World Bank-financed

Integrated Economic Development of

Small Towns Project （IEDSTP）in Xiantang Town

Dongyuan County，Heyuan City

Environmental Impact Assessment

Xiantang town Government in Dongyuan County

Guangzhou Research Institute of Environment Protection

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Abbreviations and Acronyms

CSEE	Construction Supervision Environmental Engineer
CDD	Community Driven Development
DI	Design Institute
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Monitoring Station
EPB	Environmental Protection Bureau
EMC	Enviornmental Management Coordinator
IA	Implementation Agency
MEP	Ministry of Environmental Protection
PO	Project Owner
PMO	Project Management Office
PRC	The People's Republic ofChina
SE	Supervision Engineer
TOR	Terms of Reference
WB	World Bank
XIEDTSP	World Bank-funded Xiantang Integrated Economic Development of Small Towns Project

CURRENCIES & OTIIER UNITS

MU	Area Unit (JMU=O.0667hm2)
RMB	Chinese Yuan (Renminbi)
USD	United States Dollar
Exchange rate	1 USD=6.78 RMB

CHEMICAL ABBREVIATIONS

BOD_5	Biochemical Oxygen Demand (5 days)
COD	Chemical Oxygen Demand
COD_{Mn}	Permanganate Index
NH_3-N	Ammonia Nitrogen
SS	Suspended Solids
TN	Total Nitrogen
TP	Total Phosphorus
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
Leq	Equivalent Continuous Noise Level

Contents

1 General

1.1 Project Overview

1.1.1 Origin of Project and Construction Background

The comprehensive economic development demonstration towns construction project supported by World Bank Loan in Guangdong Province, is based on national urbanization development strategy and construction of modern industrial system,. By using World Bank Loan, the project has the way to learn the advanced management experience of World Bank,. This project will promote the economic and social development of demonstration towns by means of public infrastructure construction, institutional capacity building and enhancement of leading industry in demonstration towns.

XIEDSTP is one of the six demonstration towns of Guangdong World Bank-funded Integrated Economic Development of Small Towns Project. The project organizer is the People's Government of Xiantang Town. It sets up a two-level leading group, the county level and the town level,, which is in charge of; leading , organizing and coordinating.

The goal of the project is to accomplish the steady and rapid regional economic and social development and social harmony by improving hardware and software facilities, promoting leading industry and pillar industry, optimizing the economic construction, expanding employment capacity and developing economic income of the masses in Xiantang Town.

The competent department, the people’s government of Xiantang Town, authorizes Guangzhou Research Institute of Environmental Protectiont to analysis of environmental impact. After accepting the commission, the institute .sets up an analysis team immediately to survey the control points and sensitive spots among the area and regional environment, investigate the situation of environment, economic and social development, collect massive economic and technical information.

The environmental impact report and environmental management plan of the project have been prepared pursuant to the technical information of project that provide by competent department and the requirements of revelant guideline for environment impact assessment technique.

1.1.2 Project Overview

The hardware construction of XIEDSTP includes 3 road works (Xudongyi Road, Industry Avenue, Xinquyi Road), water supply and sewerage works, lighting works and greening works and the software construction includes improving the ability of project management and monitoring.

3 roads are involved in the infrastructure construction project, including Xudongyi Road, Industry Avenue and Xinquyi Road. Xudongyi Road, connecting Xianzhuang 205 National Road from Xihuan Road, through Industry Avenue, Xinquyi Road and Xinquer Road in line, with overall length of 1.55km; Industry Avenue, connecting South Road of Xianzhuang Town from Xingfu Road (Shibami Road), through Xinquer Road, Xudong Avenue, Xudongyi Road and Meizi Avenue in line, with overall length of 2.24km; Xinquyi Road, connecting Xudongyi Road from Xingfu Road (Shibami Road), through Xinquer Road and Xudong Avenue in line, with overall length of 1.48km.Both 3 roads are 4-lane dual carriageway and urban branch road, with red line width of 30m and design speed 40km/h.

The total project investment is about RMB 116,176.0 thousand, including the investment of infrastructure construction RMB 112,366.4 thousand. The fund source composition is: USD 8 million of World Bank loan applied (about RMB 49,540.56 thousand), RMB 5 million of county financial fund and RMB 61,630.4 thousand of town fund raising. The total World Bank loan will be used in infrastructure construction.

1.1.3 Competent Department of Project

Competent Department: The People's Government of Xiantang Town, Dongyuan County

Project Type: new construction

1.1.4 Location of Project

The project, located in Xiantang New District, Xiantang Town, Dongyuan County, Heyuan City, is an infrastructure construction of Xiantang New District. The specific location of project is as shown in Fig. 1.1-1.

Fig. 1.1-1 Location of XIEDSTP

1.2 Objectives, Contents and Organization of the Environment Assessment (EA)

1.2.1 EA Objectives

According to the above environment characterstics and the regulations, such as “The People’s Republic of China Environment Assessment Act”,”the State of the Construction Project Environmental Protection Management Ordinance”,”Notifications of Strengthening Environmental Assessment and Management about International Financial Organizations Loan Construction Project” isuued by the Ministry of the State Environment Protection Administraction (No [1993] 324), and the World Bank safeguard policies of the environmental assessment law (OP4.01), domestic and World Bank on environmental impact assessment procedure, Environment Assessment proposed necessary mitigation or compensation measures to prevent, lower, slow down the negative influence after analyzing potential positive and negative environment impact of every sub-project and comparing different alternative feasible programs. EIA provide basis to the independent judge of the environment safe insurance policies for the World Bank and approval decision and management for relative administrate

departments.

1.2.2 EA Contents

This assessment includes project overview, demolition and resettlement, water and soil conservation plan, public participation and information disclosure. The environmental management plan of this assessment was compiled to be the executive document of environment management during operation stage of the project.

1.3 Environment Impact Identification and Assessment Factor Screening

Based on the requirements of both China and World Bank for environmental impact assessmen, environmental impact factors of the project is indentified by means of matrix identification method taking into consideration the property, engineering features.The result is shown in Table 1-3.

According to Table 1-3, the importance of environmental impact factors are evaluated, the result is shown in Table 1.3-1.

Table1.3-1 Identification Matrix of Environmental Impact Factors

Environmental elements \ Project activities		Preliminary period		Construction period					Operating period			
		Land occupation	Demolition and resettlement	Earth borrowing	Roadbed	Road surface	Material transport	Field operation	Traffic	Greening	Reclamation	Water drainage of side ditch
Social development	Employmentand labour	★	☆		○		○	○	☆	☆	☆	☆
	Social economy	★					○		☆		☆	
	Irrigation works				◎							☆
	Land use	★	☆		◎				☆	☆	☆	
Material resources	soil conditions			◎					★	☆		
	Surface hydrology											
	Surface water quality			◎	◎	◎						
	Conservation of water and soil			◎	◎	◎			☆	☆	☆	☆
Life quality	Acoustic environment		☆	○			◎	◎	★	☆		
	Air quality		☆	○	○		◎	◎	★	☆		
	Live condition		☆	◎	◎		◎	◎	★	☆		☆
	Aesthetics			◎	◎	◎				☆		☆

☆/○: long-term / short-term positive effect; ★/◎: long-term / short-term negative effect; blank means no effect.

Selection of environmental impact factors are shown in Table 1.3-2, Table 1.3-3.

Table1.3-2 Selection of Environmental Impact Factors

Environmental elements	Environmental impact factors	Construction period	Operating period
Social environment	Traffic, development of social economy	○	★
	Land use	☆	☆
	Demolition and resettlement, traffic, irrigation works, social economy	★	○
Living environment	Traffic, exchange, employment, income and safety	★	○
Ecological environment	Water and soil loss	★	○
water environment	Water pollution during construction period and operation period, accident risk	☆	○
Acoustic environment	Traffic noise	☆	★
Air quality	Raise dust、TSP	★	○
	Harmful substances in tail gas（NOx、CO）	○	☆

Note：★obvious effect；☆usual effect；○ slight effect

表 1.3-3 Environmental Impact Factors

Environmental elements	Environmental impact factors	
	Present situation evaluation	Forecast evaluation
Atmospheric environment	SO_2、PM_{10}、NO_2、CO、TSP	NO_2、CO
Water environment	water temperature, pH, SS, COD_{cr}, BOD_5, oil, ammonia nitrogen and so on	——
Acoustic environment	L_{Aeq}	L_{Aeq}
Ecological environment	Flora and fauna	Loss of water and soil
Solid waste	——	Construction garbage

1.4 Main Points of Assessment

Main points of assessment were identified as following after initial analysis of the project environment impact and environmental factors screening:

(1) Acoustic environment: mainly assess the influence of construction on surrounding

environment and corresponding measures during the construction period and operation period;

(2) Atmospheric environment: mainly assess the influence of construction on surrounding environment and corresponding measures during the construction period;

(3) Soil erosion: mainly assess the influence of works such as excavation, debris and tying that damage to the original surface soil, vegetation and water conservation facilities and change the original landform and landscape so as to cause the lose of solid soil control and soil erosion;

(4) Social environment: mainly assess the adverse impact of permanent occupation on land use and agriculture production and the social and economic benefits of the operation of the project;

(5) Resettlement: mainly assess the influence of resettlement activities such as land occupation under the project, residential house demolition, change and reconstruction of special facilities on Immigrant income, living environment, geographical distribution of population resettlement areas and social environment, etc;

(6) Ecology environment: mainly assess the influence of excavation and occupation on plants;

1.5 Environment Assessment Team

Guangzhou Research Institute of Environmental Protection, found in 1997, which is prepared this EIA repor, is one of the earliest research institute of environmental protection in China. It provides comprehensive technical service for Guangzhou Government in the aspect of environment management, making local environment regulations, environmental planning, environmental decision, and pollution control.

The institute has the technical force that cover all the environment protection and several certificates such as First Class certificates of environment assessment, Second Class certificates of engineering consultation, Second Class certificates of preparation of soil and water conservation plan, certificates of ISO14000 advisory qualification, and certificates of measurement authentication. It is one of the earliest national clean production audit institute and proviencal clean production technical service institute of Guangdong.

Guangzhou Research Institute of Environmental Protection is the earliest agency that start the environment assessment and protection design. The number of First Class certificates of environment assessment is: No. 2802 Certificate of National EIA. Scope of assessment:

EIA-First Class: transport, social region, chemical and petrochemical pharmaceutica, metallurgical and mechanical; Second Class: light textile chemical fiber, building material thermal power, forestry and water conservancy; Environment Impact List: normal project and special project.

1.6 Ideas and Methods of EIA

（1）Based on the preliminary investigation on the current environment of the project region, environment impact assessment (EIA) were used to assess the influence of construction on surrounding environment during the construction period and operation period;

（2）Acceding to the environment safety insurance policies of the World Bank, if the project is consistent with the safety insurance policies has been screened and appropriate safety insurance policies were assessed with corresponding management methods such as prevention and mitigation;

（3）To strengthen collection and analysis of relative basic information, investigation and assessment of current situation were developed objectively and scientifically;

（4）To focus on the analysis of the key environment problems and sensitive protection targets, key and general environment problems were screened according to the characteristic of engineering and environment;

（5）Some methods such as analogy, typical engineering analysis were used to assess positive and negative, direct and indirect influence of the project on the environment objectively. Feasible mitigation measures were proposed in response to the negative impact on the environment and feasibility of the environment management plan (EMP) were paid more attention;

（6）The positive impact on the environment had been carried forward as far as possible and the negative impact on the environment been prevented during the design stage of the project through the communication between the EIA team and the design team coordinated by the owner;

（7）The public participation will be carried out at least twice. Early phase of public participation would develop in combination with the environment impact assessment of the

project, the late phase being developed during the drafting period of the environmental impact assessment report. Views ofthe public, management departments and other organizations would be collected by releasing public opinion questionnaire, consulting expert, survey by project affect the public, authorities and other organizations. Information were published by bulletins, newspaper and Web site information.

（8）Putting the environmental protection first, make the conclusion for the feasibility of the project. The EIA will be the basis for decision-making of the government and the environmental management agency, and also be the environmental protection guide during the project design, construction and operation period.

1.7 Classification and Rate of the Assessment

Although this project, as a road construction project, may produce a variety of adverse environmental impacts, including acoustic environment, soil erosion and resettlement etc., it will not cause serious adverse environment impact according to the requirement of the World Bank policies (OP4. 01) about environment screening and classification so that the project is classified as B class.

According to relative regulations in the Environment Impact Assessment Technical Guidance about impact assessment on the surface water environment, acoustic environment, atmospheric environment and non-polluted ecosystem, assessment rating of the project were analyzed comprehensively as the following table.

Table 1.7-1 The Rating Scale of XIEDSTP

Project	Water Environment	Groundwater	Air Environment	Acoustic Environment	Ecological Environment	Environment-al risk
XIEDSTP	Grade Three	Grade Three	Grade Three	Grade One	Grade Three	Grade Two

1.8 Scope of Assessment

Assessment scope are determined according to identification of environmental impact, characteristics of terrain and climate, and environmental function demands. Assessment scope is as shown in Table 1-8-1.

Table1.8-1 Assessment Scope

Assessment factors	Assessment scope
Atmosphere	Two sides of road center line and the construction ares within 200m of station yard, focus on the sensitive factors of atmosphere
acoustic environment	Two sides of road center line and the areas within 200m of station yard during the operation period; the construction ares within 100m of station yard during the construction period.
surface water	Water segment of Xudong River from 500m upstream to Dongjiang confluence; Water segment of Dongjiang confluence from 500m upstream to 1500m downstream
groundwater	Both sides of the proposed projects and areas within 200m surrounded
Ecological environment	Two sides of road center line and the areas within 200m of station yard and other temporary construction areas
Environmental risk	Water segment of Xudong River from 200m upstream to Dongjiang main stream; Water segment of Dongjiang main stream from confluence to 1500m downstream

1.9 Evaluation time period

The evaluation time period is divided into construction period and operation period.

Construction Period: the project plans to start at December, 2014 and complish at November, 2016, the total construction period is 24 months.

Operation Period: the first year, sixth year and eleventh year of operation of the project, that is preliminary period (2016), medium period (2021) and later period (2027).

1.10 Environment Protection Goals

1.10.1 Prevention and Protection Goals

（1）To optimize construction layout, control construction occupies, minimize the pressure and destruction of engineering areas on existing farmland, forest and important economic forest covers, to strengthen construction management, optimize the construction procedure, reduce adverse impact of the project activities on the local population, fauna and flora, maintain the environmental quality and ecosystem integrity and biodiversity in the engineering and

surrounding areas.

（2）To select construction yard reasonable, to select construction methods, to reduce the impact of construction around sensitive targets.

1.10.2 Pollution Control Goals

（1）Water Environment Protection

During the construction period，the domestic sewage is processed in the cesspool,then through the temporary sewage network into No.205 national sewage network, and discharge to reach standard in Dongyuan sewage treatment plant at last. The factory effluent is deposited in the depositpool, separated the oil to reach standard of Urban Miscellaneous Water Quality Standards (GB/T18920-2002). Sensitive spots including school, hosipital, kindergarten, residential housing, research unit, drinking water source, ecological sensitive spots and scenic spot and historic interest.

Sensitive protection targets of the assessment scope are chosen by investigating the environmental elements along the line.

（1）Protection Targets of Acoustic Environment and Air Environment

Protection target of air environment is to make sure the air can reach the standard of Class II air quality and the area livable. Protection target of acoustical environment is to avoid the surrounding environment impact by traffic noise.

The principle to select protection targets of acoustic environment and air environment:

①The first row of buildings on the construiction road sides are the main target, then the second row of buildings;

② The major function of the buildings involve schools, hospitals (there are serveral sickbeds near the streets), kindergarten (mostly boarding nursery), and residential housings.

With all the pollution control goals above-mentioned, based on field inspection, the sensitive spots, such as residential housings (the first row and part of the second row of buildings), schools, hospitals, around the construction area, were chosen to be the major protection targets in this assessment.

The major sensitive spots of acoustic environment and air environment are shown in Table1.10-1, locations and pictures are shown in Fig. 1.10-1 and Fig. 1.10-2. There are four sensitive spots inside the assessment scope including Combination of Xudong Village and Xinfu Village, Combination of Xiantang Village and Meizikeng Village, Dongyuan Second Primary School, and Dongyuan Senior High School. Besides, there are two sensitive spots near the assessment scope including Dongyuan traditional Chinese medical hospital, and Xudong Primary School.

In addition, a small amount of breeding facilities and power facilities are distributed within the scope of the project evaluation, the ownership or individual of the project is related to the benefit of the project, and therefore, as a sensitive protection target.

（2）Protection Targets of Surface Water Environment

Surface runoff on project area flow into rain pipe network, then flow into Xudong River in the west of project area, finally flow into main stream of Dongjiang River. Therefore, the protection targets of surface water environment are Xudong River and Dongjiang River.

（3）Protection Targets of Ecological Environment and Socail Environment

Based on field investigation, the major sensitive spots of ecological environment and socail environment around the project area are chosen as shown in Table1.10-2

Table 1.10-2 Protection Targets of Ecological Environment and Social Environment

Environment Elements	Protection Targets	Location	Environmental features	Influence
Ecological Environment	vegetation coverage, biomass, protection and recovery of consistent integrity	along the line	Vegetation along the line	land occupation of construction, transplant
Social Environment	Levy Land and Remove	along the line	Some buildings need to remove	land occupation of road construction
	Health	along the line	Residential area	Diet, communication

（4）Protection Targets of Ancient Plant, Cultural Objects and Historic Monuments

Based on field investigation, there is no ancient plant, cultural objects and historic

monuments around the area.

The project area of Xiantang New District is mountainous region without land levelling except several industries in the south area. According to Control Detailed Plan of Xiantang New District Dongyuan County (October 2013), two sides of the road will be commercial land and industrial land, except starting area of Industry Avenue that design as residential land (now the area is Combination of Xudong Village and Xingfu Village). There is no other sensitive spots on the project area.

Table 1.10-1 The major sensitive spots of acoustical environment and air environment on the project area

Num	Section	Sensitive spots	Character	Location	Orientations	The minimum distance from roadway line/mid-line（m）	Depth displacement（m）	Building scale of assessment scope	Resident number of assessment scope	Environmental impact	Air condition standard	Resident remove	Noise implementation standards	Picture of sensitive spots
1.	The strating area of Industry Avenue, No.1 Road of New District、	Xingfu Village (belong to Xudong Village)	residential area	Two sides of road	Most side facing, some facing positvely	16/25	0	The first row fo buildings that facing the road(14 buildings, both 2-4 floors building)	The first row fo buildings that facing the road has 14 household, 64 people, the second row has 67 household, 268 people	acoustical environment and air environment	2	Yes	2	①
2		The second primary school of Dongyuan	school	West (except the starting point)	side facin	135	3.0	4 teaching building (5 floors building) and 3 students' dormitory (6 floors building), side facitng the road.	300 more studentchildren and 90 more faculty members	acoustical environment and air environment	2	No	2	②
3		High school of Dongyuan	school	West (except the starting point)）	side facin	85	0	Teaching buildings and dormitory (6 buildings, both 2-5 floors building), side facing the road	2000 more studentchildren and 90 more faculty members	acoustical environment and air environment	2	No	2	③

4	The final area of Xudongyi Road	Meizikeng Village (belong to Xiantang Village)	residential area	East	side facin	116/125	0	The first row fo building that facing the road(2 buildings, both 2-4 floors building)	The first row fo building that facing the road has 2 household, 8 people, the second row has 9 household, 36 people	acoustical environment and air environment	2	Yes	2	④

Xingfu Village

Second Primary School of Dongyuan

High School of Dongyuan

Meizikeng Village

Fig 1.10-2 The picture of sensitive point

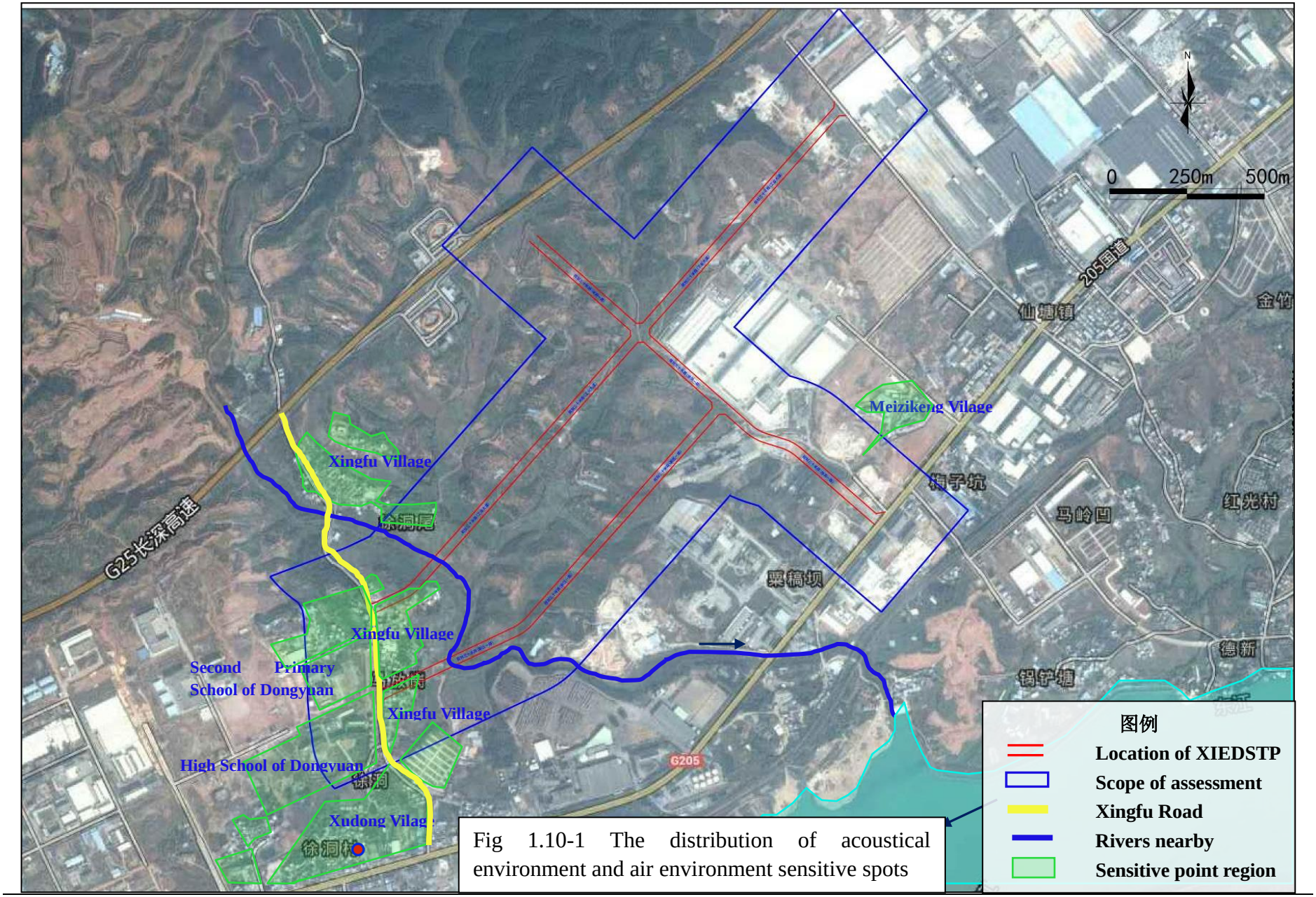


Fig 1.10-1 The distribution of acoustical environment and air environment sensitive spots

1.11 Procedure of Environment Impact Assessment

The Environment Impact Assessment of the project divided into two phases, preliminary investigation and environment impact assessment, report compilation according to "Environment protection Management Ordinance of construction project", "Technical guidelines of the environmental impact assessment" and the World Bank requirement of EI for A class project and safety insurance policies. Main task of different phase is as the following:

(1) preliminary investigation and environment impact assessment

To meet the requirement of national and local regulations and technical criteria, as well as the requirement of the World Bank, plan, content and method of EIA work were determined based on the preliminary investigation of the current situation of the covering the project region environment.

Major environment impact and corresponding assess indicators were determined in combination with the result of the feasibility research design. Detailed current situation investigation and monitoring on the acoustic environment, water environment, atmosphere environment, ecological environment in the assessment scope were developed. At the same time, current social and environment situation of the counties and towns involving in the project was detailed collected and investigated. Based on the above work, environment impact and environment forecast impact were assessed in the project region and relative works such as public participation were completed acceding to "Procedures of the environmental impact assessment of public participation".

