等。	
(二)	京津冀及周边区域大气污染治理和节能减排 1项	1.5		
1	辽宁绿色智慧公交示范项目	1.5	建设公交智能化管理调度指挥中心，购买智能系统软件、车载智能设备套、智能电子站牌、智能监控抓拍设备，购置纯电动公交车及配套充电桩，新建和改造公交综合场站等。	
	共计安排项目 3项	6.0		

0001030

盘锦市人民政府

建设用地批准书

盘政地东字[2021]14号

关于向盘锦双通城市公交有限公司
出让国有建设用地使用权的批复

盘锦双通城市公交有限公司：

你公司在盘锦市辽东湾新区2020年第1期国有建设用地使用权挂牌出让活动中，以3060万元人民币竞得PTLB2021-01-02号宗地土地使用权，现将有关事宜批复如下：

- 一、该宗地位于辽东湾新区向海大道西、沙河街南，出让土地使用权面积25497平方米；
- 二、该宗地用途为商业用地，未经批准不得擅自改变用途；
- 三、该宗地具体四至坐标见规划许可证及附图。

二〇二一年五月二十六日

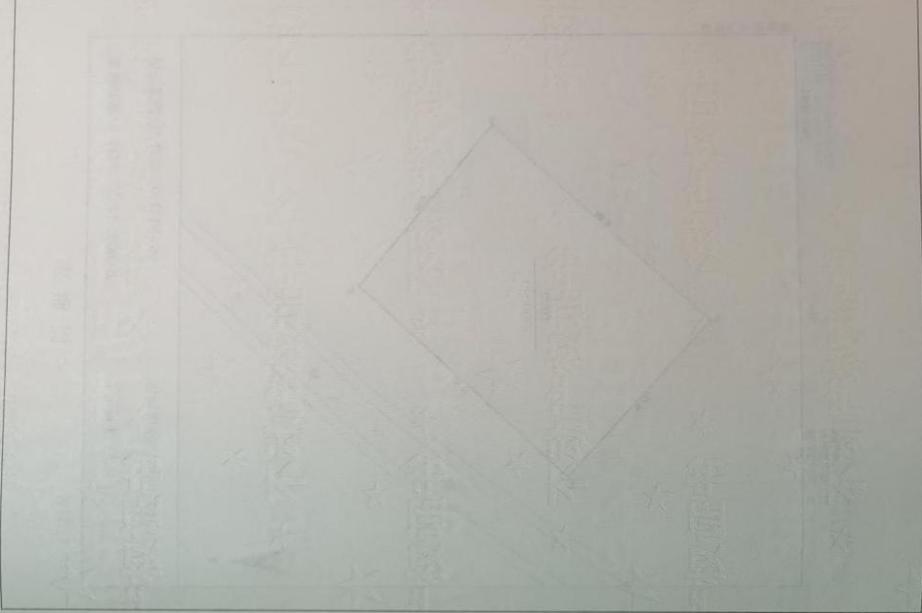


Panjin Bus Company Land Certificate

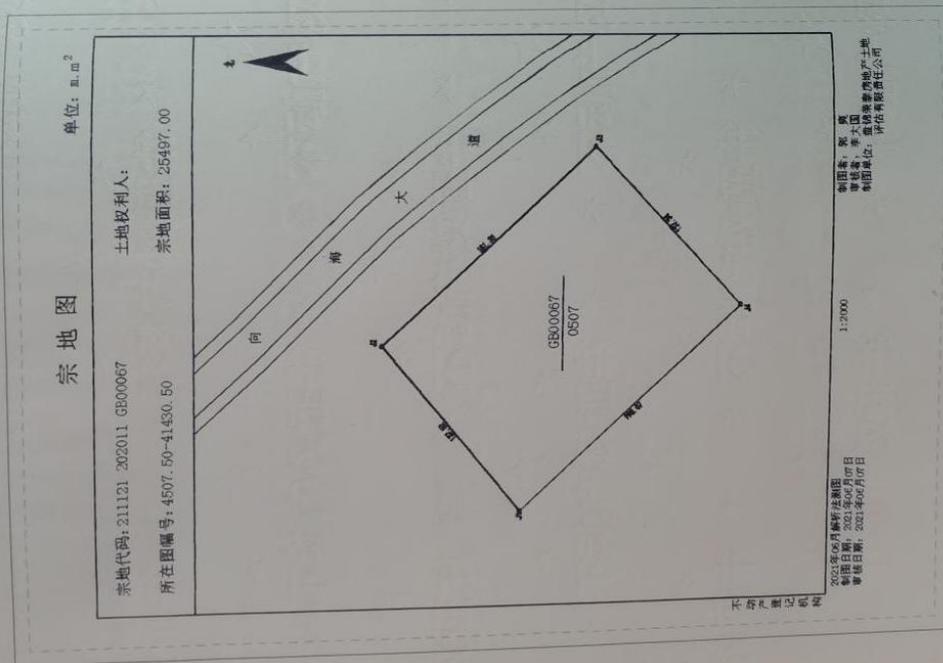
辽 (2021) 盘锦市 不动产权第 5000741 号

附 记

权利人	盘锦双通城市公交有限公司
共有情况	单独所有
坐落	盘锦辽东湾新区向海大道西 沙河街南
不动产单元号	211121202011GB00067W000000000
权利类型	国有建设用地使用权
权利性质	出让
用途	其它商服用地
面积	25497.00m ²
使用期限	国有建设用地使用权 2021年3月31日 起 2061年3月31日 止
权利其他状况	



附图页



land ownership certificate

3 List of Classified Management of Environmental Impact Assessment of Construction Projects

建设项目环境影响评价分类管理名录

(2021年版)