(2) Report Preparation

Based on the above work, corresponding environment protection measures and monitoring plan, as well as environmental investment estimates and economic technology demonstration were worked out. The EIA of XIEDSTP was prepared.

2 Environmental Policies, Framework for Laws and Regulations, Compilation Basis

2.1 National Laws and Regulations, Ministry and Commission Regulations

(1) Environmental Protection Law of the People's Republic of China（revised on April 24, 2014， implemented as from January 1, 2015）；

(2) Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution（April, 2000）；

(3) Water Pollution Prevention Law of the People's Republic of China （March, 2008）；

(4) Noise Pollution Prevention Law of the People's Republic of China （October, 1996）；

(5) Solid Pollution Prevention Law of the People's Republic of China（April, 2005）；

(6) Detailed Rules for the Implementation of the Water Pollution Prevention and Control Law of the People's Republic of China（March, 2000）；

(7) Land Administration Law of the People's Republic of China（implemented as from revision on August 28, 2004）；

(8) Soil and Water Conservation Law of the People's Republic of China（March, 2011）；

(9) Cleaner Production Promotion Law of the People's Republic of China（July, 2012）；

(10) Law of the People's Republic of China on Environment Impact Assessment（October, 2002）；

(11) Regulations on the Administration of Construction Project Environmental Protection（No. 253 of the State Council of the People's Republic of China, November, 1998）；

(12) Promotion of cleaner production by the people's Republic of China（Document GF [1996] No. 31）；

(13) Decisions of the State Council of the People's Republic of China on Implementing Scientific Viewpoint of Development and Strengthening Environmental Protection （Document GF [2005] No. 39 issued by the State Council of the People's Republic of China）；

(14) Catalogue for the Classified Administration of Environmental Impact

Assessments for Construction Projects（No. 2 Decree of the Ministry of Environmental Protection of the People's Republic of China, 2008）；

(15) The provisions for the grading and approval of the environmental impact assessment documents for the construction projects（No. 5 Decree of the Ministry of Environmental Protection of the People's Republic of China,， January 16, 2009）；

(16) Notice about the release of the government information disclosure Guide (for Trial Implementation) of the environmental impact assessment for the construction project（Document HF [2013] No.103）；

(17) Provisional Measure of Public Participating in Environmental Impact Assessment（Document HF [2006] No. 28 issued by the original State Environmental Protection Administration）；

(18) Notice on Strengthening Administration of Environmental Impact Assessment and Environmental Risks Prevention（Document HF [2012] No. 77 issued by the Ministry of Environmental Protection of the People's Republic of China）；

(19) Notice of enhancing the risk prevention of environmental impact assessment management（Document HF [2012] No.98）；

(20) Emergency notice of the environmental safety inspections（Document HF [2005] No.145）；

(21) Notice of the further strengthening of environmental supervision and management to prevent the occurrence of pollution accident emergency（Document HF [2005] No.130）；

(22) Notice of Ambient Noise issues in Environmental Impact Assessment of Construction Project such as Highway and Railway (including light rail)（HF[2003]No.94 document）；

(23) Measures for the Administration of Environmental Protection of Transport Construction Projects（No.5 Decree of the Ministry of Transport of the People's Republic of China in April 11, 2003）；

(24) Notice on Issuance of Ground Traffic Noise Pollution Prevention Policies（Document HF [2010] No. 7 issued by the Ministry of Environmental Protection of the People's Republic of China）；

(25) Notice on Implementation of Environmental Supervision for Traffic Projects（Document JHF [2004] No. 314 issued by the Ministry of Transport of the People's Republic of China）；

(26) Some opinions on the implementation of the most stringent farmland protection system in the highway construction（Document JGLF[2004] No.164）；

(27) Construction land quota for highway（Junary 1, 2000）；

(28) The design of environmental protection for construction projects（March 20, 1987）.

2.2 Local Regulations

（1）*Regulations of environmental protection in Guangdong Province*（September, 2004）；

（2）Regulations of environmental protection and management of construction project in Guangdong Province（July, 2012）；

（3）Guangdong provincial construction project environmental impact assessment document grading approval method（Document YF[2012] No.143）；

（4）Opinion on deepening the reform of environmental protection examination and approval management system for construction projects（Document YHF[2003] No.808）；

（5）Notice of enhancing the environmental protection management for construction projects（Document YF[1999] No.27）；

（6）Notice of further strengthening environmental protection work（Document YF[*2002] No.71）；*

（7）Notice of the Guangdong provincial environmental protection and ecological construction "Twelfth Five Year Plan"（Document YF[2011] No.48）；

（8）Notice of issuancing the main functional areas of Guangdong Province by the people's Government of Guangdong Province（Document YF（2012）No.120）；

（9）Notice of supporting environmental protection policies for the main functional areas of Guangdong Province（Document YHF（2014）No.7）；

（10）Heyuan environmental protection and ecological construction of "Twelfth Five Year Plan"（2011）；

（11）Letter of the Guangdong provincial environmental protection programme (2006-2020) > implementation programme（Document YHH〔2006〕No.909）；

（12）Regulations of drinking water source and water quality protection in Guangdong Province（March, 2007）；

（13）Regulations of Dongjiang River water quality protection in Guangdong Province（July 23, 2010）；

（14）Functional regionalization of surface water environment in Guangdong Province（Document YFH〔2011〕No.29）；

（15）Water quota of Guangdong province (Trial Implementation)（Document YSG[2007] No.13）；

（16）Groundwater function planning in Guangdong Province（August, 2009）；

（17）Notice of the strict limitation of water pollution projects in Dongjiang River Basin and further improving the water quality of Dongjiang River（Document YFH〔2011〕No.339）；

（18）Issuance of Guangdong Pearl River Delta clean air action plan –Second Stage(2013-2015)（Document YH〔2013〕No.14）；

（19）Notice of issuancing the air pollution prevention and control action programme (2014-2017) by the people's Government of Guangdong Province（Document YF〔2014〕No.6）；

（20）Heyuan environmental protection planning (2007-2020)（Environmental Planning Institute of Environmental protection administration, 2007）；

（21）General outline of land use planning for Heyuan city (2006-2020)；

（22）Approval of Heyuan city drinking water source protection areas（Document YFH[2000] No.95）；

（23）Heyuan city drinking water source protection area delineation program（Document HFF[2007] No.64）；

（24）The comprehensive improvement program of Pearl River water environment in Guangdong Province（Document YHF[2002] No.164）；

（25）Notice from the people's government of Heyuan City about the guidelines issued by the Heyuan municipal comprehensive renovation of Dongjiang water environment work（Document HFF〔2013〕No.83）；

（26）Guangdong water clearer action plan (2013~2020)（Document YFH（2013）No.26）；

（27）Notice of issuancing Guangdong water clearer action plan (2013-2020) implementation plan of Heyuan City（Document HHF（2013）No.294）

（28）Notice of the Provisional Regulations on the amendment of the Heyuan urban environmental noise pollution control administration（Document HFF（2010）No.78）；

（29）Regulations of Guangdong Province on the prevention and control of solid waste pollution（July, 2012）；

（30）Interim Measures for the disposal of solid wastes in Heyuan City（Document HHF[2007] No.100）；

（31）Notice of the Interim Measures for the administration of building waste disposal in Heyuan City（Document HFF（2013）No.38）；

（32）Guangdong province energy saving and emission reduction comprehensive work plan（Document YFF[2007] No.66）；

（33）The opinion of to further strengthen environmental protection and promote the implementation of ecological civilization construction by Municipal Party committee and municipal government（Document HWF（2012）No.19）；

（34）Notice of issuancing "sewage cleaning project implementation plan"（Document YF[2004] No.8）；

（35）Sewage cleaning project implementation plan（April 1, 2004）；

（36）Comments on the promotion of economic development in the current environmental protection work of the province（Document YHF[2008] No.108）；

（37）Forwarding the notice of advancing the implementation of the fourth stage of the national motor vehicle air pollutant emission standards for reply in the Pearl River Delta region from the Ministry of environmental protection（Document YFH[2010] No.125）；

（38）Circular on the implementation of the standards for the discharge of motor vehicles in the fourth stage（Document HGZ（2013）No.70）；

（39）The implementation views of public participation in Guangdong provincial construction project environmental protection （Document YHF[2007] No.99）；

（40）Notice of further increasing public participation and government information disclosure announcement in the environmental impact evaluation from Guangdong provincial environmental protection department（September, 2012）；

（41）Decision of the Standing Committee of the people's Congress of Guangdong Province on amending some local regulations（July, 2010）；

（42）Dongyuan county planning (2005-2020)；

（43）Overall plan for land use in Dongyuan County, Heyuan City (2010-2020)；

（44）Overall planning for land use in Xiantang Town, Dongyuan county (2010-2020).

2.3 Other Regulatory Documents

（1）Control Detailed Plan of Xiantang New District Dongyuan County (October 2013)；

（2）The feasibility study of XIEDSTP；

（3）Resettlement plan of XIEDSTP；

（4）Soil and water conservation plan of XIEDSTP.

2.4 Technical Specifications and Standards

2.4.1 Technical Specifications for Environmental Impact Assessment

(1) Guideline for Environment Impact Assessment Technique – General Program (HJ 2.1-2011)；

(2) Guideline for Environment Impact Assessment Technique – General Program (HJ/T2.3-93)；

(3) Guideline for Environment Impact Assessment Technique – Atmospheric Environment (HJ 2.2-2008)；

(4) Guideline for Environment Impact Assessment Technique – Acoustic Environment (HJ 2.4-2009)；

(5) Guideline for Environment Impact Assessment Technique – Ecological Impact（HJ19-2011）；

(6) Guideline for Environment Impact Assessment Technique – Underground Water Environment （HJ610-2011）；

(7) Technical guide for environmental risk assessment of construction projects（HJ/T 169-2004）；

(8) Technical guide for environmental noise and vibration control engineering（HJ2034-2013)；

(9) Specifications for Environmental Impact Assessment on Road Construction Project（（JTJB03-2006）)；

(10) Technical Specifications to Determinate the Suitable Areas for Environmental Noise of Urban Area （GB/T15190-94）；

(11) Technical specification for soild and water conservation for development and construction projects（GB 50433-2008）；

(12) Standard for soil erosion control of development construction projects（GB 50434-2008）；

(13) Pollution prevention and control technology for vehicle emissions（Document HF[1999] No.134）；

(14) Code for Design of Sound Insulation of Civil Building （GB 50118-2010）；

(15) Environment and sanitation standards for building construction（JGJ146-2004）；

(16) Sound insulation window（HJ/T17-1996）.

2.4.2 Environmental Function Division

2.4.2.1 Acoustic Environmental Function Division

According to Control Detailed Plan of Xiantang New District Dongyuan County (October 2013), the location of the project area, Xiantang New District, is an area that combine with residential, commercial and industrial feature. According to provisions of environmental noise category in Heyuan city (Document HFF[1996] No.6）, the class of this area is 2. So the area around the project was confined as Class 2 accounting environment, and implement the Class 2 standard of Acoustic Environment Quality Standard（GB3096-2008）.

According to Acoustic Environment Quality Standard（GB3096-2008）, Class 4 acoustic environment means the area , within a certain distance of the traffic arteries, need to prevent the serious impact from the traffic noise. It includes Class 4a and Class 4b. Class 4a includes the area that within a certain distance of highway, arterial road, secondary road, urban expressway, urban main road, urban secondary main road, urban rail transit (ground section), and inland waterway. Class 4b means the area that within a certain distance of main railway

line. Urban branch road doesn't belong to traffic arteries, so its acoustic environmental function division is based on the function division of the location region, and perform the environmental noise limits (nearest to the nearest) of the functional division.

The three roads that project designed are both urban branch road, the area around them are Class 2 acoustic environment. According to Acoustic Environment Quality Standard （GB3096-2008）, the region near the road motor vehicle lane boundaries of the project are both perform standard of Class 2.

2.4.2.2 Air Environmental Function Division

According to Heyuan environmental protection planning (2007-2020), the project area is Class 2 air environmental function division, and perform standard of Class 2 from *ambient air quality standard* (GB3095-1996) and *notice of issuancing the modifier list of ambient air quality standard* (GB3095-1996).

Air environmental function divisions of the project area are shown in Fig. 2.4-1.

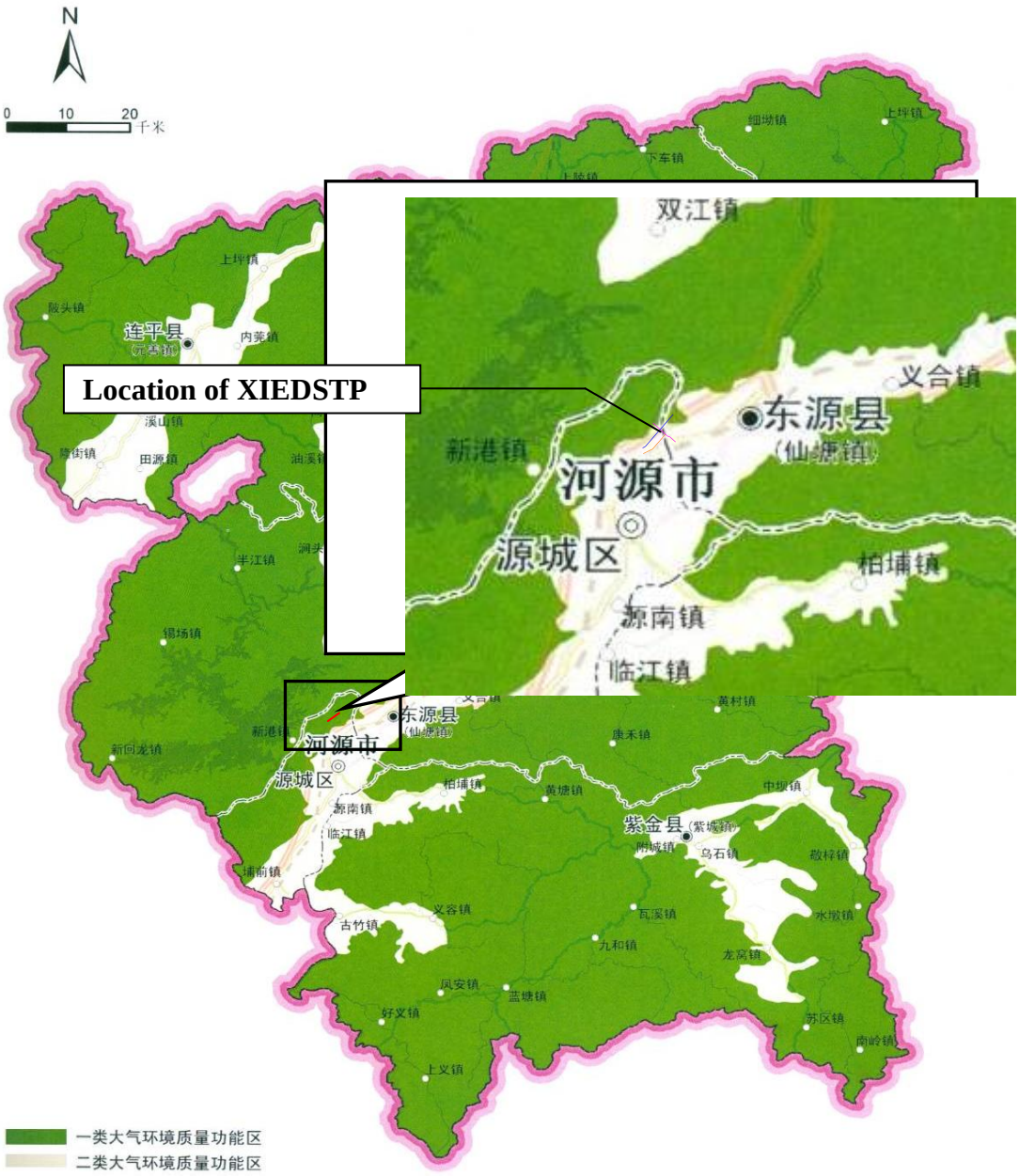


Fig. 2.4-1 Air environmental function divisions of the project area

2.4.2.3 Surface Water Environmental Function Division

The water bodies that involve in this project are Xudong River and Dongjiang River. In the operation period, the surface rain flow collect by the rainwater pipe network into Xudong River, then flow into main stream of Dongjiang River.

According to Notice of Issuancing Surface Water Environment Function Division of Guangdong Province (Document YHF[2011] No.14), the main stream of Dongjiang River is Class 2 water-body, perform standard of Class 2 based on surface water environment quality

standard（GB3838-2002）. But the standard of Xudong River was not identified in Surface Water Environment Function Division of Guangdong Province (The River Part), the present function of Xudong River is industrial and agricultural water and the water quality is worse than Class 3 standard. According to Notice of Issuancing Surface Water Environment Function Division of Guangdong Province (Document YHF[2011] No.14), "the environmental control target of the upstream and tributaries of the not listed water-body based on the minimum requirements of insurancing the main stream's environmental control target, not differ morn than one class with the main stream". Xudong River is first grade tributariy of Dongjiang River and water quality is worse than Class 3, so this EIA evaluates Xudong River as Class 3 water-body, the standard is based on Surface Water Environment Standard （GB3838-2002）.

According to *Approval of Heyuan city drinking water source protection areas（Document YFH[2000] No.95）*, there is a drinking water and water source protection area – Dongyuan county drinking water source protection area of Dongjiang River (Table 2.4-1), the project area away from its first and second land protection area 320m and 300m, no in the protection zone. The drinking water of Dongyuan County is provided by urban water supply system of Heyuan City since March 8, 2008, water source is Xinfengjiang Reservoir (Wanlv Lake), The intake of Dongyuan county drinking water source protection area of Dongjiang River is stopping using.

Table 2.4-1 Drinking Water Source Protection Area of Heyuan City (the Part of Dongyuan County)

Location	Name and Class		Water-body protection scope and water quality target	Landscape protection scope	Minimums distance from Landscape protection scope to project area
Dongyuan County	Dongyuan county drinking water source protection area of Dongjiang River	First grade	The scope is from upstream 1000m away the intake of Dongyuan Water Service to downstream 500m. Water quality target: calss 2.	Within 500m away from the water-body protection scope.	320m
		Second grade	The scope is from upstream 500m away the boundary of first grade protection area. Water quality target: calss 2.	Within 300m away from the water-body protection scope.	300m

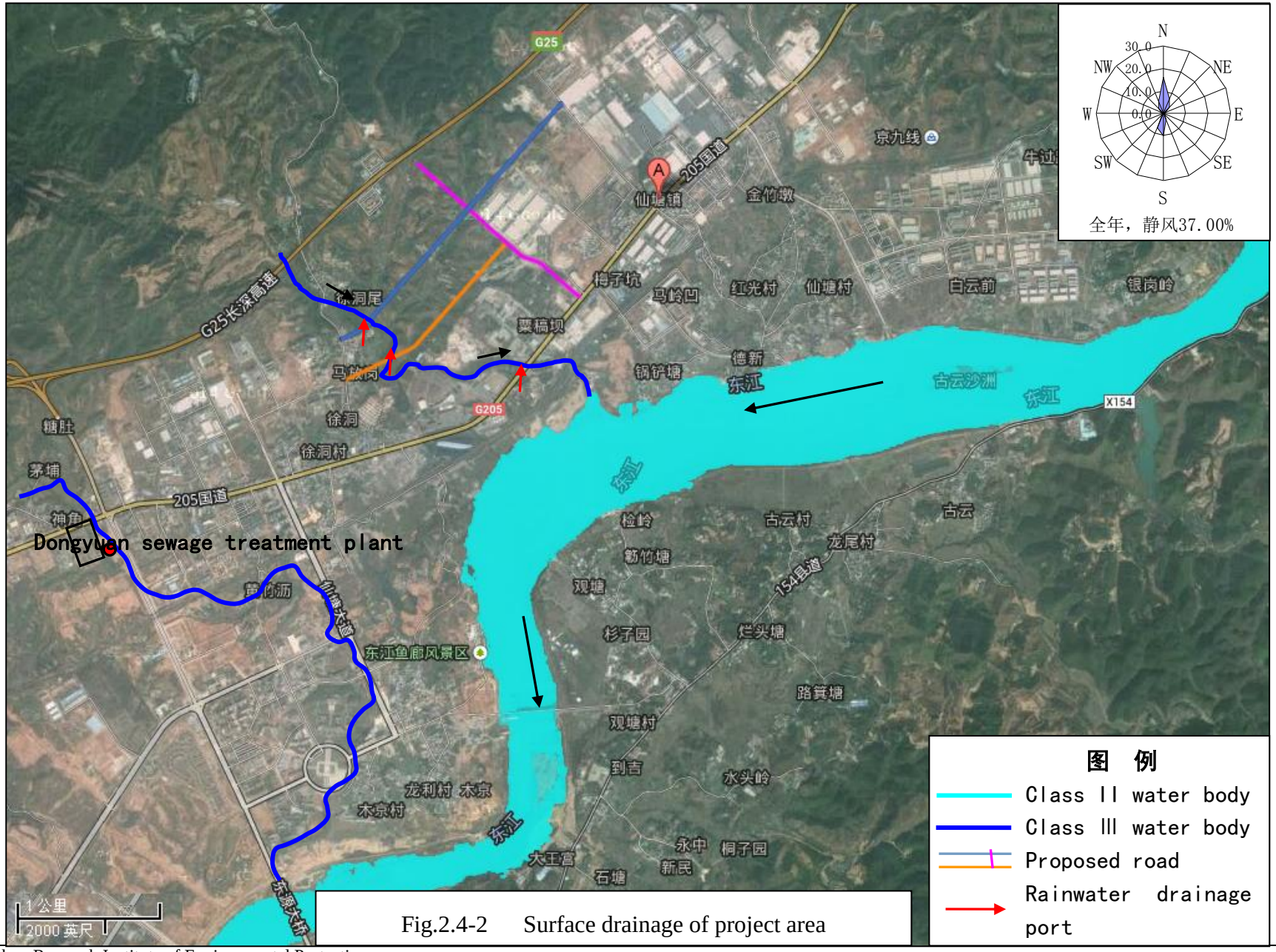


Fig.2.4-2 Surface drainage of project area

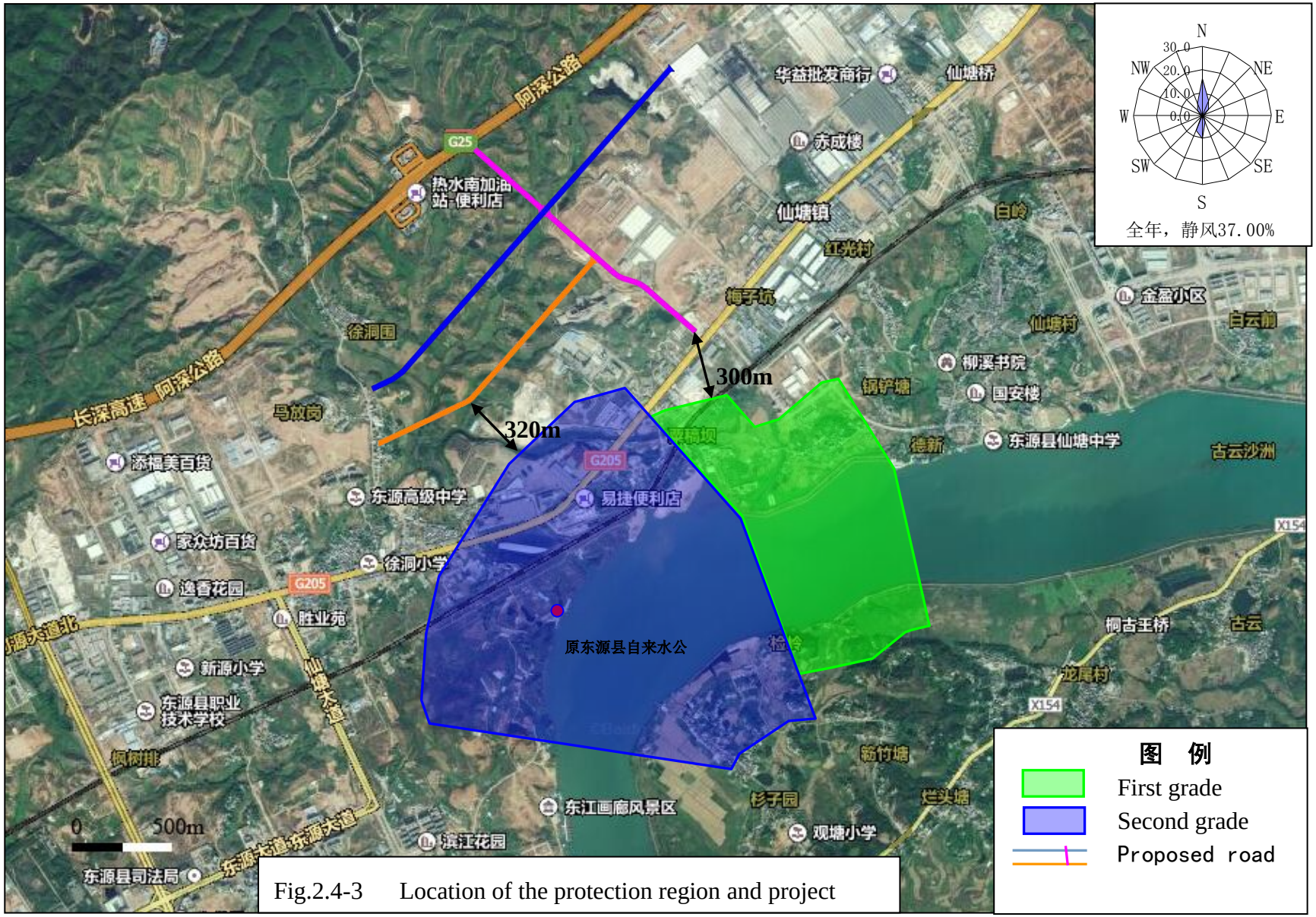


Fig.2.4-3 Location of the protection region and project

2.4.2.4 Ground Water Environmental Function Division

According to *Approval of Guangdong provincial ground water function division*（Document YF[2009] No.459） and *Notice of isuancing Guangdong provincial ground water function division*（Document YSZY[2009] No.19）, the project is located on the Dongjiang River emergency water source area of Heyuan City (H064416002T04, as shown in Fig. 2.4-4). The identification of groundwater emergency water source based on *Notice of isuancing Guangdong provincial ground water function division*（Document YSZY[2009] No.19）is the groundwater source that has good conditions of occurrence, exploitation and water quality, generally prohibit mining, only in the emergency or special drought emergency water supply area. The protection target of Dongjiang River emergency water source area of Heyuan City (H064416002T04) is Class 3 based on *groundwater quality standards* (GB/T 14848-93).

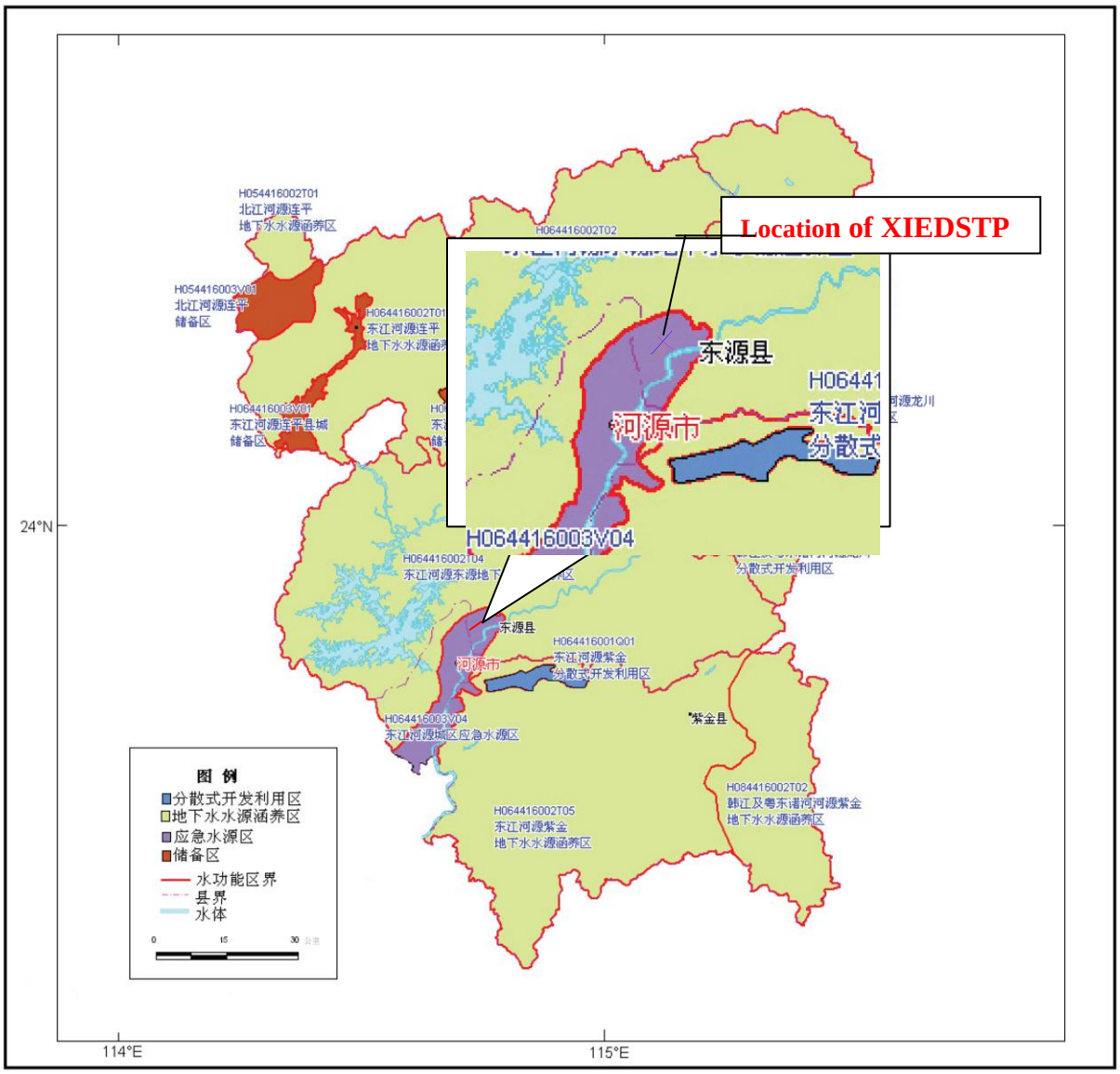


Fig.2.4-4 Guangdong provincial ground water function division

2.4.2.5 Ecological Environmental Function Division

According to the ecological hierarchical control plan of *Heyuan environmental protection planning (2007-2020)*, the project area is ecological intensive utilization area, and details are shown in Fig. 2.4-5.

Environmental function attribute of the project area is shown in Table 2.4-2。

Table 2.4-2 Environmental function attribute of the project area

Num	Type	Function attribute and standard
1	Surface Water Environmental Function Division	Xudong River, Class 3（GB 3838-2002）; Main stream of Dongjiang River, Class 2（GB 3838-2002）.
2	Ground Water Environmental Function Division	Emergency water source area, Class 3（GB/T 14848-93）
3	Air Environmental Function Division	Class 2 zone, standard by GB 3095-1996
4	Acoustic Environmental Function Division	Class 2 zone, standard by GB 3096-2008
5	Natural protection area	No
6	Scenic area	No
7	Basic farmland protection area	No
8	Reservoir area	No
9	Habitat Conservation Area	No
10	Drinking water source protection area	No
11	Sewage treatment plant collection range	Yes, Dongyuan sewage treatment plant

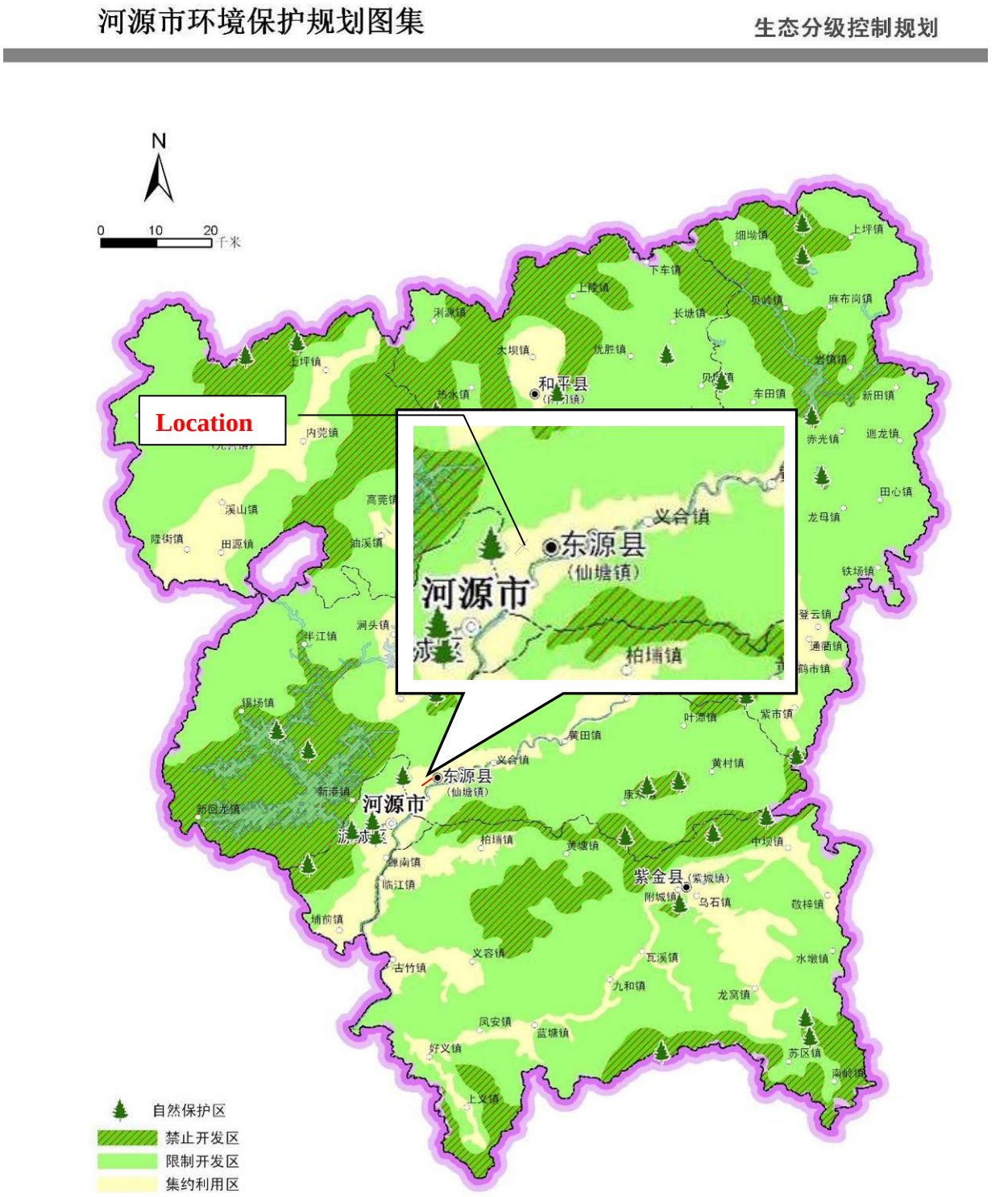


Fig.2.4-5 The relation between project area and ecological control zone

2.4.3 Evaluation Standard

2.4.3.1 Environmental Quality Standards

1、Acoustic Environment Quality Standard

The urban branch roads that designed in this project are Xudongyi Road, Industry Avenue, and New District Road. The around zone is Class 2 acoustic environmental area based on *Acoustic Environment Quality Standard*（GB3096-2008）.

Table 2.4-3 Acoustic Environmental Quality Standards for Noise

Time / Standard	Day dB（A）（6：00-22：00）	Night dB（A）（22：00-6：00）	Reference
Class II	60	50	*Environmental Quality Standard for Noise* (GB3096-2008)

2、Air Quality Standards

The project area is Class 2 air environmental function divison. According to *Notice of issuancing Ambient Air Quality Standards GB3095-2012,* the time line of implement revised quality standard is: Beijing-Tianjin-and-Hebei region, yangtze river delta, pearl river delta, and municipalities, provincial capital in 2012; 113 environmental protection key city or national environmental protection model city in 2013; every Prefectural-Level city in 2015; all country since January 1, 2016. The construction period of project is October 2014 to October 2016, so status quo evaluation and forccast evaluation of the project area perform as Class 2, details shown at Table 2.4-4.

Table 2.4-4 Air quality standards

Evaluation period	Parameter	Time	concentration limit mg/m³	Reference
status quo evaluation	Sulfur dioxide（SO_2）	Annual average	0.06	the Class II standard of *Ambient Air Quality Standards* GB3095-2012 and notice of issuancing the modifie list of ambient air quality standard (GB3095-1996)
		24-hours average	0.15	
		1-hour average	0.50	
	Nitrogen dioxide（NO_2）	Annual average	0.08	
		24-hours average	0.12	
		1-hour average	0.24	
	Carbon monoxide	24-hours average	4.0	
		1-hour average	10.0	

Evaluation period	Parameter	Time	concentration limit mg/m³	Reference
	PM_{10}	Annual average	0.10	
		24-hours average	0.15	
	TSP	Annual average	0.20	
		24-hours average	0.30	
forccast evaluation	Sulfur dioxide（SO_2）	Annual average	0.06	the Class II standard of *Ambient Air Quality Standards* GB3095-2012
		24-hours average	0.15	
		1-hour average	0.50	
	Nitrogen dioxide（NO_2）	Annual average	0.04	
		24-hours average	0.08	
		1-hour average	0.20	
	Carbon monoxide	24-hours average	4.00	
		1-hour average	10.0	
	PM_{10}	Annual average	0.07	
		24-hours average	0.15	
	TSP	Annual average	0.20	
		24-hours average	0.30	

3、Environmental Quality Standards for Surface Water

The major waterbodys of project area are Xudong River and main stream of Dongjiang River, Xudong River implement the class III standard of "Environmental Quality Standards for Surface Water"(GB3838-2002); Dongjiang River (from provincial boundarie of Jiangxi to Shilong River of Dongguan with the length 393km) implement the class II standard of "Environmental Quality Standards for Surface Water"(GB3838-2002) , see Table2.4-5.

Table2.4-5 Environmental Quality for Surface Water Execution standards

Num	Item	Class Ⅱ	Class Ⅲ	unit
1	pH	6～9	6~9	--
2	DO	≥6	≥5	mg/L
3	COD_{cr}	≤15	≤20	
4	BOD_5	≤3	≤4	
5	Ammonia nitrogen	≤0.5	≤1.0	
6	Petroleum	≤0.05	≤0.05	
7	SS	≤20	≤30	

Note： The standards of SS are based on "Quality Standards for Surface Water Resource"(SL63-94).

4、Environmental Quality Standards for Ground Water

According to Approval of Guangdong proviencal ground water function division （Document YF[2009] No.459） and Notice of isuancing Guangdong proviencal ground water function division（Document YSZY[2009] No.19）, the project is located on the Dongjiang River emergency water source area of Heyuan City (H064416002T04), and ground water quality target is Class 3 based on groundwater quality standards (GB/T 14848-93), shown as Table 2.4-6.

Table 2.4-6 Ground water quality standards

Num	Items	Standard of Class 3	Unit
1	pH	6.5~8.5	——
2	total hardness	≤450	mg/L
3	COD_{Mn}	≤3.0	mg/L
4	NH_4	≤0.2	mg/L
5	LAS	≤0.3	mg/L
6	Cr^{6+}	≤0.05	mg/L
7	Pb	≤0.05	mg/L
8	Cd	≤0.01	mg/L
9	Fe	≤0.3	mg/L
10	Zn	≤1.0	mg/L

2.4.3.2 Pollutants Discharge Standards

1、Pollutants Discharge Standards for water

The drainage system of this project is rain sewage diversion, during the construction period, domestic sewage through pretreatment to reach the Class 3 standard in second stage of *water pollutant discharge limit* (DB 44/26-2001), then into the municipal sewer network. Then flow into domestic sewage treatment plant of Dongyuan, to reach the reach the Class 1 standard in second stage of *water pollutant discharge limit* (DB 44/26-2001) and Class A standard in second stage of *Pollutant discharge standard for urban sewage treatment plant*（GB18918-2002）, then flow into Mujing River before flow into Dongjiang River. For construction wastewater, it needs to oil removal, sediment, then return to construction site.

Pollutants discharge standards for water as shown in Table 2.4-7.

Table 2.4-7 Pollutants Discharge Standards for water

Standards	PH	CODcr	BOD_5	NH_3	SS	oil
Class 3 standard in second stage of DB44/26-2001	6~9	≤500	≤300	-	≤400	≤100
Standard of domestic sewage treatment plant of Dongyuan	6~9	≤40	≤10	≤5	≤10	≤1

2、Pollutants Discharge Standards for air

Auto industry is gradually with international standards in China, according to the time table, light vehicle emission should reach the national Class 3 standards since July 1, 2007, and reach the national Class 4 standards since July 1, 2010; compression ignition engine and heavy duty diesel vehicle should reach the national Class 3 standards since January 1, 2007, and reach the national Class 4 standards since January 1, 2010, and reach the national Class 5 standards since January 1, 2012. It starts executing national Class 4 standards of fourth stage since 2013. Above all, and consider the current conditions of project, light vehicle emission should reach the national Class 3 standards in short term, Class 4 in middle term, and Class 5 in long term; heavy vehicle emission should reach the national Class 4 standards in short term, Class 5 in middle term, and Class 5 in long term. During the construction period, the emission should reach the Class 2 of second stage of *Atmospheric pollutant discharge limit*（DB44/27-2001）. The details are shown in Table 2.4-8~2.4-10.

Table 2.4-8 Atmospheric pollutant discharge limit（second stage）

production engineering	pollutant	Maximum allowable discharge concentration（mg/m^3）	Note
Pavement construction	suspended particulate matter	1.0	Non organization discharge, thehighest value of outer perimete
Pavement asphalt	Fog from asphalt	30	There is no obvious non organization discharge of the production equipment

Table 2.4-9 Light vehicle emission limit（g/km）

Stage	Type	Level	Standard weight（RM）/kg	Standards/（g/km）								
				CO		HC		NOx		HC+NOx		PM
				ignition type	compression ignition type	ignition type	compression ignition type	ignition type	compression ignition type	ignition type	compression ignition type	compression ignition type
Ⅲ	Class 1	—	All	2.30	0.64	0.20	—	***0.15***	0.50	—	0.56	0.050
	Class 2	Ⅰ	RM≤1305	2.30	0.64	0.20	—	0.15	0.50	—	0.56	0.050
		Ⅱ	1305＜RM≤1760	4.17	0.80	0.25	—	***0.18***	0.65	—	0.72	0.070
		Ⅲ	1760＜RM	5.22	0.95	0.29	—	0.21	0.78	—	0.86	0.100
Ⅳ	Class 1	—	All	1.00	0.50	0.10	—	0.08	0.25	—	0.30	0.025
	Class 2	Ⅰ	RM≤1305	1.00	0.50	0.10	—	***0.08***	0.25	—	0.30	0.025
		Ⅱ	1305＜RM≤1760	1.81	0.63	0.13	—	***0.10***	0.33	—	0.39	0.040
		Ⅲ	1760＜RM	2.27	0.74	0.16	—	0.11	0.39	—	0.46	0.060

Table 2.4-10 Heary vehicle emission limit（g/km）

Stage	material date	CO g/（kW·h）	hydrocarbon;g/（kW·h）	nitrogen oxideg/（kW·h）	particulate matter g/（kW·h）	Smoke intensity m-1
Ⅲ	2007.1.1	2.1	0.66	***5.0***	0.100.13（1）	0.8
Ⅳ	2010.1.1	***1.5***	0.46	***3.5***	0.02	0.5
Ⅴ	2012.1.1	***1.5***	0.46	***2.0***	0.02	0.5

Note：for those engines displacement per cylinder lower than 0.75dm^3 and rated power speed more than 3000r/min.

3、Noise emission standard

During the construction period, the Limit Value Standard For The Boundary Of Building Construction （GB 12523-2011）, refer to Table 2.4-11.

Table 2.4-11 Limit Value Standard For The Boundary Of Building Construction （GB12523—2011）

Day	Night
70dB（A）	55dB（A）
Note：The maximum noise level at night is not allowed to be more than 15 dB（A）. If the noise source of the project site is close to the noise sensitive building and the outdoor condition can not be suit for measuring, the indoor measuring can be adopted with the noise assessing standard less 10 dB（A）as the benchmark.	

During the operation period, the region that around two sides of the road vehicle lane perform as Class 2 standard by *acoustic environment quality standards*（GB3096-2008）, details shown at Table 2.4-12; the indoor region perform as the standards by *regulation for sound insulation design for civil buildings* （GB 50118-2010）, details shown at Table 2.4-13.

Table 表 2.4-12 Limit value of noise

Time / Standards	Day dB（A）（6：00-22：00）	Night dB（A）（22：00-6：00）	Standard base
Class 2	60	50	acoustic environment quality standards（GB3096-2008）
Class 4a	70	55	

Table 2.4-13 Limit value of indoor noise

Room type	Allowable noise level（dB(A)）	
	Day	Night
Bedroom	≤45	≤37
Living room	≤45	

2.5 World Bank Safeguard Policies

(1) World Bank Operational Policy and Procedures: Environmental Assessment (OPIBP4.01)

(2) World Bank Operational Policy and Procedures: Involuntary Resettlement (OPIBP4.12)

(3) World Bank Operational Policy and Procedures: Information Disclosure (BP7.15)

2.6 Rationality and validity Analysis of Construction Project

2.6.1 Feasibility Analysis of Project Location

The construction project has got the approval of Xiantang Town becoming the comprehensive economic development demonstration towns construction project supported by World Bank Loan from the people's government of Heyuan City (Document HFH[2009] No.149). The project also has got *the description about landuse situation of Xiantang District Dongyuan County* from Dongyuan Municipal Land and Resources Bureau, consider the location is feasibility.

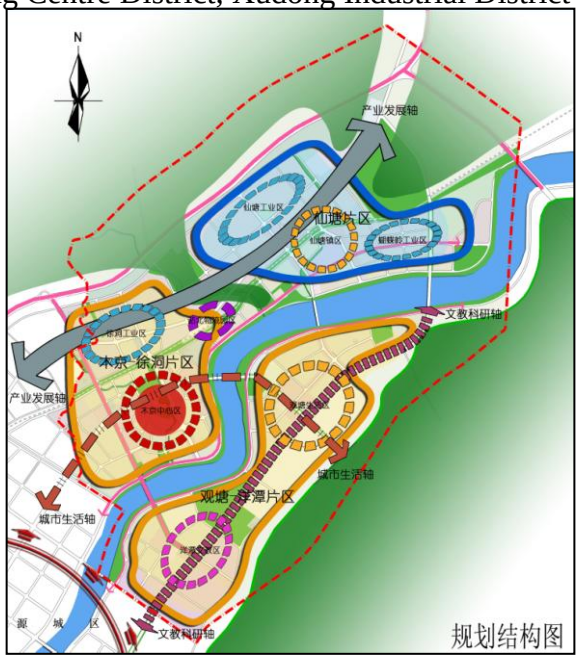
2.6.1.1 Conformity Analysis with Master Planing of Dongyuan County

According to *master planning of Dongyuan County (2005-2020)*, the centre of Dongyuan County is the county's political, economic and cultural center, to become a modern riparian city that combine with undertaking foreign manufacturing and developing processing industry, business, tourism.

Dongyuan County is designed to become a planning structure , "riverbanks, three axis, three districts":

(1) District Mujing-Xudong

This district located on the west of Dongjiang River and Xudong River, has 75 thousand planning population. This district designs to be the political, economic and cultural centre of county, and tourist service base. It consists of Mujing Centre District, Xudong Industrial District and Station North Logistics Area.



1) Mujing Center District consists of administrative center (both sides of Administrative Avenue), business service center (both sides from Dongyuan Avenue to Xiantang Avenue), cultural recreation center (both sides of Guangchang Avenue), and Center Park. Residential land distribute around those area, Riverside Park and tourist service distribute along the river.

2) Xudong Industrial District locates on north

of Jingjiu Railway, consist of Industrial No.1 District, Industrial No.2 District, and Xudong Industrial Park, and Asia Chuangjian Industrial Park. It designs to be a district based on introducing the pharmaceutical, electronic industry and has a good environment quality.