第一条 为了实施建设项目环境影响评价分类管理，根据《中华人民共和国环境影响评价法》的有关规定，制定本名录。

第二条 根据建设项目特征和所在区域的环境敏感程度，综合考虑建设项目可能对环境产生的影响，对建设项目的环境影响评价实行分类管理。

建设单位应当按照本名录的规定，分别组织编制建设项目环境影响报告书、环境影响报告表或者填报环境影响登记表。

第三条 本名录所称环境敏感区是指依法设立的各级各类保护区域和对建设项目产生的环境影响特别敏感的区域，主要包括下列区域：

(一) 国家公园、自然保护区、风景名胜区、世界文化和自然遗产地、海洋特别保护区、饮用水水源保护区；

(二) 除(一)外的生态保护红线管控范围，永久基本农田、基本草原、自然公园(森林公园、地质公园、海洋公园等)、重要湿地、天然林，重点保护野生动物栖息地，重点保护野生植物生长繁殖地，重要水生生物的自然产卵场、索饵场、越冬场和洄游通道，天然渔场，水土流失重点预防区和重点治理区、沙化土地封禁保护区、封闭及半封闭海域；

— 2 —

(三) 以居住、医疗卫生、文化教育、科研、行政办公为主要功能的区域，以及文物保护单位。

环境影响报告书、环境影响报告表应当就建设项目对环境敏感区的影响做重点分析。

第四条 建设单位应当严格按照本名录确定建设项目环境影响评价类别，不得擅自改变环境影响评价类别。

建设内容涉及本名录中两个及以上项目类别的建设项目，其环境影响评价类别按照其中单项等级最高的确定。

建设内容不涉及主体工程的改建、扩建项目，其环境影响评价类别按照改建、扩建的工程内容确定。

第五条 本名录未作规定的建设项目，不纳入建设项目环境影响评价管理；省级生态环境主管部门对本名录未作规定的建设项目，认为确有必要纳入建设项目环境影响评价管理的，可以根据建设项目的污染因子、生态影响因子特征及其所处环境的敏感性质和敏感程度等，提出环境影响评价分类管理的建议，报生态环境部认定后实施。

第六条 本名录由生态环境部负责解释，并适时修订公布。

第七条 本名录自2021年1月1日起施行。《建设项目环境影响评价分类管理名录》（环境保护部令第44号）及《关于修改〈建设项目环境影响评价分类管理名录〉部分内容的决定》（生态环境部令第1号）同时废止。

环评类别		报告书	报告表	登记表	本栏目环境敏感区含义
114	公园（含动物园、主题公园；不含城市公园、植物园、村庄公园）；人工湖、人工湿地	特大型、大型主题公园；容积500万立方米及以上的人工湖、人工湿地；涉及环境敏感区的容积5万立方米及以上500万立方米以下的人工湖、人工湿地；年补水量占引水河流引水断面天然年径流量1/4及以上的人工湖、人工湿地	其他公园；不涉及环境敏感区的容积5万立方米及以上500万立方米以下的人工湖、人工湿地；涉及环境敏感区的容积5万立方米以下的人工湖、人工湿地	不涉及环境敏感区的容积5万立方米以下的人工湖、人工湿地	第三条（一）中的全部区域
115	旅游开发	/	缆车、索道建设	其他	
116	影视基地建设	涉及环境敏感区的	其他	/	第三条（一）中的全部区域；第三条（二）中的除（一）外的生态保护红线管控范围，基本草原、森林公园、地质公园、重要湿地、天然林，重点保护野生动物栖息地，重点保护野生植物生长繁殖地；第三条（三）中的全部区域
117	胶片洗印厂	/	全部	/	
118	驾驶员训练基地、公交枢纽、长途客运站、大型停车场、机动车检测场	/	涉及环境敏感区的	/	第三条（一）中的全部区域；第三条（二）中的除（一）外的生态保护红线管控范围，永久基本农田、基本草原、森林公园、地质公园、重要湿地、天然林，重点保护野生动物栖息地，重点保护野生植物生长繁殖地；第三条（三）中的文物保护单位

环评类别		报告书	报告表	登记表	本栏目环境敏感区含义
119	加油、加气站	/	城市建成区新建、扩建加油站；涉及环境敏感区的	/	第三条（一）中的全部区域
120	洗车场	/	危险化学品运输车辆清洗场	/	
121	汽车、摩托车维修场所	/	营业面积5000平方米及以上且使用溶剂型涂料的；营业面积5000平方米及以上且年用非溶剂型低VOCs含量涂料10吨及以上的	/	
122	殡仪馆、陵园、公墓	/	殡仪馆；涉及环境敏感区的	/	第三条（一）中的全部区域；第三条（二）中的除（一）外的生态保护红线管控范围，基本农田保护区
123	动物医院	/	设有动物颅腔、胸腔或腹腔手术设施的	/	
五十一、水利					
124	水库	库容1000万立方米及以上；涉及环境敏感区的	其他	/	第三条（一）中的全部区域；第三条（二）中的除（一）外的生态保护红线管控范围，重要水生生物的自然产卵场、索饵场、越冬场和洄游通道
125	灌区工程（不含水源工程的）	涉及环境敏感区的	其他（不含高标准农田、滴灌等节水改造工程）	/	第三条（一）中的全部区域；第三条（二）中的除（一）外的生态保护红线管控范围，重要水生生物的自然产卵场、索饵场、越冬场和洄游通道

项目类别		环评类别	报告书	报告表	登记表	本栏目环境敏感区含义
173	核技术利用项目退役		生产放射性同位素的（制备PET用放射性药物的除外）；甲级非密封放射性物质工作场所	制备PET用放射性药物的；乙级非密封放射性物质工作场所使用 I 类、II 类、III 类放射源场所存在污染的；使用 I 类、II 类射线装置（X 射线装置和粒子能量不高于 10 兆电子伏的电子加速器除外）存在污染的	丙级非密封放射性物质工作场所；使用 I 类、II 类、III 类放射源场所不存在污染的	

说明：

1. 名录中项目类别后的数字为《国民经济行业分类》（GB/T 4754-2017）及第 1 号修改单行业代码。
2. 名录中涉及规模的，均指新增规模。
3. 单纯混合指不发生化学反应的物理混合过程；分装指由大包装变为小包装。
4. 名录中所标“*”号，指在工业建筑中生产的建设项目。工业建筑的定义参见《工程结构设计基本术语标准》（GB/T 50083-2014），指提供生产用的各种建筑物，如车间、厂前区建筑、生活间、动力站、库房和运输设施等。
5. 参照《中华人民共和国环境保护税法实施条例》，建设城乡污水集中处理工程，是指为社会公众提供生活污水处理服务的工程，不包括为工业园区、开发区等工业聚集区域内的企业事业单位和其他生产经营者提供污水处理服务的工程，以及建设单位自建自用的污水处理工程。
6. 化学镀、阳极氧化生产工艺按照本名录中电镀工艺相关规定执行。