3) Staion North Logistics Area designs to be a logistics area that service the whole city based on Xiantang Railway Freight Station.

(2) District Xiantang

This district located on the west of Dongjiang River and east of Xudong River, has 35 thousand planning population. This district designs to be the important industrial centre of county. It consists of Xiantang District, Xiantang Industrial District and Hudieling Industrial District.

1)Xiantang District：the residential area and commercial center, focus on protection and utilization of historic district in first village of South Park;

2) Xiantang Industrial District: a industrial district based on decoration material industry;

3) Hudieling Industrial District: a industrial district based on food processing industry.

(3)Guangtang-Yangtan District

This district located on the east of Dongjiang River, has 20 thousand planning population. This district designs to be an area based on cultural, educational research and high technology industrial park. It consists of Yangtang Cultural District and Guantang Residential District.

1) Yangtang Cultural District: the extend area of Mujing Center District, based on resident and commercial function. It's the center of county east coast.

2) Guantang Residential District: based on developing college education, technical secondary education and vocational technical training.

The project area designs to be comprehensive economic development demonstration area, which fits orientation of Dongyuan Master Planning. In *Dongyuan Master Planning (2005-2020)*, Xiantang New District is not included in the planning area, some of its land design to be alternate land (Fig. 2.6-1), its development and construction lack of relevant planning guidance. Therefore, the control detailed planning of new district was made based on *Dongyuan Master Planning (2005-2020)* by City Planning and Design Room of Dongyuan County at October, 2013.

This project is the municipal engineering improvement project of the new district. It fits the

control detailed planning of new district and *Dongyuan Master Planning (2005-2020).*

2.6.1.2 Conformity Analysis with Land Use Planing of Xiantang Town

The project area located on Xiantang New District, based on *the control detailed planning of Xiantang New District*, the designed road construction of the project fits the planning of the control detailed planning (Fig.2.6-2). So, the project fits the requeriment of landuse planning in Xiantang Town.

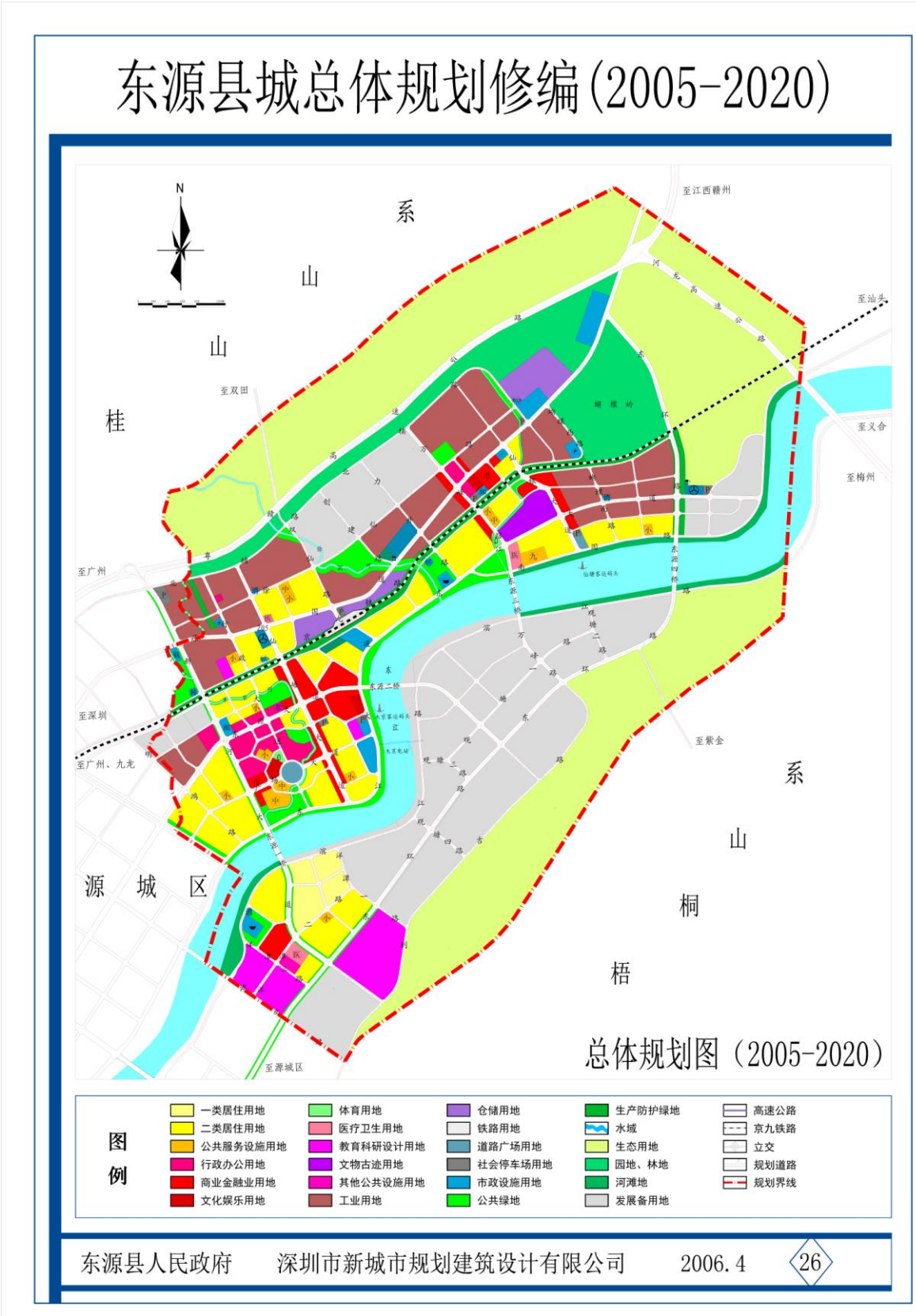


Fig.2.6-1 Master Planning of Dongyuan County

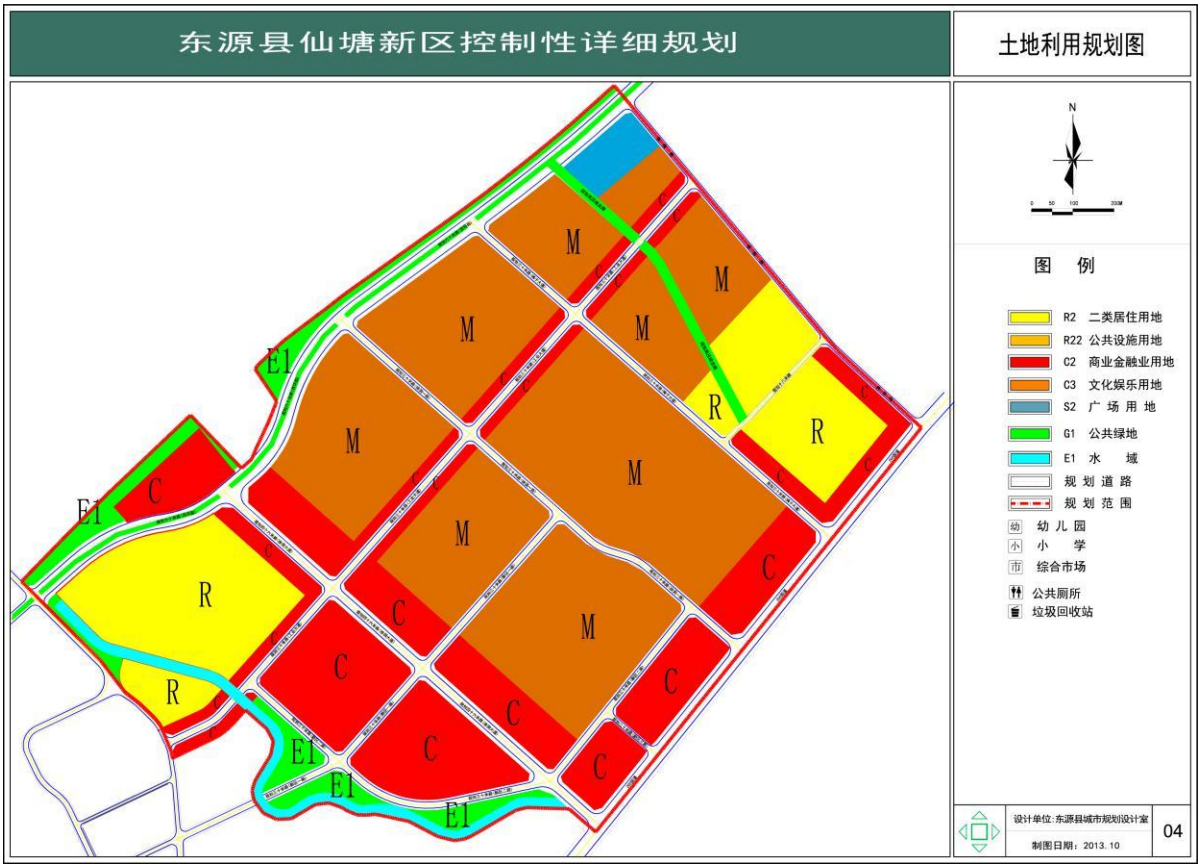


Fig.2.6-2 Land use Planning of Xiantang New District

2.6.2 Conformity Analysis with Sewage Pipe Network planning of Dongyuan County

The project supporting the construction of sewage pipe network, during the operation period, the sewage that produced from the project area flow into Dongyuan sewage plant to reach the standard and then discharge. According to the planning of sewage treatment plant collecting scope and pipe network construction *of Dongyuan County (Fig.2.6-3)*, the project area is inside the pollution collecting scope of first period planning construction. So the project fits the planning of sewage pipe network of Dongyuan County.

Domestic sewage treatment plant of Dongyuan County is based on BOT model, its design sewage disposal capacity is 30 thousand tons each day, collecting scope includes Dongyuan New Town and part of Industry Park. The discharge standard is based on the Class 1 standard in second stage of *water pollutant discharge limit* (DB 44/26-2001) and Class A standard in second stage of *Pollutant discharge standard for urban sewage treatment plant* （GB18918-2002）. The design import COD concentration ≤250mg/L and export COD concentration 40mg/L, which

based on Microporous Aeration A2/O Oxidation Ditch. First period construction started running at May, 2010 and passed acceptance of environmental protection at June 30.

The project fits the planning of sewage pipe network of Dongyuan County.

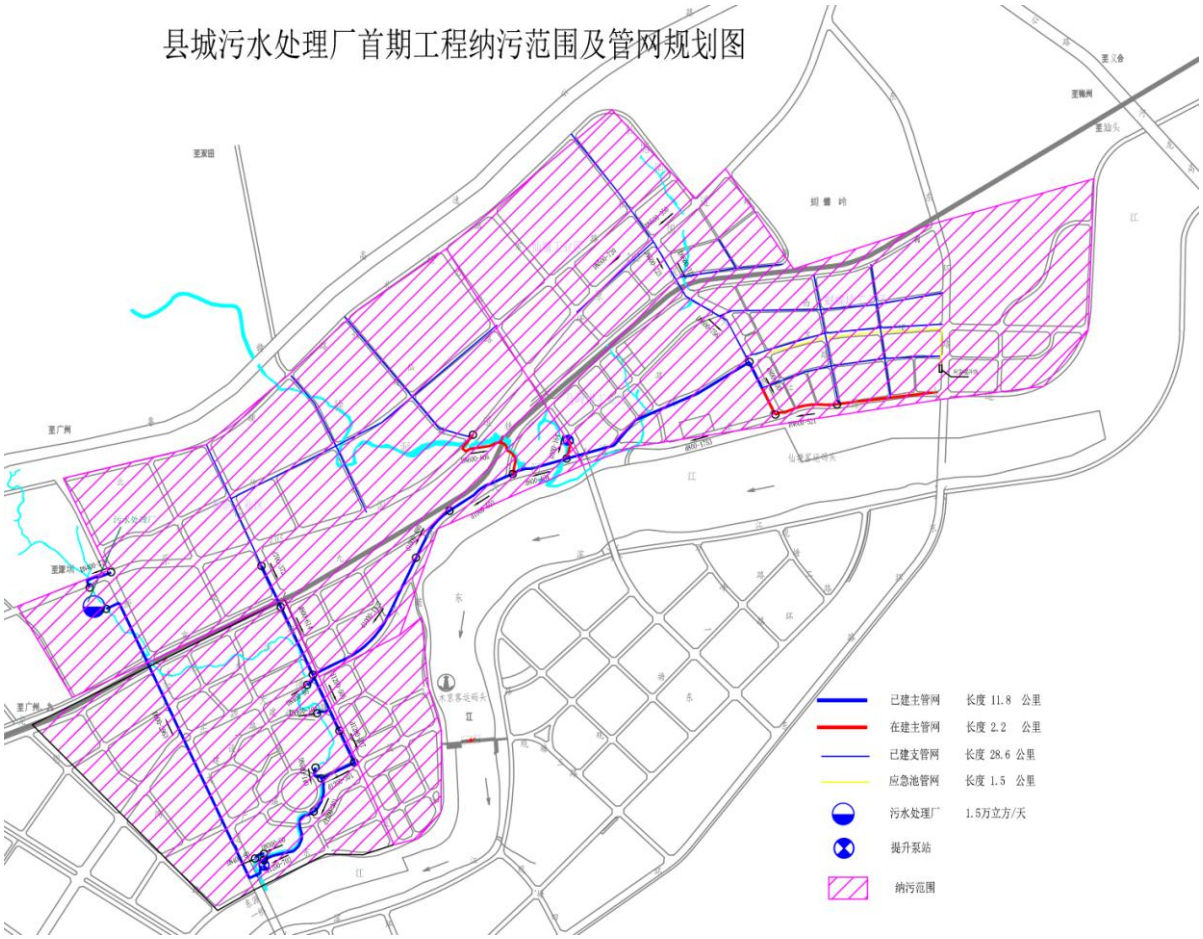


Fig.2.6-3 sewage treatment plant collecting scope and pipe network construction of Dongyuan County (First period)

2.6.3 Acceptance Analysis of Environment Impact

According to the environmental monitoring results, the project construction area has good air quality. The construction could cause fugitive dust during construction period, because of the short emission time, the influence could be reduce by taking some measures. The tail gas emissions has a certain effect on the air quality during operation period, but can be acceptable. During construction period, mechanical noise will influence the regional environment sensitive spots, which can be reduce by taking some measures. During operation period, traffic noise has obvious impact on environment, so corresponding control measures are made in this assessment, the noise impact will be acceptable after using necessary sound insulation measures in the

sensitive spots.

During construction period, soil Erosion Impact would change the ecological environment. By taking the reasonable measures for soil and water conservation, the impact can become positive to improve the urban ecological environment and recover the ecological environment. So the impact of ecological environment is acceptable.

Recognition analysis of public participation

According to the survey results of the public participation, participants are both support the project. Because this project is positive with urban construction, traffic condition, living environment and local economic development, the public participation of the project is good.

2.6.4 Rationality Analysis with Environment of the Project Area

It has few environment sensitive spots around the project area, and the construction is no across big river, so the location is reasonable.

After complete this project, it would be a important influence to improve the life of people and promote the gradual perfection of the urban ecological structure.

Generally speaking, the project will improve the current situation of infrastructure construction in this area, increased social service capacity, positive to the lives and employment of local people, then improve the environment of local investment promotion, it plays a important role in the development of local economy and society

2.6.5 Conformity Analysis with Basic Farmland Protection Zone of the Construction Projects

This project doesn't involve basic farmland protection zone. It has little influence of agricultural production.

2.6.6 Conformity Analysis with Laws and Regulations of Water Protection

1、The relationship between the project and the water source protection area

Table 2.6-1 Drinking Water Source Protection Area of Heyuan City (the Part of Dongyuan County)

Location	Name and Class		Water-body protection scope and water quality target	Landscape protection scope	Minimums distance from Landscape protection scope to project area
Dongyuan County	Dongyuan county drinking water source protection area of Dongjiang River	First grade	The scope is from upstream 1000m away the intake of Dongyuan Water Service to downstream 500m. Water quality target: Class 2.	Within 500m away from the water-body protection scope.	320m
		Second grade	The scope is from upstream 500m away the boundary of first grade protection area. Water quality target: Class 2.	Within 300m away from the water-body protection scope.	300m

The project area is not in the protection area, and the water intake of Dongyuan county drinking water source protection area of Dongjiang River is stopped using.

2、Conformity Analysis between project and laws and regulations of water protection

①*Water Pollution Prevention Law of the People's Republic of China*（March, 2008）: "The Fifty-Five, it is forbidden to build sewage outfall in the drinking water source protection zone." "The Fifty-Nine, it is forbidden any new construction, alteration and expansion about discharging pollution in the Class 2 drinking water source protection zone; the built construction should be remove or shut down."

②*Detailed Rules for the Implementation of the Water Pollution Prevention and Control Law of the People's Republic of China*（March, 2000）: "The Twenty-three, it is forbidden any new construction, and expansion about discharging pollution in the Class 2 drinking water source protection zone"

③*Regulations of environmental protection in Guangdong Province*（September, 2004）:"The Fifteenth, it is forbidden to build any list project in drinking water source protection zone: (1) new build or expand construction project about discharging pollution containing persistent organic pollutants and Hg, Cd, Pb, As, Cr; (2) build sewage outfall; (3) build the storage tanks, warehouses, stacks, oil gas pipelines and waste recycling fields or processing fields of oil and other toxic substances; (4) build any catering, entertainment facilities that would occupy the river, lake and other drinking water sources or directly discharge pollution to the river, lake and other water-bodies; (5)set up the livestock farms and breeding areas; (6) other pollution project."

This project is not belong to pollution construction projects, doesn't locate in water protection zone. It fits the national and local laws and regulations of water protection.

2.6.7 The Project Fits *Regulations of Dongjiang River water quality protection in Guangdong Province*

Regulations of Dongjiang River water quality protection in Guangdong Province（July 23, 2010）: "The Twenty-Three, it is prohibited from engaging in tourism, swimming and stocking of livestock, aquaculture in the Class 1 drinking water protection zone; it is forbidden to new build or expand construction project about discharging pollution, the alteration should reduce the discharge."

The project is not in the scope of Dongyuan county drinking water source protection area

of Dongjiang River, and does not discharge pollution to Dongjiang River. So this project fits the regulations of Dongjiang River water quality protection in Guangdong Province.

3 Project Overview

3.1 Construction Project Overview

The location of project is in Xiantang New District Dongyuan County Heyuan City. The project is an improvement of infrastructure construction in Xiantang New District. The construction project includes infrastructure construction of Xiantang New District, enhancing construction of the agency and ability, improving the ability of project management and monitoring, as shown at Table 3.1-1. The EIA object is infrastructure construction, which includes 3 road works, water supply and sewerage works, lighting works and greening works, details as shown at Table 3.1-2.

Table 3.1-1 Content and Scale of Construction Project

Num	Index	Unit	Value
1	infrastructure construction	shown at Table 2.1-2	
2	enhancing construction of the agency and ability,		
2.1	The transfer plan of Xiantang Building Materials Industry Park	item	1
2.2	Study on cooperation mechanism of Xiantang Building Materials Industry	item	1
3	Plan of improving the ability of project management and monitoring	item	1
Note: the object is infrastructure construction.			

Table 3.1-2 Content and Scale of infrastructure construction

Num	Index	Unit	Value
One	Road		
1.1	Xudongyi Road	km	1.55
1.2	Industry Avenue	km	2.24
1.3	Xinquyi Road	km	1.48
Two	Water supply network		
2.1	DN300	m	3200
2.2	DN150	m	1860
三	Rain pipe network		
3.1	DN1500	m	1550
3.2	DN1200	m	3090
四	Sawage pipe network		

Num	Index	Unit	Value
4.1	DN1500	m	1550
4.2	DN1200	m	3720
Five	Greening works	m^2	15810
Six	Light works	Term	1

3 roads are involved in the infrastructure construction project, including Xudongyi Road, Industry Avenue and Xinquyi Road:

①Xudongyi Road, connecting the existing State Road205 from Xihuan Road, through Industry Avenue, Xinquyi Road and Xinquer Road in line, with overall length of 1.55km;

②Industry Avenue, connecting the existing Zhennan Road from Xingfu Road (Shibami Road), through Xinquer Road, Xudong Avenue, Xudongyi Road and Meizi Avenue in line, with overall length of 2.24km;

③Xinquyi Road, connecting Xudongyi Road from Xingfu Road (Shibami Road), through Xinquer Road and Xudong Avenue in line, with overall length of 1.48km.

Both 3 roads are 4-lane dual carriageway and urban branch road, with red line width of 30m and design speed 40km/h.

（5）Project Investment：

The total project investment is about RMB 116,176.0 thousand, including the investment of infrastructure construction RMB 112,366.4 thousand. Environmental protection investment is about 2,151 thousand, 1.85% of the total investment.

The fund source composition is: USD 8 million of World Bank loan applied (about RMB 49,540.56 thousand), RMB 5 million of county financial fund and RMB 61,630.4 thousand of town fund raising. The total World Bank loan will be used in infrastructure construction.

3.2 Road Direction and Important Construction Point

The location of project is in Xiantang New District Dongyuan County Heyuan City. The project is an improvement of infrastructure construction in Xiantang New District. 3 roads are involved in the infrastructure construction project, their direction shown at Fig.3.2-1 and Fig.3.2-2.

①Xudongyi Road (from Xihuan Road to State Road 205) is a planning road. Its direction is from northwest to southeast, across Industry Avenue, Xinquyi Road and Xinquer Road. The Southeast part of road is planning to build on the base of existing packway, and connecting the existing State Road 205 in the south.

②Industry Avenue (from Xingfu Village Road to Zhennan Road) is a planning road. Its direction is from southwest to northeast, start at Xingfu Village Road, across Xinquer Road, Xudong Avenue, Xudongyi Road and Meizi Avenue in line, and connecting present Zhennan Road in the east.

③Xinquyi Road (from Xingfu Village Road to Xudongyi Road), is a planning road. It starts at Xingfu Village Road, and its direction basically as Industry Avenue with a distance about 320m, across Xinquer Road and Xudong Avenue in line, end up at a T type intersection with planning Xudongyi Road.

There are 3 present roads will across with the planning roads, which is No.205 National Road, Xingfu Village Road and Zhennan Road.

No.205 National Road, the urban main road, present is 30m width, 4-lane dual carriageway, plan to be 6-lane dual carriageway with red line width of 60m; Xingfu Village Road present is cement pavement, 8m width and plan to be 18m width;Zhennan Road present is cement pavement, 30m width in the south part (350m length), 8m width in the north and plan to be 4-lane dual carriageway with 18m width.