4 Questionnaire

阜新绿色公交示范项目社会稳定风险评估公众参与调查问卷

尊敬的调查对象，您好！感谢您抽出宝贵的时间来回答这份问卷。本次**阜新市绿色公交示范项目**在公交十三五发展规划的基础上，结合本地区未来的发展需要，规划考虑建设以下内容：

(1) 更新、增补绿色纯电动公交车辆；(2) 配套购置建设充电桩、客流记录仪等公交附属设施；(3) 对现有公交系统进行智能化改造升级。

现根据《辽宁省发展改革委关于印发辽宁省固定资产投资项目社会稳定风险评估管理办法的通知》(辽发改投资〔2015〕897号)的要求，为了维护利益相关者和广大群众的合法权益，对本项目开展民意调查。本调查采用记名的方式，答案没有对错之分，如实回答就是最好的回答。

我们郑重承诺：保证您的答案仅用于本项目的社会稳定风险分析，不会影响到您的个人利害关系。在此表示衷心感谢！

1：您对本项目的了解程度？

了解 一般 不了解

2：您认为修建本项目是否有利于本地区的经济及社会发展？

有利 不利 不知道

3：您所在地区？

市中心 市郊 市域非城镇地区

4：您与本项目的关系？

公交从业人员 公交乘客 项目邻近居民 其他关系

5：对于本项目，您最担心哪方面因素？

破坏社会稳定 项目不合法 环境污染 生活环境发生变化

6：您对本项目建设的态度？

非常支持 一般支持 不支持

7：您不支持本项目建设的理由是（非常支持、一般支持的可以不填）？

调查对象签名：齐瑞

联系方式：

年 月 日

公交问询调查表

1. 您现在住址在哪个区:

- ① 中心区
- ② 城区 ✓
- ③ 郊区
- ④ 外地

2. 您的年龄是:

- ① 6-14 岁
- ② 15-19 岁
- ③ 20-49 岁
- ④ 50-59 岁 ✓
- ⑤ 59 岁以上

3. 如果您骑自行车出行, 感到不方便的主要原因是:

- ① 不安全
- ② 存放不方便
- ③ 骑车太累
- ④ 自行车车道太窄
- ⑤ 太拥挤
- ⑥ 其它 ✓

4. 您乘公交车上班(学), 您从家里步行到公交车站大约要走:

- ① 6 分钟以下
- ② 6-10 分钟
- ③ 11-15 分钟 ✓
- ④ 16-20 分钟
- ⑤ 20 分钟以上

5. 如果您乘公交车上班(学), 您在车站候车时间大约为:

- ① 6 分钟以下
- ② 6-10 分钟
- ③ 11-15 分钟 ✓
- ④ 16-20 分钟
- ⑤ 20 分钟以上

6. 您乘公交车上班(学), 从最后一个公交车站下车步行到单位(学校)大约要走:

- ① 6 分钟以下
- ② 6-10 分钟 ✓
- ③ 11-15 分钟
- ④ 16-20 分钟
- ⑤ 20 分钟以上

7. 您从家到单位(学校)需换几次公交车:

- ① 不用换车
- ② 1 次
- ③ 2 次 ✓
- ④ 2 次以上

9. 您认为目前阜新市公交车存在的主要问题是:(限选两项)

- ① 车内太挤
- ② 行车不准时
- ③ 候车时间太长
- ④ 票价太高
- ⑤ 服务态度差 ✓
- ⑥ 不方便
- ⑦ 其它

10. 您对目前阜新市公交车运行整体状况感到:

- ① 很满意
- ② 满意
- ③ 比较满意
- ④ 一般 ✓
- ⑤ 不满意
- ⑥ 很不满意

11. 您认为改善目前阜新市客运状况应大力发展:

- ① 公交
- ② 出租车
- ③ 中巴 ✓
- ④ 地铁
- ⑤ 私家车

12. 您认为单位通勤车应:

- ① 大力发展
- ② 适当发展
- ③ 维持现状 ✓
- ④ 适当减少
- ⑤ 逐步取消

13. 请您为改善目前公交客运交通提出您的见解或方法:

开车从换挡总忘刹车

公交问询调查表

1. 您现在住址在哪个区:

- ① 中心区
- ② 城区
- ③ 郊区
- ④ 外地

2. 您的年龄是:

- ① 6-14 岁
- ② 15-19 岁
- ③ 20-49 岁
- ④ 50-59 岁
- ⑤ 59 岁以上

3. 如果您骑自行车出行, 感到不方便的主要原因是:

- ① 不安全
- ② 存放不方便
- ③ 骑车太累
- ④ 自行车车道太窄
- ⑤ 太拥挤
- ⑥ 其它

4. 您乘公交车上班(学), 您从家里步行到公交车站大约要走:

- ① 6 分钟以下
- ② 6-10 分钟
- ③ 11-15 分钟
- ④ 16-20 分钟
- ⑤ 20 分钟以上

5. 如果您乘公交车上班(学), 您在车站候车时间大约为:

- ① 6 分钟以下
- ② 6-10 分钟
- ③ 11-15 分钟
- ④ 16-20 分钟
- ⑤ 20 分钟以上

6. 您乘公交车上班(学), 从最后一个公交车站下车步行到单位(学校)大约要走:

- ① 6 分钟以下
- ② 6-10 分钟
- ③ 11-15 分钟
- ④ 16-20 分钟
- ⑤ 20 分钟以上

7. 您从家到单位(学校)需换几次公交车:

- ① 不用换车
- ② 1 次
- ③ 2 次
- ④ 2 次以上

9. 您认为目前葫芦岛市公交车存在的主要问题是:(限选两项)

- ① 车内太挤
- ② 行车不准时
- ③ 等车时间太长
- ④ 票价太高
- ⑤ 服务态度差
- ⑥ 不方便
- ⑦ 其它

10. 您对目前葫芦岛市公交车运行整体状况感到:

- ① 很满意
- ② 满意
- ③ 比较满意
- ④ 一般
- ⑤ 不满意
- ⑥ 很不满意

11. 您认为改善目前葫芦岛市客运状况应大力发展:

- ① 公交
- ② 出租车
- ③ 中巴
- ④ 地铁
- ⑤ 私家车

12. 您认为单位通勤车应:

- ① 大力发展
- ② 适当发展
- ③ 维持现状
- ④ 适当减少
- ⑤ 逐步取消

13. 请您为改善目前公交客运交通提出您的见解或方法:

葫芦岛绿色公交示范项目社会稳定风险评估公众参与调查问卷

尊敬的调查对象，您好！感谢您抽出宝贵的时间来回答这份问卷。本次葫芦岛市绿色公交示范项目在公交十三五发展规划的基础上，结合本地区未来的发展需要，规划考虑建设以下内容：

- (1) 更新、增补绿色纯电动公交车辆；(2) 配套购置建设充电桩、等公交附属设施；(3) 对现有公交系统进行智能化改造升级。

现根据《辽宁省发展改革委关于印发辽宁省固定资产投资项目社会稳定风险评估管理办法的通知》(辽发改投资〔2015〕897号)的要求，为了维护利益相关者和广大群众的合法权益，对本项目开展民意调查。本调查采用记名的方式，答案没有对错之分，如实回答就是最好的回答。

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1：您对本项目的了解程度？

- 了解 一般 不了解

2：您认为修建本项目是否有利于本地区的经济及社会发展？

- 有利 不利 不知道

3：您所在地区？

- 市中心 市郊 市域非城镇地区

4：您与本项目的关系？

- 公交从业人员 公交乘客 项目邻近居民 其他关系

5：对于本项目，您最担心哪方面因素？

- 破坏社会稳定 项目不合法 环境污染 生活环境发生变化

6：您对本项目建设的态度？

- 非常支持 一般支持 不支持

7：您不支持本项目建设的理由是（非常支持、一般支持的可以不填）？

调查对象签名：

联系方式：

2020年4月13日

盘锦绿色公交示范项目社会稳定风险评估公众参与调查问卷

尊敬的调查对象，您好！感谢您抽出宝贵的时间来回答这份问卷。本次盘锦市绿色公交示范项目在公交十三五发展规划的基础上，结合本地区未来的发展需要，规划考虑建设以下内容：