	
Start point of Xudongyi Road	Final point of Xudongyi Road

	
Start point of Industry Avenue	Final point of Industry Avenue
	
Start point of Xinquyi Road	Final point of Xinquyi Road

Fig.3.2-2 Present situation of planning road

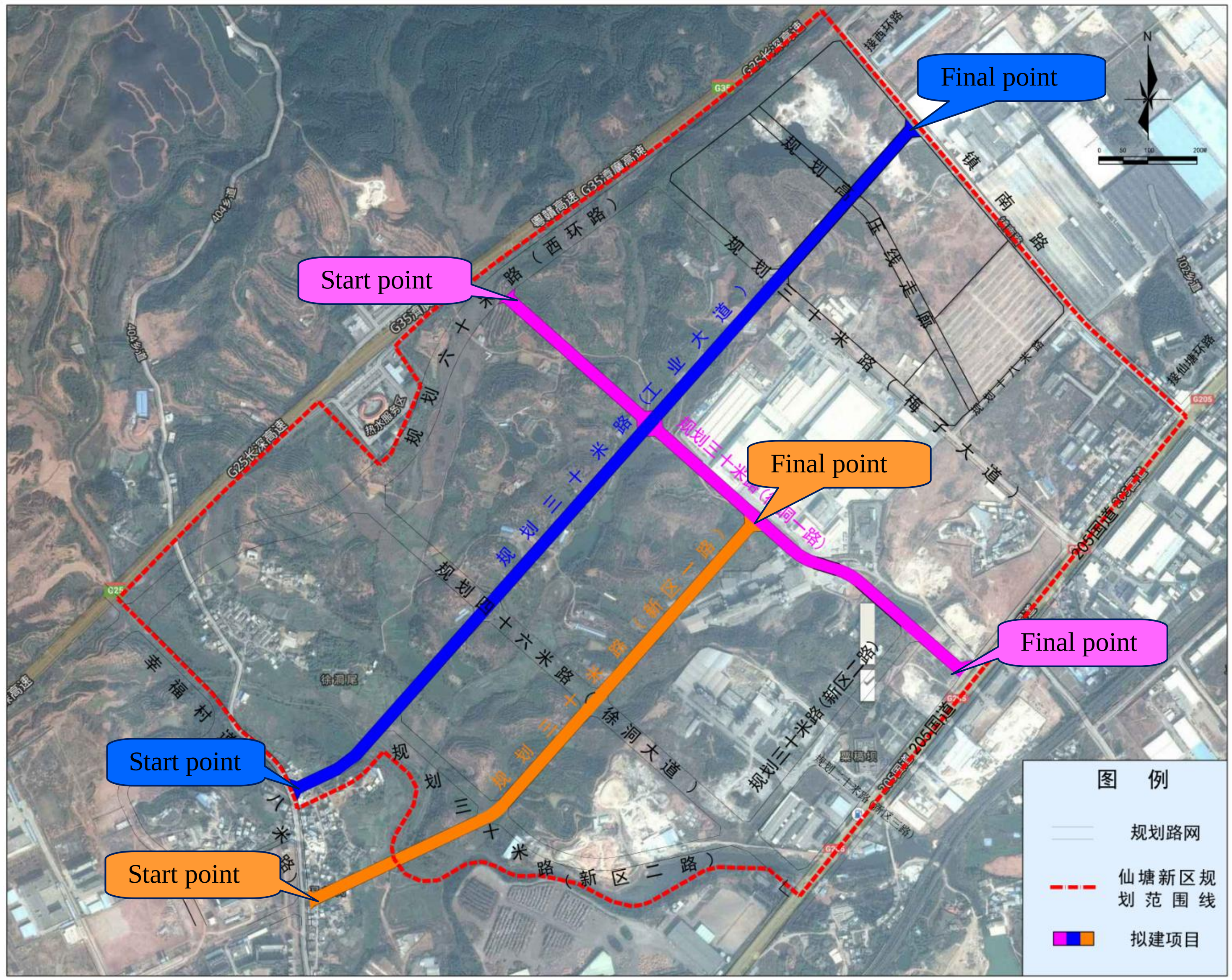


Fig.3.2-1 Road direction

3.3 Major Construction Content

The location of project is in Xiantang New District Dongyuan County Heyuan City. 3 roads are involved in the infrastructure construction project, including Xudongyi Road, Industry Avenue and Xinquyi Road, both urban branch roads. The planning construction content includes road works, traffic works, water supply and sewerage works, lighting works and greening works. Details are shown at Table 3.1-1 and Table 3.1-2.

3.4 Technical standard

3 roads are involved in the infrastructure construction project, including Xudongyi Road (from Xihuan Road to No.205 National Road), Industry Avenue (from Xingfu Village Road to Xudongyi Road) and Xinquyi Road (from Xingfu Village Road to Xudongyi Road). Technical indicators are shown at Table 3.4-1, and network construction is shown at Table 3.4-2.

Table 3.4-1 Technical indicators of planning road

Num	Index		unit	value	Xudongyi Road	Industry Avenue	Xinquyi Road
1	Road level		——	branch	branch	branch	branch
2	Design driving speed		km/h	40、30、20	40	40	40
3	Pavement design age		year	10	20	20	20
4	the width of the road base		m	——	30	30	30
5	circular curve	minimum radius without super elevation	m	150	300	300	300
6		minimum radius without easement curve	m	/	500	500	500
7		minimum length of circular curve	m	25	35	35	35
8		minimum length of easement curve	m	25	35	35	35
9	vertical curve	minimum radius of convex vertical curve	m	250	400	400	400
10		minimum radius of vertical sag curve	m	250	450	450	450

11		maximum longitudinal grade	%	8	7	7	7
12		Minimum slope length	m	85	110	110	110
13		Minimum length of vertical curve	m	25	35	35	35
14	transverse slope		%	1-2	1.5	1.5	1.5
15	stopping sight distance		m	30	40	40	40
16	Seismic fortification intensity		degree	7	Ⅶ	Ⅶ	Ⅶ

Table 3.4-2 Pipe Network of project

Num	Type	caliber	Laying length
1	storm sewer	DN1500	1550m
		DN1200	3090m
2	sewage pipe	DN1500	1550m
		DN1200	3720m
3	water supply pipe	DN150	1860m
		DN300	3200m

3.5 Design Situation of Sub Construction

3.5.1 Road Construction

（1）Road plane design

According to control detailed planning and design of Xiantang New District, road plane design of project is shown at Fig.3.5-1.

（2）Road vertical design

Road vertical design of project is shown at Fig.3.5-1. Road vertical design is restricted to the present situation of No.205 National Road, Zhennan Road and Xingfu Village Road, regional terrain, and other road design of Xiantang New District. The elevation of road main control points are shown at Table 3.5-1.

Table 3.5-1 Road main control points of project

Road	control points	Elevation (m)	longitudinal slope
Industry Avenue	Connect point with Xingfu Village Road	56.11	⑦ → ⑥: 0.3%
	Connect point with Xinquer Road	55.20	⑤ → ⑥: 0.3%
	Connect point with Xudong Avenue	56.29	④ → ⑤: 1.0%
	Connect point with Xudongyi Road	62.28	③ → ④: 1.02%
	Connect point with Meizi Avenue	66.91	② → ③: 1.0%
	Connect point with High pressure corridor	69.70	② → ①: 0.5%
	Connect point with Zhennan Road	68.50	
Xudongyi Road	Connect point with Xihuan Road	66.72	① → ④: 0.89%
	Connect point with Industry Avenue	62.28	④ → ②: 0.90%
	Connect point with Xinquyi Road	59.13	② → ③: 1.50%
	Connect point with Xinquer Road	52.00	③ → ④: 1.29%
	Connect point with No.205 National Road	49.50	
Xinquyi Road	Connect point with Xingfu Village Road	54.10	① → ②: 0.44%
	Connect point with Xinquer Road	51.81	③ → ②: 0.37%
	Connect point with Xudong Avenue	53.14	③ → ②: 1.0%
	Connect point with Xudongyi Road	59.13	

（3）Road cross section design

Both 3 roads are 4-lane dual carriageway and urban branch road, with red line width of 30m, motor vehicle road transverse slope of 1.5%, and pedestrian road transverse slope of 2.0%. The cross section design is shown at Fig.3.5-2.

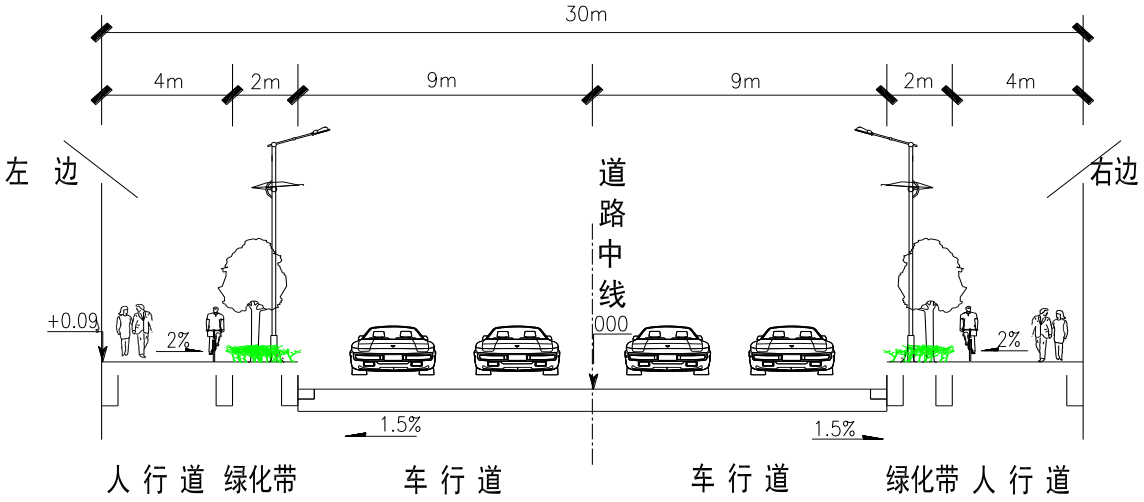


Fig. 3.5-2 Road cross section design

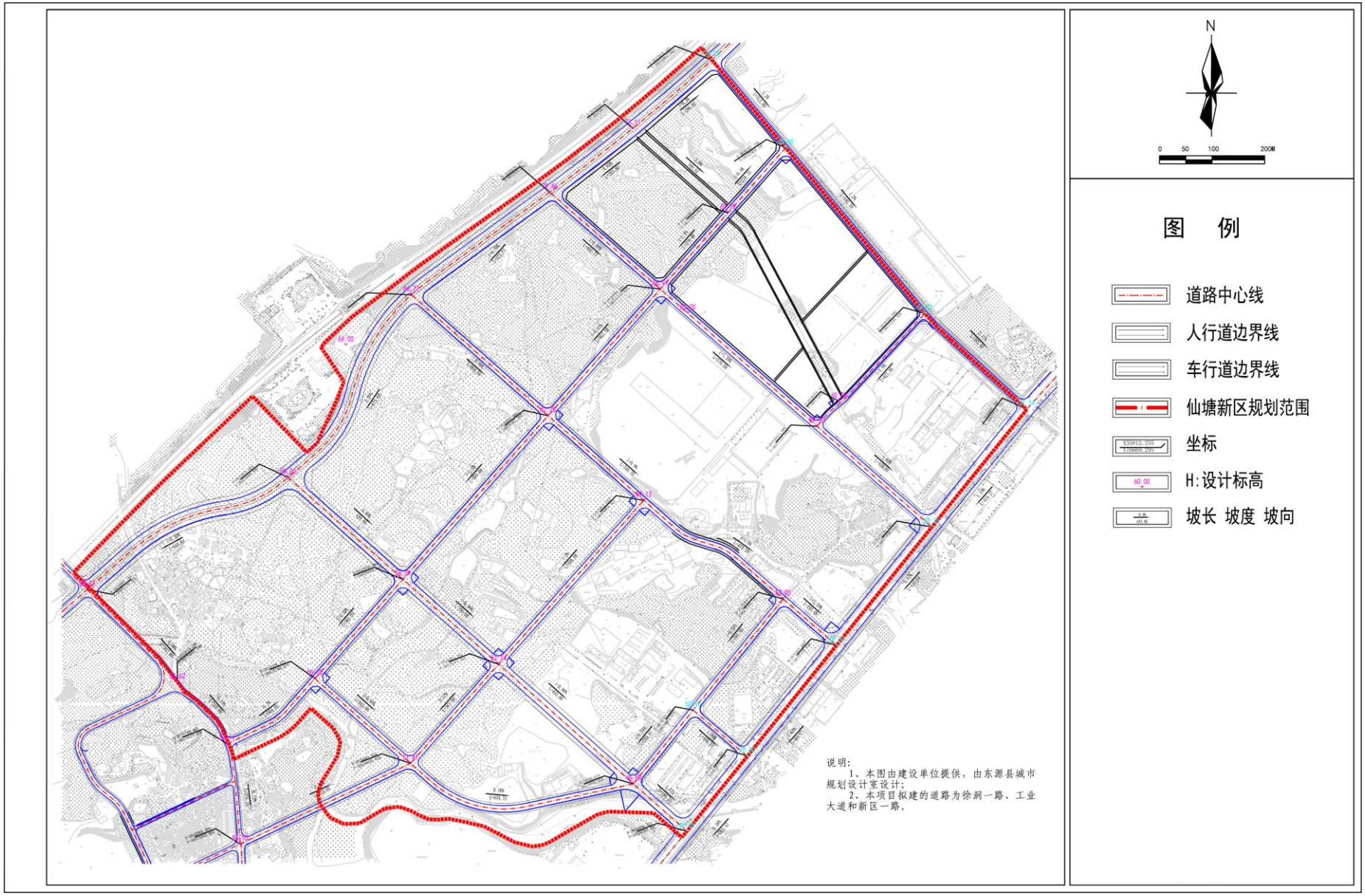

N
0 50 100 200M
图 例
道路中心线
人行道边界线
车行道边界线
仙塘新区规划范围
坐标
H:设计标高
坡长 坡度 坡向
说明:
1、本图由建设单位提供，由东源县城市规划设计室设计;
2、本项目拟建的道路为徐洞一路、工业大道和新区一路。

Fig.3.5-1 Road Plane Design of Project

（4）Intersection design

There is 5 intersection in the project road design. The intersection graphic design scheme considering the development of land, the requirement of mass production and life, and the influence of intersection for road traffic capacity. The design scheme is major pavement repaving and vertical design scheme is based on connecting present road.

（5）Pavement Structure Design

Because the climate is humid and rainy, small temperature difference, no cold damage of project area, the pavement structure is good water stability.

The structure is 28m thick cement concrete (flexural strength 5Mpa) surface layer, 20cm thick 5% cement stabilized crushed stone base layer, 20cm thick 4% cement stabilized crushed stone base layer, and 15cm thick gravel cushion layer.

（6）Subgrade Design

1）Fill subgrade

The roads locate on low mountains and hills area, elevation difference is 20~30m, The source of subgrade filling from cutting excavation and soil along the hillside. Subgrade filling is based on the following principles:

①Side slope of embankment: when side slope of fill subgrade less than or equal to 8m, slope ratio is 1:1.5; when side slope of fill subgrade more than 8m and less than 12m, use broken line slope, slope ratio of up 8m is 1:1.5, other is 1:1.75; when side slope of fill subgrade more than 12m and less than 16m, slope ratio of up 8m is 1:1.5, other is 1:1.75, and a 2m width plain stage of slope with 3% camber cross slope should be build in the middle. Part of the roads have contractive slope, should reduce the removal or build of shoulder wall or embankment wall.

②Slope width: when embankment slope height H≤6m, slope width =1m; when embankment slope height H>6m, slope width =2m; when embankment slope height H>16m, a 2m width plain stage of slope should be build in the middle (8m), the slope ratios are 1:1.5, 1:1.75 and 1:2.

2）Excavation subgrade

Based on the geological structure, geotechnical properties and fracture development degree of project area, the slope tatios of excavative subgrade are settled as follow:

If the slope height of excavative subgrade ≤12m and the subgrade is made of soft rock and soil, deal them with slow down slope and cover with three-dimensional vegetation and spray turfing protection.

If the slope height of excavative subgrade between 12m to 25m, a 2m width plain stage of slope should be build in the middle (10m height), first grade slope's ratio shouldn't higher than 1:05, second grade slope's ratio should be as low as possible. If the slope height of excavative subgrade ≥25m, considered the stratum boundary situation, the slope should be classified every 10m, the plain stage should be covered by cemented rock and build drain dyke to reduce the erode, the upset slope could reduce the slope ratio and cover with three-dimensional vegetation and spray turfing protection. The top of slope should be arc processing (R=2m) to fit in natural hillside, and lockrand with grass to enhance the landscape effect.

3）Zore fill subgrade and soil cutting design

When the height of fill subgrade lower than 1.5m, it is considered to be zore fill subgrade. To make sure the range of zore fill subgrade and soil cutting roadbed compaction not less than 96%, the filler or topsoil should change to crushed gravel (the changed thickness should not less than 80cm). When CBR meet the specifications and water content close to the optimal water content, the subgrade can be compacted after digging; when water content is high or CBR doesn't meet the specifications, the subgrade should change to crushed gravel.

When the CBR of excavation subgrade roadbed,which is soil or soft rock doesn't meet the specifications, or roadbed water content too high to reach the the required degree of compaction, the subgrade below pavement structure layer should be processing, the treatment and the required degree of compaction are same as zero fill subgrade.

4）Design of soaking embankment near the river and fish ponds

According to the characteristics of each section, the comprehensive design is made by roadbed filling, drainage and protection. The slope rate of the embankment below the design water level should be 1.75, subgrade should be filling with materials that have good permeability, embankment slope should cover with M7.5 mortar rubble, and the paving height is 50cm higher than the design water level.

5）Clear top soil, road trough

Before filling the subgrade, the grass, topsoil, roots should be remove, and then rolled or compacted, to reach the compact degree requirements. Subgrade earthwork quantity table has been deducted from the number of tank parts; topsoil removal across the board calculated by 30cm, removal topsoil were as spoil and should not use for roadbed construction; ultra wide rolling earthwork around on both sides should be super fill 0.5 meters.

3.5.2 Water Supply Construction

The supply water source of Xiantang New District is Xiantang water plant, and there is a DN300 water supply pipeline on both sides of No.205 National Road. 5060m new water supply pipeline is designed in the project, includes 1860m DN150 pipeline and 3200m DN300 pipeline.

3.5.3 Sewerage Construction

Drainage system is rain and sewage diversion system. There are both one DN800 rain water network and DN800 sewer network in the two sides of No.205 National Road in the south Xiantang New District, and the present rain and sewage pipe network are reserved for a number of DN400 connection wells..

The project plans to build 5270m the sewage pipe network, including 1550m DN1500 and 3720m DN1200.The project also plans to build 4640 rain water network, including 1550m DN1500 and 3090m DN1200. The contents of the pipe network construction are shown in table 3.5-2. The rain and sewage pipe network are build on one side of the road respectively.

Table 3.5-2 Rain and Sewage Pipe Network Construction of the Project

Type	Num	Caliber	Length（M）
sewage	1	DN1500	1550
	2	DN1200	3720
rain	1	DN1500	1550
	2	DN1200	3090

The rainwater of Xudongyi Road will be collected by rainwater pipes into No.205

National Road's rainwater pipe network, then discharged into Xudong River; the rainwater of Industrial Avenue and Xinquyi Road will be collected by sewage pipe network, then discharged into Xudong River on the west side of the project. Sewage is collected by sewage pipe network into the No.205 National Road sewage pipe network, eventually entering the urban sewage treatment plant of Dongyuan County and discharged into the Mujing River, then flow into the Dongjiang River. The rainwater and sewage pipe network of Xiantang New District design as shown in Fig.3.5-3 and Fig.3.5-4.

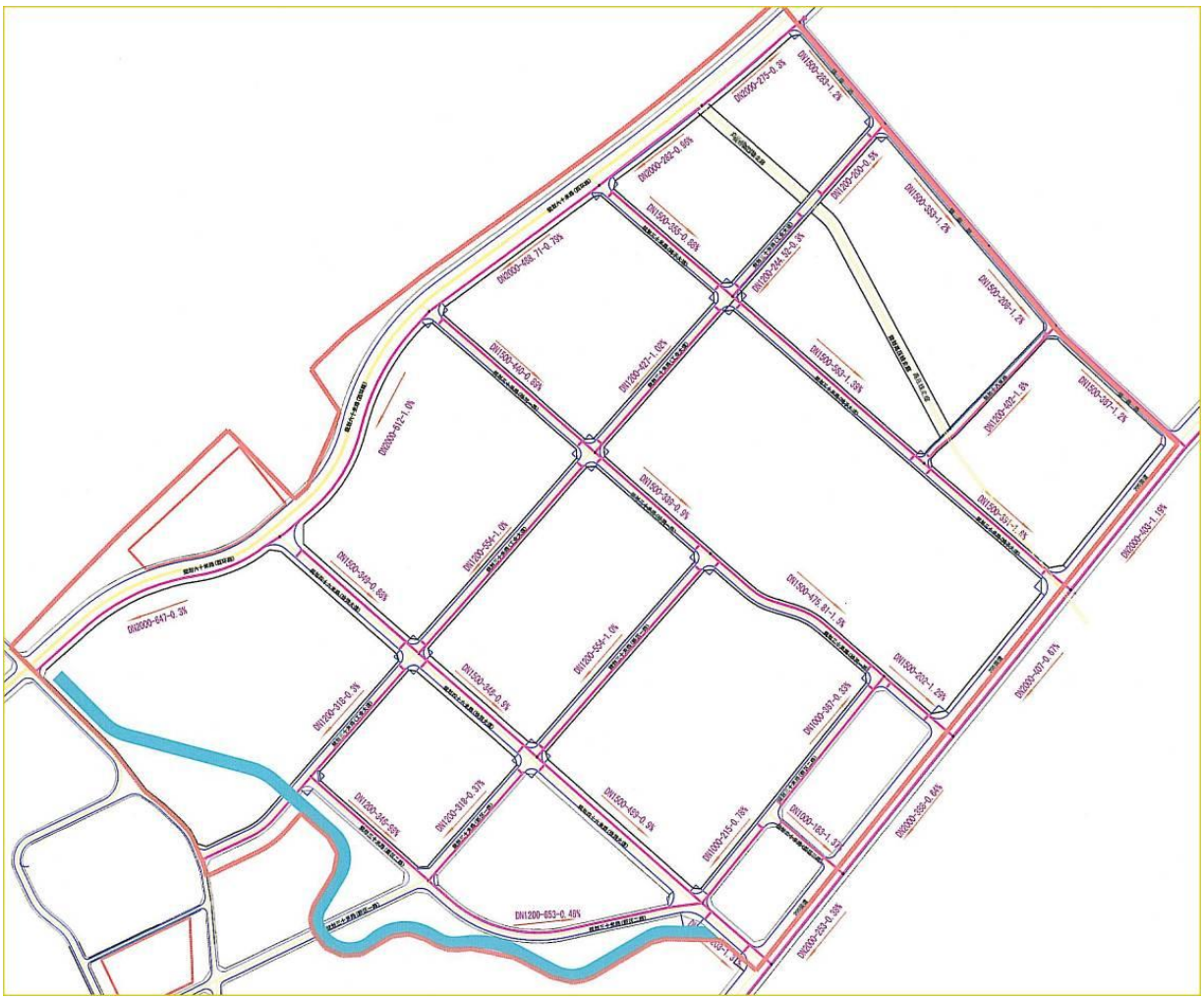


Fig.3.5-3 The rainwater pipe network design plan

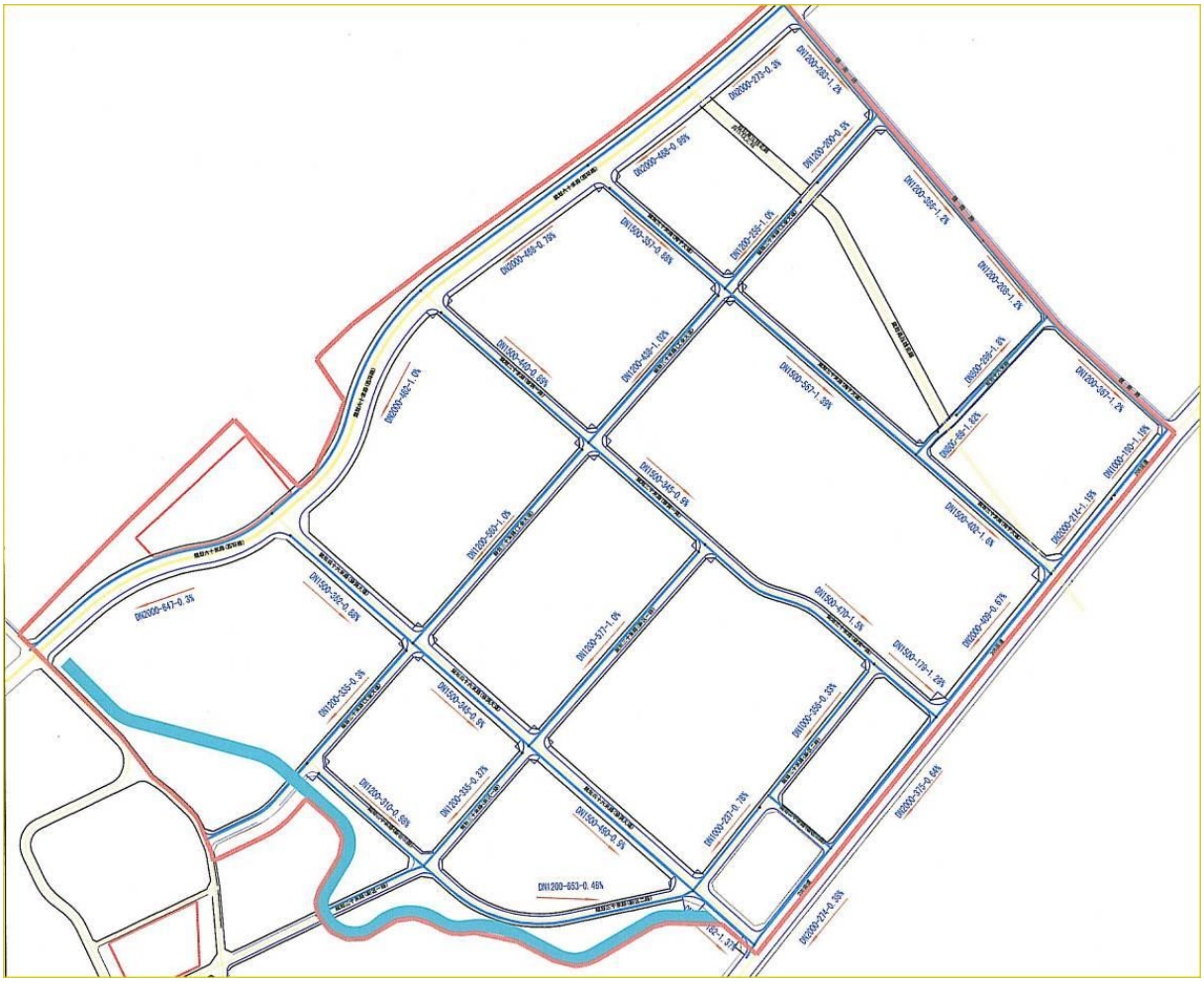


Fig.3.5-4 The sewage pipe network design plan

3.5.4 Greening Construction

There are 2m width green belt on both sides of proposed road, which locate between the sidewalks and driveways. The first consideration of green plant is the safety function and ensure anti dazzle shading effect, to reach the design standard of the environmental protection; secondly consideration is the economic optimization principle based on a one-time investment and the management and protection in the future; in the premise of ensuring the first and second consideration, then pay attention to the creation of landscape, to ensure evergreen in four seasons. The choice of plant species are trees and shrubs which should be suitable for the local natural conditions, soil conditions and should be drought resistant, corrosion, cut resistant, anti cold, anti pollution.