(1) 更新、增补绿色纯电动公交车辆；(2) 配套购置建设充电桩、客流记录仪等公交附属设施；(3) 对现有公交系统进行智能化改造升级。

现根据《辽宁省发展改革委关于印发辽宁省固定资产投资项目社会稳定风险评估管理办法的通知》(辽发改投资〔2015〕897号)的要求，为了维护利益相关者和广大群众的合法权益，对本项目开展民意调查。本调查采用记名的方式，答案没有对错之分，如实回答就是最好的回答。

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3: 您所在地区？

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- 公交从业人员 公交乘客 项目邻近居民 其他关系

5: 对于本项目，您最担心哪方面因素？

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6: 您对本项目建设的态度？

- 非常支持 一般支持 不支持

7: 您不支持本项目建设的理由是 (非常支持、一般支持的可以不填)？

调查对象签名：

联系方式：

年 月 日

营口绿色公交示范项目社会稳定风险评估公众参与调查问卷

尊敬的调查对象，您好！感谢您抽出宝贵的时间来回答这份问卷。本次营口市绿色公交示范项目在公交十三五发展规划的基础上，结合本地区未来的发展需要，规划考虑建设以下内容：

(1) 更新、增补绿色纯电动公交车；(2) 配套购置建设充电桩、客流记录仪等公交附属设施；(3) 对现有公交系统进行智能化改造升级。

现根据《辽宁省发展改革委关于印发辽宁省固定资产投资项目社会稳定风险评估管理办法的通知》(辽发改投资〔2015〕897号)的要求，为了维护利益相关者和广大群众的合法权益，对本项目开展民意调查。本调查采用记名的方式，答案没有对错之分，如实回答就是最好的回答。

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了解 一般 不了解

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有利 不利 不知道

3：您所在地区？

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6：您对本项目建设的态度？

非常支持 一般支持 不支持

7：您不支持本项目建设的理由是（非常支持、一般支持的可以不填）？

调查对象签名：

联系方式：

年 月 日

公交问询调查表

1. 你现在住址在哪个区	7. 您从家到单位（学校）需换几次公交车
①中心区 ②城区 ③郊区 ④外地	①不用换车 ②1次 ③2次 ④2次以上
2. 您的年龄是	8. 您认为目前营口市公交车存在的主要问题是
①6-14岁 ②15-19岁 ③20-49岁 ④50-59岁 ⑤59岁以上	①. 车内太挤 ②. 行车不准时 ③. 等车时间太长 ④. 票价太高 ⑤. 服务态度差 ⑥. 不方便 ⑦. 其他
3. 如果您骑自行车出行，感到不方便的主要原因是	9. 您对目前营口市公交车运行整体状况感到
①不安全 ②存放不方便 ③骑车太累 ④自行车车道太窄 ⑤太拥挤 ⑥其他	①很满意 ②满意 ③比较满意 ④一般 ⑤. 不满意 ⑥. 很不满意
4. 您乘公交车上班（学），您从家里步行到公交车站大约要走	10. 您认为公交项目对经济与社会发展的作用
①6分钟以下 ②6—10分钟 ③11—15分钟 ④16—20分钟 ⑤20分钟以上	①有利 ②不利 ③不知道
5. 如果您乘公交车上班（学），您在车站候车时间大约为	11. 您对发展公交项目的态度
①6分钟以下 ②6—10分钟 ③11—15分钟 ④16—20分钟 ⑤20分钟以上	①非常支持 ②一般支持 ③不支持
6. 您乘公交车上班（学），从最后一个公交车站下车步行到单位（学校）大约要走	12. 请您为改善目前公交客运交通提出您的见解或方法
①6分钟以下 ②6—10分钟 ③11—15分钟 ④16—20分钟 ⑤20分钟以上	