3.5.5 Lighting Construction

The road construction both are 4-lane dual carriageway, 15 meters high double

cantilever street lamps are planned on both side of the sidewalk green belt with a distance of 40m between each lamps. The roadway lamps are 2x220W LED, with a 3.5m length of cantilever. The sidewalk lamps are 30WLED.

3.6 Road Construction Scheme and Construction Organization

The construction of this project is mainly the road construction, and the other constructions are combined with the road construction process, construction technology and pollution structure chart as shown in Fig. 3.6-1.

The major construction method and technology:

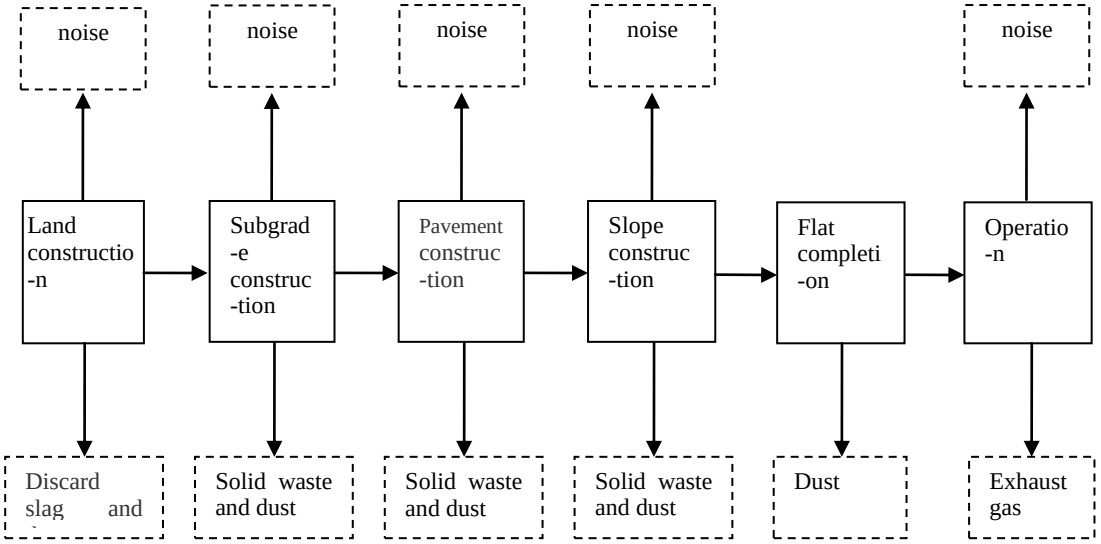


Fig.3.6-1 Construction Technology and Pollution Structure Chart

According to the project design plan, the construction will begin in December 2014, and the completion time is November 2016, the construction period is 24 months. Based on the soil and water conservation report of project, the construction site is set up on mine heap of Yaohui clay processing plant, the position shown in Fig.3.6-2.

In the construction process, in order to facilitate the drainage, the drainage pipe network construction would go first, then following the pavement construction during the subgrade construction. When the water supply pipes laying under the sidewalk, the thickness of covering soil is not less than 0.60 m, when the pipes laying in the roadway, the thickness of

covering soil thickness is not less than 0.70m; the rainwater pipeline under the most unfavorable area should cover soil with 1.5 ~ 1.7m thickness.

（1）The set up of construction site, soil field and dump field

According to soil and water conservation plan report of the project, there is no soild field and dump slag field during the project construction period, a small amount of stripping topsoil (0.51 million m^3) is temporary stacking in temporary soil dump field, which used as greening covering soil after the construction. The construction site and temporary soil dump field is set up on mine heap of Yaohui clay processing plant. This area is public domain nowadays and rent by Yaohui clay processing plant for dumping mine. The area is open ground without vegetation covering, so there is no removal of vegetation and negative ecological impact involve when it is used for temporary construction site.

（2）Water, electricity and communication during construction

There are numbers of breeding facilities distributed Xiantang New District, the condition of electricity, communications and water supply is good. The water that used for construction and living can be connected from the nearby water pipe network. The the existing conditions of site can meet the need of construction.

（3）Building materials, and transportation conditions

This project locates in XianTang Town Dongyuan County, there are Xingfu Village Road, No.205 National Road and Zhennan Road locate on the west, the south and the east of the area.respectively, There are solid, sand or gravel road all over the site, so the new temporary construction road is no necessary. The internal and external transportation is convenient, all the required sand, stone could buy from the local legitimate operators. There is not need to build sand, stone field. And the required cement, pipe culvert and steel can be purchased at the local.

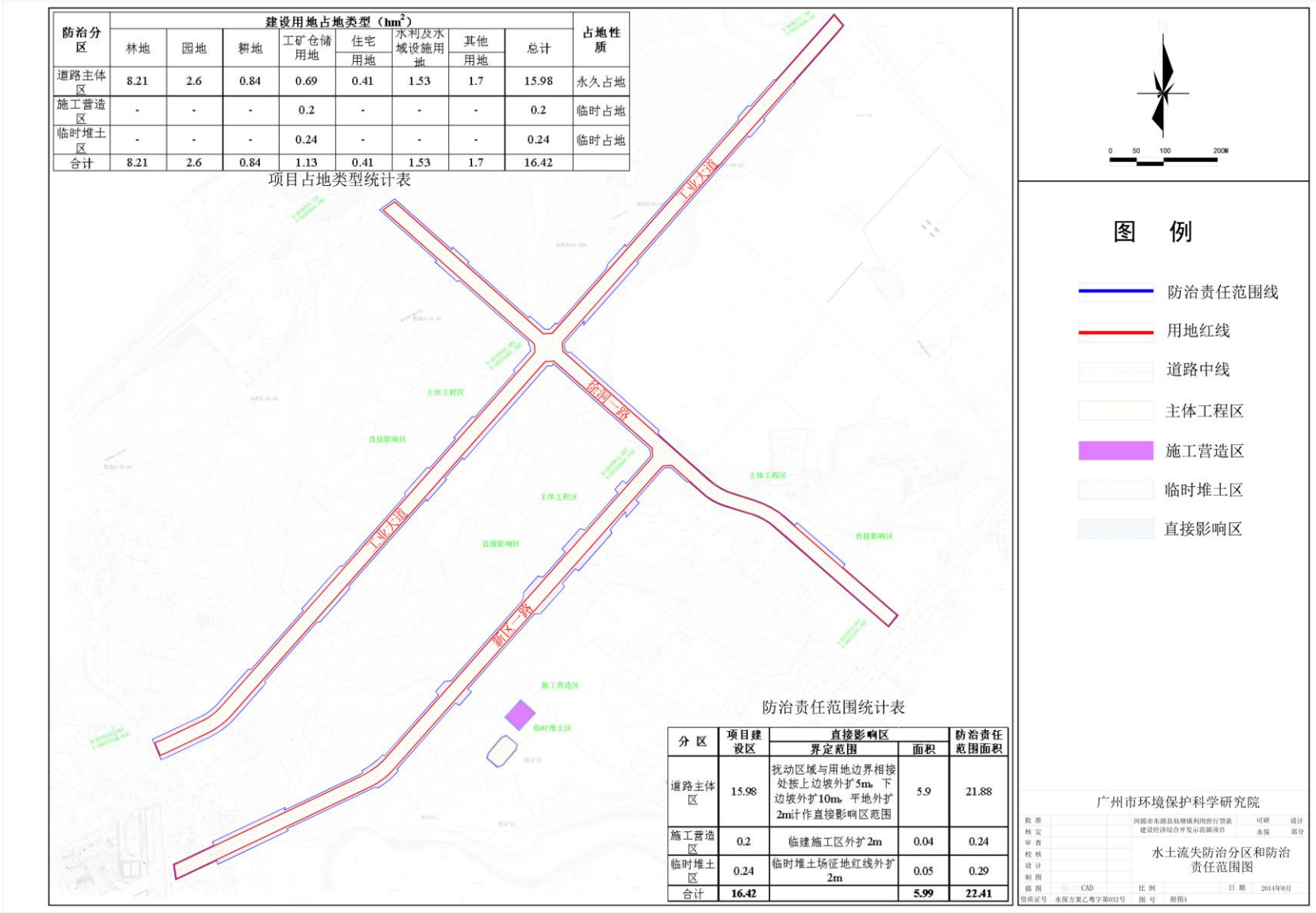


Fig.3.6-2 The location of Construction site

3.7 Traffic Volume Forecast

Based on the feasibility study report of project, the results of traffic volume forecast are shown in Table 3.7-1.

Table 3.7-1 The forecast of traffic peak volume hourly in each characteristic year（pcu/h）

Year / Road	2016	2021	2027
Xudongyi Road	338	476	703
Industry Avenue	268	377	557
Xinquyi Road	245	348	510

According to *Notice of adjusting the traffic situation of the highway and investigating the type of vehicle and the conversion coefficient of the vehicle (Document GTBZ[2005] No.126),* the mix traffic volume in each characteristic year of the project have been calculated, the conversion coefficient is shown in Table 3.7-2. Based on the different traffic situation, it should be modified to fit in the real situation. So in this calculation, the conversion coefficient have been chosen based on the driveway situation of the exacted road. The conversion coefficient of small vehicle, middle vehicle and large vehicle are 1, 1.5, 2.0.

The environment influence of proposed road is depend on the traffic volume, according to the project design, the prediction peak hours of traffic volume, it classifies small passenger car, small trucks and other vehicle that below 3.5t as small vehicle, the proportion of 85%; it classifies the buses, trucks and other 3.5t~12t vehicle as middle vehicle, the proportion is 10%; it classifies double deck bus, heavy truck, bus, truck, container truck and the vehicle more than 12t as large vehicles, the proportion of 5%. Daytime traffic (each hour) take 60% of the peak hour traffic, night (8 hours) traffic take 20% of the total day traffic. Peak hour, daytime hours, night hours traffic volume are shown at Table 3.7-4.

Table 3.7-2 Pcu conversion coefficient of vehicles

Type	Conversion Coefficient	Note
Coach	1.0	Rated seat ≤19
Bus	1.5	Rated seat＞19

Van	1.0	capacity tonnage ≤2t
Medium truck	1.5	2t≤capacity tonnage≤7t
Large trucks	2.0	7t≤capacity tonnage≤14t
Extra large truck	3.0	capacity tonnage＞14t
Trailer	3.0	include semitrailer, platform truck;
Container truck	3.0	——
Motorcycle	1.0	include motorbike, truck motorcycle, motor tricycle;
Tractor	4.0	——
Animal drawn vehicle	4.0	——
Rickshaw	1.0	include human tricycles, barrow
Bike	0.2	include electric bicycle

Table 3.7-3 The classified standards and proportion after operation

Type	Weight	Proportion
small vehicle	Below 3.5t	85%
middle vehicle	3.5t~12t	10%
large vehicle	12t above	5%

Table 3.7-4 The Forecast of traffic volume

Road	Year	Peak hour				Day (per hour)				Night (per hour)			
		large	middle	small	sum	large	middle	small	sum	large	middle	small	sum
Xudongyi Road	2016	15	31	261	307	9	18	157	184	5	9	78	92
	2021	22	43	368	433	13	26	221	260	6	13	110	130
	2027	32	64	543	639	19	38	326	383	10	19	163	192
Industry Avenue	2016	12	24	207	244	7	15	124	146	4	7	62	73
	2021	17	34	292	343	10	21	175	206	5	10	87	103
	2027	25	51	430	506	15	30	258	304	8	15	129	152
Xiquyi Road	2016	11	22	190	223	7	13	114	134	3	7	57	67
	2021	16	32	269	316	9	19	161	190	5	9	81	95
	2027	23	46	394	464	14	28	237	278	7	14	118	139

4 Overview of Natural Environment

4.1 Overview of natural environment

4.1.1 Geographical location

This project is located in xiantang town dongyuan county , Heyuan city, it is aiming at xiantang new city's infrastructure construction projects.

Heyuan city is located in the northeast of Guangdong province, middle and upper reaches of east river; the east is Meizhou city; the south is Huizhou city; the west is Shaoguan city; and the north is Ganzhou city in Jiangxi province. It is an important transport hub city of northern Guangdong districts. With a total area of 15821 km^2, it has yuancheng city, dongyuan county, longchuan county, zijin county, lianping county and heping country , a total of one city and five counties. Dongyuan county is located in the middle of Heyuan city, which is approved by the state council for the new county in 1993 (it is the riverhead counties formerly , Heyuan suburbs). Dongyuan county is adjacent to Heyuan city,and it is the second largest county area of Guangdong province.The east is wuhua county, longchuan county, the north is lianping county, heping country ,the south is by zijin county, the west is Huizhou longmen county, Shaoguan xinfeng country. And it is the junction of the pearl river delta and north Guangdong mountains. The county area covers an area of 4070 square kilometers, it has 21 villages and towns (one is the minority township).

Xiantang town locates at the center of dongyuan county;and it is 9 kilometers far from the northeast of Heyuan city. Xiantang town is convenient in land and water transportation. For example the beijing-kowloon railway, 205 state road, east river, heyi highway ,dragons river under construction, GuangDongjiangxi expressway. These 'six dragon' of the city are from south to north, and there is a xiantang train depot ,the waterways run up direct to longchuan,under direct to Huizhou, Guangzhou. Xiantang town's advantage is very outstanding.

4.1.2 Climate and Weather

Dongyuan country is middle subtropical monsoon region with high temperature, high humidity, and the sunshine time is long, the rainfall amount is rich,the annual average temperature is 20.7 ℃. Its extreme maximum temperature is 39.3℃, the minimum temperature is 4.5 ℃. Annual average relative humidity is 77%, the frost-free period is 335 ~ 345 days. Years of accumulated temperature is about 77700 ℃. Annual average rainfall precipitation is 1567 ~ 2142.6 mm and it is concentrating in april to june mainly. It is influenced by Marine climate and continental climate alternation, so it is remarkable different during the year and four seasons. spring is cold wet, summer is hot and rainy, autumn day is high air, winter is cold and dry.

4.1.3 Geology

Dongyuan country is lower from north to south, hill are mainly on both sides of the mountainous. Mountain area accounted for 60% of the county area , rivers and reservoirs (including the xinfengjiang reservoir) accounted for 10%. The hills and mountain are 3.4 million mu, 230000 mu of paddy field, 150000 mu of dry land, and bar field to 20000 mu, water area to 570000 mu.

Dongyuan country has a state-level modern agriculture demonstration area-of lighthouse basin development. Lighthouse basin is in Heyuan hinterland, 40 km far from the downtown of Heyuan; lighthouse town is the center of dongyuan county, including 10 towns of dongyuan, six town of lianping county, three town of heping county, with a total area of 1941.1 square kilometers. This project is located in the new district of xiantang district ,it belongs to Heyuan basin, where the terrain ups and downs. The whole terrain is northeast high and southwest low. The highest elevation is 75 meters, the minimum elevation is 39 meters. The planning land is most higher than that of the dongjiang river flood warning control level (45 meters).

4.1.4 Horological Characteristics

Dongyuan is rich in water resources; rivers, lakes, waterfalls, springs dotted. Such as Evergreen lake, it is one of the largest artificial lake in southern China; the

water area is 370 square kilometers. A world-famous first reservoir of south China -- xinfengjiang reservoir; the storage capacity is 13.9 billion cubic meters. Water quality can reach the national level of drinking water standards. Dongjiang, xinfengjiang are the main river, and the county has 173000 kw for the development of water resources.

On the west side of the project, there is a small river stream--xudong river, and it is the dongjiang river tributaries.

4.1.5 Soil and Vegetation

According to the data analysis of dongyuan county's record, the county soil can be divided into seven types, 12 classes, 35 soil genera, 75 species. Parent rock soil are mainly granite, sandstone, basalt, limestone, sand shale and so on. Zonal soil is latosolic red soil, red soil and yellow .Latosolic red soil account for 46.7% , red soil accounts for 13.6%, and yellow soil accounted for 7.12%. Other major soil types have loam, sandy soil, rice paddies, alluvial soil and so on . Soil is common acidic, and the PH value is between 4.8 to 6.5.

Dongyuan county is in the south of central subtropical along the north subtropical .The zonal vegetation types is still the evergreen monsoon rain forest type of the tropical seasonal rain forest. There are many different kinds of trees and vegetation, the forest coverage rate is 67.3 ~ 73.5%. The component types are lauraceae, Euphor biaceae, Myrtaceae, Proteaceae, Elaeo – carpaceae.

Due to long-term human destruction, native forest vegetation has ceased to exist. The status quo of vegetation are conifers, acacia ,eucalyptus plantation ,many kinds of secondary forest and shrub grassy slope. The vegetation can be divided into 6 types, 36 kinds. It mainly includes: 1) evergreen coniferous forest, which is mainly composed of Pinus massoniarla, Cunninghamia lanceolata. Cunninghamia lanceolata forest is cultivated, uneven distribution, which is mainly artificial on demand or natural planting by aerial, and part of them is the natural forest. 2) the evergreen broad-leaved forest accounted for 12.24%, which is one of the main types of existing vegetation, and it is one of the major ecological public welfare forest under construction. 3) evergreen monsoon forest, and it is the secondary forest. It is mainly

distributed in the mountains, valley area, most of it is tree layer. 4) The montane elfin forest, which is mainly distributed in the hills above an altitude of 800 m, has small trees bend into the bushes, and some small and sparse canopy. The main tree species are schima superba, Gordonia axillaris, Rapanea neriifolia, China rat, fall really sweet, white dragon, which are almost 1.4 ~ 1.8 m height. Shrubs have Eurya chinensis, rice floral and so on. 5) brush, which is one of the main existing vegetation types of dongyuan county. It is a secondary vegetation or a stage of vegetation succession after repeated deforestation. 6) economic forest and fruit trees, they are mainly distributed in low mountain, roads and reservoirs. They include the Litchi chinensis, dimocarpus longan, prulus salicina, citrus reticulata, cmicrocarpa and so on.

4.1.6 Investigation and Evaluation of Surface Water Present Situation Environment Quality

4.1.6.1 Monitoring Sites Setting

In order to define the evaluation of water environment quality present situation, to understand the main water pollutants present situation and the characteristics of the water environment changing ,to provides the necessary basic data for assessment. The construction unit entrust shenzhen testing technology co., LTD on xudong river and the dongjiang river about current situation of environmental monitoring. They layout three monitoring section in total. For detailed data ,we can see the table 4.1 1 and figure 4.1 1.

Table 4.1 1 Surface water environmental monitoring section layout list

number	river	Detection section location	Coordinate
W1	Xudong river	500m upstream of Xudong river	23°49'08"N,114°44'28"E
W2		500m upstream of Xudong river run into the Dongjiang mouth	23°48'57"N,114°45'24"E
W3	Dongjiang river	1500m downstream of Dongjiang river run into Xudong river	23°47'52"N,114°45'6"E

4.1.6.2 Sampling Frequency and Time Monitoring

Monitoring time is on August 21, 2014 to Aug. 23, 2014,for three days, sampling 1 times a day.

4.1.6.3 Monitoring Project

According to the objective of the project and adjacent water environmental quality requirements to determine the water quality monitoring factors as: pH, $COD_{Cr,}$ BOD_5, SS, ammonia nitrogen, petroleum, dissolved oxygen, a total of seven.

4.1.6.4 Monitoring Analysis Method

According to "surface water environment quality standard" (GB3838-2002) and the national environmental protection bureau issued "environmental monitoring technical specifications" and other relevant requirements, we start Sampling and analytical methods. For detailed data ,we can see table 4.1 2.

Table 4.1-2 Surface water monitoring method, using instruments and the minimum detection limit list

number	Category	Monitoring method	instruments	minimum detection
1	DO	Iodine amount method GB/T 7489-1987	Burette	0.2mg/L
2	COD_{Cr}	Rapid closed catalytic digestion'Water and wastewater monitoring analysis method' State Environmental Protection Administration 2002	6B-25COD Digestion instrument	5mg/L
3	BOD_5	Dilution inoculation method HJ505-2009	LRH-70 Biochemical incubator	0.5mg/L
4	pH	Glass electrode method GB6920-1986	PHS-3C Microcomputer type pH meter	/
5	Ammonia nitrogen	Spectrophotometric method for sodium Spectrophotometry HJ535-2009	UV759S Ultraviolet visible spectrophotometer.	0.025 mg/L
6	SS	Weight method GB11901-1989	FA2004B Electronic balance	4 mg/L
7	Oil	Infrared spectrophotometry method HJ637-2012	LT-21A Infrared spectrophotometer	0.01mg/L

Figure 4.1-1 Surface water environment status monitoring points

4.1.6.5 Evaluation Standard and Evaluation Method

(1) The evaluation standard

Dongjiang executes the Ⅱ class water quality standards, xudong river executes Ⅲ water quality standards.

(2) Evaluation method

In the light of the environmental impact assessment technical guideline "(HJ/T2.3-93) ,they recommended the single project evaluation method evaluating the water quality parameters. (HJ/T2.3-93) suggested that single evaluation method using standard index method. Let us take single water quality parameter I in the first j point for example, the standard index calculation formula are following.

$$S_{ij}=C_{ij}/C_{si}$$

Type: Sij - individual water quality evaluation factors I in the first j sampling point standard index;

Cij - the concentration of water quality evaluation factors I in the first j sampling points, (mg/L);

Csi - evaluation standard of the evaluation factor I (mg/L)

The pH value of single factor index and the standard index of DO are following.

(1) the pH single factor index press type calculation

$$S_{pH,j} = \frac{(7.0 - pH_j)}{(7.0 - pH_{LL})} \qquad pH_j \leq 7.0$$

$$S_{pH,j} = \frac{(pH_j - 7.0)}{(pH_{UL} - 7.0)} \qquad pH_j > 7.0$$

Type: pH_j - monitoring value;

pH_{LL} - water quality standards specified in the pH of the lower limit;

pH_{UL} - water quality standards specified in the pH of the upper limi

(2) The standard index of DO

$$S_{DO,j} = \frac{|DO_f - DO_j|}{|DO_f - DO_s|} \qquad DO_j \geq DO_s$$

$$S_{DO,j} = 10 - 9\frac{DO_j}{DO_s} \qquad DO_j < DO_s$$

Type: $DO_f = 468 / (31.6 + T)$, mg/L, T is water temperature (℃);

S_{DO}, j - the standard index of dissolved oxygen in the first j sampling point;

DO_f - saturated dissolved oxygen concentration, mg/L;

DO_s - water quality standard of dissolved oxygen on the surface, mg/L;

DOj - rivers in j sampling point of dissolved oxygen concentration.

If the standard index of water quality parameters > 1, it is indicated that the water quality parameters exceed the standard limit of the water quality. This can not meet the functional requirements of water quality. The standard index of water quality parameter is higher, which indicates that the water quality parameter is over standard.

4.1.6.6 Monitoring Results and The Analysis and Evaluation

(1) Monitoring Results

Water quality monitoring results and statistical conditions are shown in table 4.1 3 and table 4.1 4.

Table 4.1 3 Surface water environment quality present situation of monitoring results

(unit: water temperature ℃, pH dimensionless, the rest mg/L)

Monitoring name	Monitoring time	pH	DO	COD_{Cr}	BOD_5	NH_3-N	SS	oil
W1：500m upstream of Xudong river	2014-08-21	7.02	5.2	16.0	3.8	6.68	28	0.02
	2014-08-22	7.04	5.3	15.5	3.8	6.61	25	0.03
	2014-08-23	6.98	5.2	16.2	3.9	6.55	30	0.03
	average	7.01	5.23	15.90	3.83	6.61	27.67	0.03
W2：500m upstream of Xudong river run into the Dongjiang mouth	2014-08-21	7.05	5.1	22.0	4.8	5.26	32	0.04
	2014-08-22	7.10	5.2	23.0	5.1	5.19	29	0.05
	2014-08-23	7.03	5.1	22.5	5.2	5.22	31	0.05
	average	7.06	5.13	22.50	5.03	5.22	30.67	0.05
W3：1500m downstream of Dongjiang river run into Xudong river	2014-08-21	7.80	6.2	11.6	2.4	0.220	11	0.02
	2014-08-22	7.73	6.1	10.2	2.2	0.217	10	0.01
	2014-08-23	7.72	6.3	10.8	2.3	0.224	11	0.01
	average	7.75	6.2	10.87	2.30	0.22	10.67	0.01

Table 4.1-4 Each monitoring section monitoring results evaluation index list

Monitoring name	Monitoring time	pH	DO	CODCr	BOD5	NH3-N	SS	oil
W1：500m upstream of Xudong river	2014-08-21	0.01	0.95	0.80	0.95	6.68	0.93	0.40
	2014-08-22	0.02	0.92	0.78	0.95	6.61	0.83	0.60
	2014-08-23	0.02	0.95	0.81	0.98	6.55	1.00	0.60
	average	0.01	0.94	0.80	0.96	6.61	0.92	0.53
W2：500m upstream of Xudong river run into the Dongjiang mouth	2014-08-21	0.03	0.95	1.10	1.20	5.26	1.07	0.80
	2014-08-22	0.05	0.97	1.15	1.28	5.19	0.97	1.00
	2014-08-23	0.02	0.95	1.13	1.30	5.22	1.03	1.00
	average	0.03	0.957	1.13	1.26	5.22	1.02	0.93
W3：1500m	2014-08-21	0.67	0.72	0.77	0.80	0.44	0.55	0.40

downstream of Dongjiang river run into Xudong river	2014-08-22	0.57	0.71	0.68	0.73	0.43	0.50	0.20
	2014-08-23	0.56	0.73	0.72	0.77	0.45	0.55	0.20
	average	0.60	0.72	0.72	0.77	0.44	0.53	0.27

From table 4.1 4 and 4.1 3, the water quality of dongjiang river is good, the monitoring indexes can reach the surface water environment quality standard "(GB3838-2002) Ⅱ class standards. But Xudong river's pollution is serious, ammonia nitrogen excesses in 5 ~ 6 times, in W2 section, CODcr, BOD5, SS, oil are in the different levels of overweight, in two monitoring cross section , only pH value is not exceeding bid. In W3 monitoring sections, in addition to the dissolved oxygen levels, other water quality factor indexs are all meet the surface water environment quality standard "(GB3838-2002) Ⅱ class standard requirements. Xudong river is rather serious, and the main reason is that xudong river flow across the yantian (dongyuan) industrial transfer park. Due to the municipal sewage pipe network's imperfect, some untreated sewage directly discharged into the xudong river, it caused the chrome of water into polluting. In addition, by the area of farmland, cultivation facilities, agricultural non-point source pollution is also a cause of excess chrome polluted water. Therefore, the project in the process of construction should be strengthened for sludge wastewater treatment and discharge, as far as possible ,to reduce wastewater and pollutants discharging, to reduce the effect of xudong's water quality.

4.1.7 Present Situation of Air Environmental Quality Investigation and Evaluation

In order to understand the main pollution problems of this proposed site area environmental air , to master the air environmental quality of the present situation and the surrounding areas before the construction project is located. The construction unit entrust Shenzhen Suoao testing technology co., LTD on the project area

environmental air monitoring.

4.1.7.1 Monitoring Sites Setting

The direction of the dominant wind in this area is given priority to the north wind, the substandard dominant wind direction for the whole year is given priority to the south wind. There are not obvious atmospheric pollution sources in the evaluation area. Monitoring point is shown in figure 4.1 2 and table 4.1 5.

Table 4.1-5 Monitoring point

number	Monitoring point position	Relative position of project	Coordinate
A1	Meizikeng village	W	23°49'11"N,114°44'27"E
A2	Xu dong village happy village group	NE	23°49'18"N,114°44'27"E

4.1.7.2 Monitoring Project

SO_2, NO_2, CO, TSP, PM_{10}, a total of five, at the same time ,we record wind speed, wind direction, temperature, humidity, atmospheric pressure and other meteorological parameters.

4.1.7.3 Monitoring Time and Frequency

Monitoring time is on August 21, 2014 to August 27, 2014, a total of seven days,for SO_2, NO_2, CO, we monitor hour average 4 times a day, respectively at 2:00, 08:00, 14:00, 20:00. Every time's sampling will not be less than 45 minutes, the daily average monitoring of PM_{10},TSP,will be more than 20 hours a day.

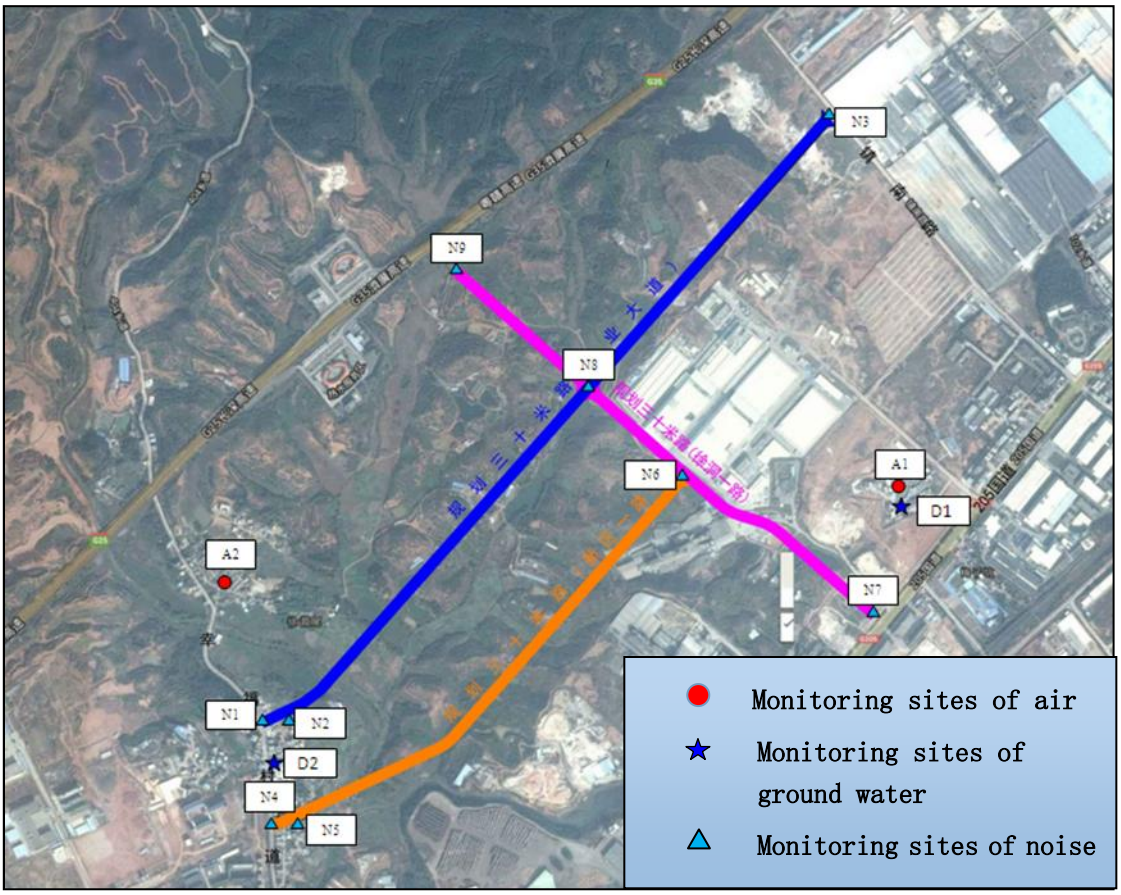


Figure 4.1-2 environmental air, groundwater, environmental noise status monitoring values

4.1.7.4 Monitoring Analysis Method

The sampling and analysis methods of monitoring project are according to the technical specification for environmental monitoring and the air, waste gas monitoring ,analysis method of the relevant provisions which are issued by the national environmental protection bureau. For detailed message,we can see table 4.1-6.

Table 4.1-6 Environmental air monitoring methods, the use of instruments and detection limit

number	Category	Monitoring method	instruments	minimum detection
1	SO_2	Aniline spectrophotometric methodHJ482-2009	UV759S Ultraviolet visible spectrophotometer and spectrophotometer	0.007 mg/m³
2	NO_2	Naphthyl ethylenediamine dihydrochloride spectrophotometric method HJ 479-2009	UV759S Ultraviolet visible spectrophotometer and spectrophotometer	0.015 mg/m³
3	TSP	Weight method GB/T 15432-1995	FA2004B Electronic balance	0.001mg/m³
4	PM_{10}	Ambient air PM_{10} and $PM_{2.5}$ gravimetric method HJ618-2011	FA2004B Electronic balance	0.010mg/m³
5	CO	Non dispersive infrared method GB9801-1988	GXH-3011A1CO Portable infrared ray Gas analyzer	0.125 mg/m³

4.1.7.5 Evaluation Standard and Evaluation Method

The evaluation area of this project belongs to the mixed residential and commercial area, and air environmental function area belongs to the category of ambient air. The present situation of air environmental quality evaluation to perform the ambient air quality standard (GB3095-1996) and its modified single secondary standard. The concrete numerical value is shown in table 4.1-7.

Table 4.1-7 Ambient air quality standard unit: mg/m^3

Contaminants	Value time	Concentration limit mg/m^3	Standard source
SO_2	Annually average	0.06	Environmental air quality standard Quasi（GB3095-1996） and About the release of the environment Air quality standards Modify Single notice
	Daily average	0.15	
	1 hour average	0.50	
NO_2	Annually average	0.08	
	Daily average	0.12	
	1 hour average	0.24	

Contaminants	Value time	Concentration limit mg/m^3	Standard source
CO	Daily average	4.0	（[2000] first）secondary atandard
	1 hour average	10.0	
PM_{10}	Annually average	0.10	
	Daily average	0.15	
TSP	Annually average	0.20	
	Daily average	0.30	
	24 hours average	0.30	

(2) Evaluation method

With the single factor index method for atmospheric environmental quality status assessment, the average concentration range and the standard rate of the monitoring points were statistically. The air pollution index of single air pollution is used for the quality of environment air quality,its computation formula is $P_i = C_i / C_{oi}$.

Type p_i: the quality of the atmospheric pollutants I index;

C_i: I measured value of pollutants, mg/m^3;

C_{oi}: the item I standard value of pollutants, mg/m^3.

4.1.7.6 Monitoring Results and The Analysis ,Evaluation

Atmospheric monitoring results and evaluation are shown in table 4.1-8, table 4.1-9. During the detection of meteorological ,parameters are shown in table 4.1-10, table 4.1 -11.

Table 4.1-8 Present situation monitoring results of atmospheric environment quality unit: mg/m^3

Inspection items / Sampling date		SO_2				NO_2				CO				PM_{10}	TSP
		2:00	8:00	14:00	20:00	2:00	8:00	14:00	20:00	2:00	8:00	14:00	20:00	20h	20h
8 月 21 日	Meizikeng village	0.008	0.009	0.012	0.011	0.019	0.026	0.037	0.034	0.250	0.375	0.625	0.500	0.061	0.132
	Xingfu village	0.010	0.011	0.014	0.012	0.027	0.038	0.043	0.039	0.125	0.375	0.625	0.375	0.064	0.150
8 月 22 日	Meizikeng village	0.010	0.014	0.012	0.011	0.023	0.035	0.041	0.043	0.375	0.625	0.875	0.750	0.077	0.162
	Xingfu village	0.011	0.015	0.016	0.012	0.028	0.041	0.049	0.045	0.250	0.625	0.750	0.500	0.059	0.169
8 月 23 日	Meizikeng village	0.009	0.011	0.015	0.013	0.026	0.042	0.040	0.035	0.250	0.875	0.500	0.500	0.066	0.127
	Xingfu village	0.009	0.012	0.014	0.013	0.023	0.046	0.040	0.041	0.125	0.375	0.875	0.750	0.072	0.147
8 月 24 日	Meizikeng village	0.010	0.012	0.013	0.015	0.021	0.026	0.037	0.04	0.125	0.500	0.625	0.500	0.081	0.133
	Xingfu village	0.011	0.014	0.015	0.013	0.019	0.029	0.037	0.034	0.125	0.500	0.750	0.625	0.069	0.153
8 月 25 日	Meizikeng village	0.010	0.013	0.015	0.013	0.024	0.045	0.042	0.038	0.250	0.375	0.750	0.625	0.070	0.144
	Xingfu village	0.010	0.012	0.014	0.013	0.022	0.034	0.051	0.044	0.125	0.500	0.875	0.625	0.075	0.166
8 月 26 日	Meizikeng village	0.011	0.012	0.016	0.014	0.025	0.032	0.044	0.042	0.125	0.500	0.375	0.750	0.068	0.141
	Xingfu village	0.008	0.010	0.013	0.011	0.020	0.027	0.038	0.033	0.250	0.375	0.625	0.500	0.082	0.156
8 月 27 日	Meizikeng village	0.008	0.014	0.015	0.012	0.023	0.027	0.038	0.033	0.375	0.625	0.875	0.500	0.069	0.152
	Xingfu village	0.009	0.010	0.014	0.012	0.025	0.037	0.045	0.035	0.375	0.500	0.750	0.625	0.074	0.145

Table 4.1-9 status monitoring results of atmospheric environment quality evaluation index list

unit: mg/m^3

Contaminants	Monitoring point	Value time	Concentration range（mg/m^3）	Concentration maximum of the target rate（%）		Excessive rate
				①	②	
SO_2	A1	1 hour average	0.008~0.016	3.2	3.2	0
	A2	1 hour average	0.008~0.016	3.2	3.2	0
NO_2	A1	1 hour average	0.019~0.045	18.8	22.5	0
	A2	1 hour average	0.019~0.051	21.3	25.5	0
CO	A1	1 hour average	0.125~0.875	8.8	8.8	0
	A2	1 hour average	0.125~0.875	8.8	8.8	0
PM_{10}	A1	Daily average	0.061~0.081	54.0	54.0	0
	A2	Daily average	0.059~0.082	54.7	54.7	0
TSP	A1	Daily average	0.127~0.152	50.7	50.7	0
	A2	Daily average	0.143~0.169	56.3	56.3	0

Note: ①Adopt the environmental air quality standard (GB3095-1996) and its modified single secondary standard of evaluation result

②Adopt the evaluation results of the environmental air quality standard (GB3095-2012)

From table 4.1-8, table 4.1-9: the pollutant exceeding standard of each monitoring point in the region was 0, the pollutant concentration can reach the environmental air quality standard (GB3095-1996) and its modified single secondary standard requirements. It also can achieve the secondary standard requirements of the environmental air quality standard (GB3095-2012). The quality of the regional environment is good.

Table 4.1-10 The meteorological parameter list of plum village monitoring

Monitoring date	Detection time	Temperature℃	Air pressure kPa	Humidity%	Wind direction	Wind speed m/s
2014-08-21	02:00-03:00	25	100.2	67.1	southeast	2.3
	08:00-09:00	28	100.1	62.3	southeast	2.0
	14:00-15:00	32	100.0	56.4	southeast	1.8
	20:00-21:00	28	100.1	58.2	southeast	1.9
2014-08-22	02:00-03:00	25	100.2	68.1	south	2.2
	08:00-09:00	29	100.0	63.3	south	2.0

Monitoring date	Detection time	Temperature℃	Air pressure kPa	Humidity%	Wind direction	Wind speed m/s
	14:00-15:00	35	99.8	54.1	south	1.9
	20:00-21:00	30	99.9	56.2	south	1.9
2014-08-23	02:00-03:00	25	100.1	67.0	southeast	2.3
	08:00-09:00	28	100.0	64.2	southeast	2.0
	14:00-15:00	34	99.9	57.1	southeast	1.8
	20:00-21:00	30	100.0	60.5	southeast	2.0
2014-08-24	02:00-03:00	25	100.2	67.1	southeast	2.2
	08:00-09:00	28	100.0	64.4	southeast	1.9
	14:00-15:00	34	99.8	57.2	southeast	1.8
	20:00-21:00	31	99.9	60.5	southeast	2.0
2014-08-25	02:00-03:00	25	100.1	66.8	south	2.2
	08:00-09:00	27	100.0	62.2	south	2.1
	14:00-15:00	35	99.8	56.4	south	1.8
	20:00-21:00	31	99.9	59.7	south	1.9
2014-08-26	02:00-03:00	25	100.3	68.6	south	2.3
	08:00-09:00	28	100.1	64.2	south	2.1
	14:00-15:00	35	99.8	59.1	south	1.9
	20:00-21:00	30	100.0	59.2	south	2.0
2014-08-27	02:00-03:00	25	100.2	66.4	south	2.2
	08:00-09:00	27	100.1	61.1	south	2.0
	14:00-15:00	35	99.8	56.0	south	1.8
	20:00-21:00	31	100.0	58.4	south	1.8

Table 4.1-11 The meteorological parameter list of xudong village and xinfu village group monitoring

Monitoring date	Detection time	Temperature℃	Air pressure kPa	Humidity%	Wind direction	Wind speed m/s
2014-08-21	02:00-03:00	24	100.2	67.1	southeast	2.3
	08:00-09:00	27	100.2	62.3	southeast	2.1
	14:00-15:00	32	100.0	56.4	southeast	1.7
	20:00-21:00	28	100.1	58.2	southeast	1.9
2014-08-22	02:00-03:00	24	100.3	68.1	southeast	2.2
	08:00-09:00	28	100.0	63.3	southeast	2.1
	14:00-15:00	34	99.8	54.1	southeast	1.9
	20:00-21:00	30	99.9	56.2	southeast	1.9
2014-08-23	02:00-03:00	25	100.2	67.0	southeast	2.3
	08:00-09:00	28	100.1	64.2	southeast	2.0

Monitoring date	Detection time	Temperature℃	Air pressure kPa	Humidity%	Wind direction	Wind speed m/s
	14:00-15:00	34	99.9	57.1	southeast	1.8
	20:00-21:00	29	100.0	60.5	southeast	2.0
2014-08-24	02:00-03:00	25	100.2	67.1	southeast	2.2
	08:00-09:00	27	100.0	64.4	southeast	2.0
	14:00-15:00	34	99.8	57.2	southeast	1.8
	20:00-21:00	30	100.0	60.5	southeast	2.0
2014-08-25	02:00-03:00	25	100.1	66.8	southeast	2.2
	08:00-09:00	26	100.0	62.2	southeast	2.1
	14:00-15:00	34	99.8	56.4	southeast	1.8
	20:00-21:00	31	99.9	59.7	southeast	2.0
2014-08-26	02:00-03:00	24	100.3	68.6	southeast	2.3
	08:00-09:00	27	100.1	64.2	southeast	2.2
	14:00-15:00	34	99.8	59.1	southeast	1.9
	20:00-21:00	30	100.0	59.2	southeast	2.0
2014-08-27	02:00-03:00	25	100.2	66.4	southeast	2.2
	08:00-09:00	27	100.0	61.1	southeast	2.0
	14:00-15:00	35	99.8	56.0	southeast	1.8
	20:00-21:00	31	100.0	58.4	southeast	1.9

4.1.8 Acoustic Environment Quality Present Situation and Evaluation

4.1.8.1 Monitoring Points

According to the project by the regional environmental characteristics, noise environment sensitive target and noise pollution status, we select the typical nine sound environment along the sensitive monitoring. We layout 9 points totally, as shown in the table 4.1-12,detailed location is shown in figure 4.1-2.

4.1.8.2 Monitoring Project

L_{eq}、L_{min}、L_{10}、L_{50}、L_{90}、L_{max}.

4.1.8.3 Monitoring Time and Frequency

From 2014.8.21 to 2014.8.22 ,this 2 consecutive days(6:00 ~ 22:00) between day and night (22:00 to 6:00) without construction monitoring around, each monitoring will not be less than 20 minutes.

Table 4.1-12 Acoustic Environment Monitoring Points

number	location	Coordinate	Monitoring points	Noise source
N1	Industrial Avenue starting point	23°48'59"N 114°44'32"E	1	Happiness village road traffic noise monitoring
N2	Happy village 1	23°48'57"N 114°44'34"E	1	Monitor the well-being of village life noise
N3	Industrial Avenue destination	23°49'52"N 114°45'27"E	1	Monitor the industrial noise and traffic noise of the town road from the end of the Industrial Road
N4	New District starting point	23°48'49"N 114°44'35"E	1	Happiness village road traffic noise monitoring
N5	Happy village 2	23°48'48"N 114°44'36"E	1	Monitor the well-being of village life noise
N6	The end of xinqu first road	23°49'8"N 114°45'31"E	1	Monitoring the industrial noise at the end of the New
N7	The end of xudong first road	23°49'7"N 114°45'33"E	1	Monitoring 205 national highway traffic noise
N8	the Intersection of xudong first road and Industrial Avenue	23°49'30"N 114°44'41"E	1	Monitor the industrial noise of the road and Industrial Avenue
N9	The start of xudong first road	23°49'35"N 114°44'52"E	1	Monitoring G35 GuangDongjiangxi high-speed traffic noise

4.1.9 Monitoring Methods and Instruments

Table 4.1-13 Noise monitoring method, use of instruments and detection limit list

Number	Project name	Monitoring method	Instruments	Minimum detection limit
1	noise	Acoustic environment quality standard GB3096 -2008	AWA5610D Integral sound level meter AWA6221B Acoustic calibrator	35（dB）

4.1.9.1 Evaluation Standard and Methods

The project is located in the 2 class sound environment function. Xingfu town road, south town road are the branch of the city, N1 ~ N6, N8 ~ N9 monitoring points are according to the national standard of the People's Republic of China 'the standards for acoustic environmental quality' (GB3096-2008) in 2 class standard (day: 60 db (A); night: 50 db (A)) were evaluated. The 205 national highway is for the traffic trunk line, within the scope of 30 m. The standards for acoustic environmental quality (GB3096-2008) of 4 A class standard (day: 70 db (A); night: 55 db (A)), therefore, N7 is according to the standards for acoustic environmental quality (GB3096-2008) of 4 A class standard.

4.1.9.2 Monitoring Results and the Analysis and Evaluation

Environmental noise monitoring results of Road along the status quo are shown in table 4.1-14

According to the noise monitoring result in table 4.1-14, in addition to the N7 point, other N1 ~ N6, N8 ~ N9 point noise are achieving the standards for acoustic environmental quality (GB3096-2008) 2 class standard day and night. Regional acoustic environmental quality conforms to the standard requirements. The main noise sources of N7 exceed for the 205 national road traffic noise.

Table 4.1-14 Project noise status monitoring results

number	Monitoring location	Monitoring day		Monitoring time	Monitoring result（dB）					
					L_{eq}	L_{10}	L_{50}	L_{90}	L_{min}	L_{max}
N1	Industrial Avenue starting point	2014-08-21	First layer	day(06:00-22:00)	52.5	58.7	51.6	48.5	45.8	62.9
				night(22:00-06:00)	47.1	48.5	40.5	37.5	36.3	65.7
			Second layer	day(06:00-22:00)	52.3	58.5	51.4	48.3	45.6	62.7
				night(22:00-06:00)	46.9	48.3	40.3	37.3	36.1	65.5
			Third layer	day(06:00-22:00)	52.1	58.3	51.2	48.1	45.4	62.5
				night(22:00-06:00)	46.7	48.1	40.1	37.1	35.9	65.3
		2014-08-22	First layer	day(06:00-22:00)	53.4	60.2	52.1	48.9	47.6	68.1
				night(22:00-06:00)	47.8	52.0	45.5	43.5	42.6	55.4
			Second layer	day(06:00-22:00)	53.2	60.0	51.9	48.7	47.4	67.9
				night(22:00-06:00)	47.6	51.8	45.3	43.3	42.4	55.2
			Third layer	day(06:00-22:00)	53.0	59.8	51.7	48.5	47.2	67.7
				night(22:00-06:00)	47.4	51.6	45.1	43.1	42.2	55.0
N2	Happy	2014-08-21	First	day(06:00-22:00)	47.9	/	/	/	/	/

number	Monitoring location	Monitoring day		Monitoring time	Monitoring result（dB）					
					L_{eq}	L_{10}	L_{50}	L_{90}	L_{min}	L_{max}
	village 1		layer	night(22:00-06:00)	43.6	/	/	/	/	/
			Second layer	day(06:00-22:00)	47.7	/	/	/	/	/
				night(22:00-06:00)	43.4	/	/	/	/	/
			Third layer	day(06:00-22:00)	47.5	/	/	/	/	/
				night(22:00-06:00)	43.2	/	/	/	/	/
		2014-08-22	First layer	day(06:00-22:00)	48.2	/	/	/	/	/
				night(22:00-06:00)	44.4	/	/	/	/	/
			Second layer	day(06:00-22:00)	48.0	/	/	/	/	/
				night(22:00-06:00)	44.2	/	/	/	/	/
			Third layer	day(06:00-22:00)	47.7	/	/	/	/	/
				night(22:00-06:00)	43.9	/	/	/	/	/
N3	Industrial Avenue destination	2014-08-21		day(06:00-22:00)	54.8	61.0	53.9	50.8	48.1	65.2
				night(22:00-06:00)	46.6	48.0	40.0	37.0	35.8	65.2
		2014-08-22		day(06:00-22:00)	56.9	63.7	55.6	52.4	51.1	71.6
				night(22:00-06:00)	47.4	49.3	46.2	44.4	43.7	50.6
N4	New District starting point	2014-08-21	First layer	day(06:00-22:00)	50.5	52.5	47.3	46.3	45.4	65.1
				night(22:00-06:00)	48.5	49.9	47.8	46.2	44.7	65.1
			Second layer	day(06:00-22:00)	50.3	52.3	47.1	46.1	45.2	64.9
				night(22:00-06:00)	48.3	49.7	47.6	46.0	44.5	64.9
			Third layer	day(06:00-22:00)	50.0	52.0	46.8	45.8	44.9	64.6
				night(22:00-06:00)	48.0	49.4	47.3	45.7	44.2	64.6
		2014-08-22	First layer	day(06:00-22:00)	51.0	53.1	50.1	48.4	47.7	54.3
				night(22:00-06:00)	47.5	49.8	46.0	44.0	43.2	51.0
			Second layer	day(06:00-22:00)	50.8	52.9	49.9	48.2	47.5	54.1
				night(22:00-06:00)	47.3	49.6	45.8	43.8	43.0	50.8
			Third layer	day(06:00-22:00)	50.5	52.6	49.6	47.9	47.2	53.8
				night(22:00-06:00)	47.0	49.3	45.5	43.5	42.7	50.5
N5	Happy village 2	2014-08-21	First layer	day(06:00-22:00)	52.7	/	/	/	/	/
				night(22:00-06:00)	44.8	/	/	/	/	/
			Second layer	day(06:00-22:00)	52.5	/	/	/	/	/
				night(22:00-06:00)	44.6	/	/	/	/	/
			Third layer	day(06:00-22:00)	52.2	/	/	/	/	/
				night(22:00-06:00)	44.3	/	/	/	/	/
		2014-08-22	First layer	day(06:00-22:00)	53.7	/	/	/	/	/
				night(22:00-06:00)	45.6	/	/	/	/	/
			Second layer	day(06:00-22:00)	53.5	/	/	/	/	/
				night(22:00-06:00)	45.4	/	/	/	/	/

number	Monitoring location	Monitoring day		Monitoring time	Monitoring result（dB）					
					L_{eq}	L_{10}	L_{50}	L_{90}	L_{min}	L_{max}
			Third layer	day(06:00-22:00)	53.2	/	/	/	/	/
				night(22:00-06:00)	45.1	/	/	/	/	/
N6	The end of xinqu first road	2014-08-21		day(06:00-22:00)	43.2	/	/	/	/	/
				night(22:00-06:00)	45.4	/	/	/	/	/
		2014-08-22		day(06:00-22:00)	47.2	/	/	/	/	/
				night(22:00-06:00)	46.3	/	/	/	/	/
N7	The end of xudong first road	2014-08-21		day(06:00-22:00)	**70.7**	/	/	/	/	/
				night(22:00-06:00)	**65.6**	/	/	/	/	/
		2014-08-22		day(06:00-22:00)	**72.8**	/	/	/	/	/
				night(22:00-06:00)	**66.4**	/	/	/	/	/
N8	The Intersection of xudong first road and Industrial Avenue	2014-08-21		day(06:00-22:00)	52.1	/	/	/	/	/
				night(22:00-06:00)	44.5	/	/	/	/	/
		2014-08-22		day(06:00-22:00)	52.2	/	/	/	/	/
				night(22:00-06:00)	45.3	/	/	/	/	/
N9	The start of xudong first road	2014-08-21		day(06:00-22:00)	45.8	/	/	/	/	/
				night(22:00-06:00)	36.4	/	/	/	/	/
		2014-08-22		day(06:00-22:00)	46.8	/	/	/	/	/
				night(22:00-06:00)	37.1	/	/	/	/	/

4.1.10 Present Situation Investigation and Evaluation of Groundwater Environment Quality

4.1.10.1 Monitoring Stations Layout

In order to evaluate the water quality of groundwater in the district, to understand the present situation of the main groundwater pollution and the changing characteristics of groundwater environment ,to provide the basic data for the assessment of groundwater environment. The construction units entrust Shenzhen city suao testing technology co., LTD.to monitor the current situation of the groundwater environment. We lay out 2 monitoring section totally.For detailed we can see table 4.1-15, figure 4.1-2.

Table 4.1-15 Groundwater monitoring points

Num	Monitoring point	Coordinate
D1	Meizikeng village	23°49'28"N,114°44'54"E
D2	Xudong Village Xingfu Village group	23°48'53"N,114°44'36"E

4.1.10.2 Monitoring Project

The monitoring factors include water temperature, ammonia nitrogen, LAS, oil, six valence chromium, lead, iron, pH, total hardness, COD_{Mn}, 10 in total. At the same time, the flow direction, the coordinate of the well, the diameter of the well and the structure of the well are also monitored.

4.1.10.3 Monitoring Time and Frequency

August 21, 2014, 1 days of monitoring, we mine the shallow depth of water (sampling point depth should be within the well water level below 1.0m)

4.1.10.4 Monitoring Methods and Instruments

Groundwater monitoring method, the use of instrument and detection limit are at table 4.1-16.

Table 4.1-16 Groundwater monitoring method,instrument and detection limit

Number	Project name	Monitoring method	Instrument	Detection limit
1	pH	《Standard Test Method for drinking water Sensory and physical indexes》GB/T 5750.4-2006 Glass electrode method	PHS-3C Microcomputer type pH meter	/
2	Total hardness	《Standard Test Method for drinking water Sensory and physical indexes》GB/T 5750.4-2006 Two sodium EDTA titration	Burette	1.0 mg/L
3	Permanganate index	《Standard Test Method for drinking water Organic synthetic index》GB/T5750.7-2006 Acidic / alkaline potassium permanganate titration	Burette	0.05 mg/L

4	Ammonia nitrogen	《Standard Test Method for drinking water Inorganic non metallic target》GB/T5750.5-2006 Spectrophotometric method for sodium Spectrophotometry	UV759S Ultraviolet visible spectrophotometer.	0.02 mg/L
5	lead	《Standard Test Method for drinking water Metal index》 GB/T5750.6-2006 Inductively coupled plasma emission spectrometry	Optima8000 Inductively coupled plasma emission spectrometer	0.001 mg/L
6	iron	Inductively coupled plasma emission spectrometry（ICP-AES 法）《Water and wastewater monitoring analysis method》(the fourth State Environmental Protection Administration 2002）	Optima8000 Inductively coupled plasma emission spectrometer	0.0045 mg/L
7	Six valence chromium	《Standard Test Method for drinking water Metal index》 GB/T5750.6-2006 Two spectrophotometric method for two phenyl carbon	UV759S Ultraviolet visible spectrophotometer.	0.004 mg/L
8	pH	《Standard Test Method for drinking water Sensory and physical indexes》GB/T 5750.4-2006 Glass electrode method	PHS-3CMicrocomputer type pH meter	/
9	oil	Infrared spectrophotometry method HJ637-2012	LT-21A Infrared spectrophotometer	0.01 mg/L

4.1.10.5 Evaluation Criteria and Methods

The project is located in the Dongjiang Heyuan Yuancheng emergency water area (H064416002T04). We carry out evaluating according to the ground water quality standard "(GB / t14848-93) class III standard.

4.1.10.6 Monitoring Results and Analysis and Evaluation

Groundwater quality and water level monitoring results are shown in table 4.1-17, 4.1-18. Seen from the table 4.1-17,we can find where the project is located in ,the regional groundwater quality overall is good, most indexes of water quality can achieve ‘the ground water quality standard’ (GB / t14848-93) class III standards, some indicators such as the pH of plum pit village,the CODMn and ammonia nitrogen of happiness village group are ultra III

standard.

Table 4.1-17 Results of groundwater quality monitoring

(Unit: pH dimensionless, total E. coli group /L, and the remaining mg/L)

Item	Meizikeng village	Xudong village happy village group
Water temperature	25	23.1
pH	**6.12**	6.92
Total hardness	13.2	174
CODMn	0.28	**4.66**
Ammonia nitrogen	0.03	**1.4**
LAS	<0.05	<0.05
oil	<0.01	<0.01
Six valence chromium	<0.004	<0.004
lead	<0.001	<0.001
iron	0.0143	0.0121

Table 4.1-18 Monitoring results of groundwater level

Monitoring point position	Water level	Sidewall structure
Meizikeng village	1.8m	Cement casing
Xudong village happy village group	7.9m	Cement casing

4.1.11 Survey of Ecological Environment Status

4.1.11.1 Land Ecological Status Survey

Due to the destruction of human long-term ,the project where is located within the region of the primary forest vegetation has ceased to exist. The present vegetation are conifers, acacia, eucalyptus and other plantation , a variety of secondary forest and shrub grassland. Vegetation classification can be divided into 6 vegetation types, 36 vegetation types. Mainly include: 1) evergreen coniferous forest consisting mainly of masson pine (Pinus massoniarla) and Chinese fir (Cunninghamia lanceolata). One of the Chinese fir plantation are cultivated, uneven distribution,and masson pine is mainly artificial on-demand or natural seeding and aerial part of natural forest. 2) evergreen broad-leaved forest, the distribution area of 12.24%, is one of the main types of the existing vegetation, and it is one of the main forest stand types for the construction of ecological public welfare forest. 3) evergreen monsoon forest, this is

the secondary forest community, mainly distributed in the mountains, the gully area, the wide geographical distribution of arbor layer composed of more species. 4) the montane elfin forest,which is mainly distributed in the mountain at an altitude of 800 m above, small trees bending, shrubby, small canopy,and the canopy is sparse. Main tree species are Schimasuperba, Gordonia axillaris, Rapanea neriifolia thorn, drop true fragrance, white dragon, highly in 1.4~1.8m. The Bush is Eurya chinensis, tea rice floral and so on. 5) scrub is one of the main types of vegetation in Dongyuan county. The secondary vegetation, after repeated felling of forest, is a stage of vegetation succession. 6) economic forests and fruit trees are mainly distributed around the low mountains, highways and reservoirs. Litchi chinensis. Dimocarpus longan, Prulus salicina , Citrus reticulata, Cmicrocarpa and so on.

The land in the region of the land animals insects have butterflies, dragonflies, earthworms, mosquitoes and so on. Birds are sparrows, doves and so on. Mammals such as rats, mice and so on. We don’t found in large and medium sized mammals. The rare and endangered species of the country were not found during the investigation.The vegetation scenes are shown in figure 4.1-3.

Figure 4.1-3 Vegetation photos in the project area

4.1.11.2 Status Quo of Regional Aquatic Ecology

We use literature survey in the regional aquatic ecological investigation and assessment mainly. We are majoring in the collection of Guangdong Province, Heyuan City Water Department, agriculture department, the relevant environmental impact assessment of scientific research units of Guangdong Province. All the cities along the Dongjiang River fishery part of aquatic ecological survey data over the years in the Dongjiang River Basin , the ecological status of the aquatic regions are described.

1. Plankton

(1) Phytoplankton

According to various historical records, there are a total of 150 genera algae in Dongjiang river,they are belonging to 55 families ,25 orders of 11 classes and 9 doors. The dominant species of the river in the region of the project are: whip like algae, Navicula, Melosira and plume sites. The main species: bloom Microcystis, Pseudomonas Microcystis, Oscillatoria, screw algae, rubber sheath algae, Huang Beizao, eudorina and butted desmids, column drum desmids, Nitzschia closterium, corpus of algal cells, Shuangling algae, straight chain diatoms, needle bar algae, feather Wenzao, ovate algae in, cloth letter diatoms, bridge, algae, Navicula, Hira Sakamo, flat naked algae, swallow angle dinoflagellates, bifurcation cone capsule algae.and so on.

The statistical status of phytoplankton in Heyuan city are in 4.1-19

Table 4.1-19 Algae species composition and quantity in Heyuan section of Dongjiang River

place	total（million）	Biomass（mg/L）	The proportion of each door by quantity（%）			
			Cyanobacteria	Cryptophyta	Dinoflagellate	Golden algae
Heyuan city	0.1858	1.37	6.35	0	0	0
place	total（million）	Biomass（mg/L）	The proportion of each door by quantity（%）			
			Huang algae	Diatom	Barley green algae	
Heyuan city	0.1858	1.37	0	84.25	2.85	

(2) Zooplankton

According to the survey, there are 30 genera of protozoa and 34 genera of rotifers, 22 class of Cladocera genera, and 3 orders of copepods in Dongjiang River Basin. The main species are shell sand worm shell, shell crown borer, changyuan tintinnid, arcella, neck canal base synthetic fleas, long leg body flea, tip frontopsylla, long amount of trunk fleas, bare abdominal fleas, flat straight fleas, eggs flea, microscopic rotifers,crystal car rotifers, abdominal limb rotifers, cone a rotifer, Gaucho rotifers and calanoid, copepod nauplii, no day physical activity. Statistical status of zooplankton in Heyuan city can be seen at table 4.1-20.

4.1-20 The statistics of planktonic animal biomass in Heyuan section of Dongjiang River

Type	Protozoan	Rotifer	Branch angle	Radial foot
Individual number (n/ L)	175	110	1.1	2.2
Biomass (mg/ L)	0.009	0.080	0.010	0.026

2. Benthic

According to records, there are 50 genera and 73 species benthos in Dongjiang basin. The common species are China garden snail, marsh clam, flat screw, shake lines larvae and dragonfly nymph and so on. The statistical status of benthic animals in Heyuan City, we can see table 4.1-21.

4.1-21 Statistics of benthic biomass in Heyuan section of Dongjiang River

Soft animal		Aquatic insects		Link animal		Chitosan		Subtotal	
Density（n/m^2）	Biomass（g/m^2）	Density（n/m^2）	Biomass（g/m^2）	Density（n/m^2）	Biomass（g/m^2）	Density（n/m^2）	Biomass（g/m^2）	Density（n/m^2）	Biomass（g/m^2）
103	80.08	15	0.30	120	1.20	0	0	238	81.58

3. Fish resources

According to records, Dongjiang River Basin have 12 orders, 26 families, 89 genera and 123 species fish. Carps are the most, there are 82 species, 66.66% of the total. Secondly, 15 Perciformes fish, accounted for 12.20%; 13 species of Siluriformes, accounted for 10.57% of the total. According to aquatic organisms for the systematic investigation from the Hydropower Reservoir Fisheries Research Institute of the Dongjiang River, there are carp, grass carp, shad, silver carp, yellow tail dense Bleeker, Spinibarbus, Squaliobarbus curriculus, Hainan culter, southern white turtle and Parabramis pekinensis in Dongjiang river. Most species are carps, accounting for 64.47% of the total number of Dongjiang fish, the main species are following.

(1) the Cyprinidae. The main species are carp, black carp, crucian carp, Guangdong bream, Squaliobarbus curriculus, South tin fish, silver floating.

(2) Cobitidae: the main species are loach, loach Cobitis, Guangxi loach

(3) Beard catfish :the main species are;Hu Zi catfish, Clarias catfish

(4) the dangerous section; Huang Sang fish, long wo fish, big fish with fin length wo

(5) silurid catfish:catfish, Vietnamese catfish

In addition to Cypriniformes.,there are 30 kinds of fish such as perciformes duan hu fish, eel to anguillidae, disc peaceful fish, including economic fish production accounted for 70% of the total amount of fishing. Twentieth Century early sixty's River fishing is nearly 2500, to the beginning of the eighty's is 250, after entering the twenty-first Century is increasingly reduced.

According to the survey, Heyuan section of Dongjiang, the semi migratory fish are silver carp and black carp; migratory fish are: carp, trout, catfish, Japanese eel, Whitehead's Siniperca chuatsi, Alice Tsui mandarin fish, perch, take Ping, shad.

4.1.11.3 Evaluation Results

Due to long-term human’s destruction , native forest vegetation in the site has ceased to exist. The present vegetation are conifers, acacia, eucalyptus and other plantation and a variety of secondary forest and shrub grassland. Vegetation classification can be divided into 6 vegetation types, 36 vegetation types.

In Heyuan section of Dongjiang,the standing crop of algae, which belongs to the

oligoclonal band, the level of cyanobacteria and green algae is relatively average, indicating that nitrogen and phosphorus in water content are quite low.

Some species of rotifer can be as the quality indicator organism, especially different Brachionus spp, is almost pure oligotrophic characteristics, and the genus of Brachionus rotifers is closely related to the nutrient. In Heyuan section of Dongjiang ,we found different Brachionus genera, but brachionus was not found,In a ce rtain sense that the water quality of Dongjiang Heyuan section is good.

The distribution of benthic is on the average, fish species and other domestic major river systems of fish composition characteristics are basically the same, indicating that the present situation of aquatic ecosystem of Dongjiang River is good.

4.2 Social Environment

4.2.1 Social and Economic Situation of Dongyuan County

Dongyuan County has 20 towns (Xian Tang town, lighthouse Town, Luo Hu town, Chuan Tang town, Shun Tian town, Shangguan town, Zeng Tian town, Liu Cheng town, Yi synthetic Town, LAN Kou town, Huang Tian town, ye Tan town, Huang Cun town, Kang He town, Tin Town, Newport Town, Shuangjiang Town, Jian tou town, semi Jiang town, Hui Long town), a nationality township (Zhang Xi Yu Zu township).

There are 142252 households, a population of 569053 people in Dongyuan County. Including 288938 men and 280115 women. The main ethnic is Han, followed by Yu, a population of 8825 people, accounting for 1.5% of the total population of the county.

Dongyuan county government adheres to the implementation of ‘stand ing industrial county, stabling agricultural county, tourism booms county, vigorous expansion of the city, strong education of the county, harmony and stability, and solid this strong base’ this seven strategic. Dongyuan county government takes a new road to industrialization actively, the county planning is divided into three economic area. There are township industrial economic zone along 205 National Road and the highway , focusing on the development of investment, developing foreign oriented economy. East Township is a resource economic zone, focusing on the use of local mineral resources for deep processing, the endogenous development of economy; evergreen Lake Township in the reservoir area is ecological

protection zone, focusing on the development of ecological agriculture, ecological forestry and ecological tourism. To create industrial county, tourism county, ecological county,and in order to create Houfa Dongyuan as the goal, they grab and catch international industry and the industrial transfer opportunities of Pearl River Delta. We vigorously promote the development of economy. And they have made great achievements, the economic construction and social undertakings are remarkable, the the growth rate of years' tax ranked in the forefront of the province's 67 mountainous area county, the six main economic comprehensive indexes score among the highest in Heyuan City.

In 2013, Dongyuan county completed GDP for 86.37 billion yuan, at an increase of 13.0%; 42.75 billion yuan of industrial added value of the whole society, at an increase of 21.1%; 134.5 billion yuan output value of industry, at an increase of 18%. Per capita net income of farmers is 9007 yuan, at a growth of 7.8%, and fixed asset investment is 57.1 billion yuan, at an increase of 22.4%. The local public budget income is 6.03 billion yuan, grew by 27.1%; 9.9 billion yuan of revenue, at an increase of 19%. The public budget revenue of the corresponding level is 1.3 billion yuan. Tax revenue basic will realize the impact of billion yuan, the gross value of industrial output in three industries accounted for 49.4%, occupying a half of the country.

In the year of 2013, Dongyuan county adheres to the market oriented, giving full play to the advantages of ecological resources, creating features vigorously, establishing brands, and eco-tourism, ecological agriculture development are keeping continuing to accelerate.

4.2.2 Social and Economic Situation of Xiantang town

Xiantang town is located in the northeast of Heyuan City,and it is in the seat of the county, 5 kilometers far away from the county. The town has a total area of 164.17 square kilometers, which 10074 mu is arable land with 13 village (home) committee, a number of 28900 people in total. Water and land transportation is convenient in Xian Tang town, the Beijing Kowloon Railway, GuangMeiShan railway, 205 State Road, HeYi Road, East Ring Road, Helong, Guangdong, Jiangxi highway, and Dongjiang River flow from the south to the north, runs through the whole territory. With the Sin Tong railway freight station, location advantage is very outstanding.

Forestry, mineral and water resources are more abundant in Xian Tang town , the main minerals are rare earth, fluorite ore, kaolin, zinc and other including. Kaolin has proven with reserves of more than 3000 million tons, 500 million tons of fluorite ore. Hydropower resources are rich, with a daily water supply of 38000 cubic meter waterworks. There are 1 Dongjiang Hydropower Station, 1 Small Water Conservancy Power Station ,4 secondary reservoir.

In 2012, the town completed a number of 4230.85 million yuan in the gross industrial output value, at an increase of 15.8 percent; 99.671 million yuan in the agricultural total production value ,at an increase of 6.0%; 246.11 million yuan, in taxation at an increase of 31%; and per capita net income of farmers is 8063 yuan, at a growth of 8.6%.

4.3 Survey of Xian Tang New District

4.3.1 Status Quo Land and Planning , Construction Targets

Xian Tang District is located in the west side of the town of Xian Tang in Dongyuan County, Heyuan City. Xu Dong Industrial Park is adjacent to the west, Xian Tang Town core area is on the southeast side, the GuangDongjiangxi expressway is near the northern side. The transportation is convenient, the location condition is better. The planning area located south to state road 205, east to town road, west to the happy village road, north to west road, the total land area is 1 square kilometers.

There are 135.78 hectares of urban construction land area, 44.08% of the total land area, water area. Other land use are 172.22 hectares, 55.92% of the total land area. In the use of other land, woodland area is the largest, 38.37% of the total area. Current situation of land use types of the New District of Xian Tang District is shown in table 4.3-1.

Table 4.3-1 Status of land use in the New District of Xiantang District

number	catagory		Land code	The measure of area（Hectare）	Total land use proportion
1	Total land			308	100.00%
2	Urban construction land			135.78	44.08%
	Among them	Road square land	S1	2.61	0.8%
		Administrative office land	C1	0.33	0.17%
		Commercial land	C2	6.50	2.1%

number	catagory		Land code	The measure of area（Hectare）	Total land use proportion
		Industrial land	M	126.34	41.01%
3	Water and other land			172.22	55.92
	Among them	Water land	E1	21.37	6.93%
		Cultivated land	E2	11.33	3.69%
		Garden plot	E3	9.21	2.99%
		Woodland	E4	118.19	38.37%
		Village construction land	E6	12.12	3.94%

The construction target of the new district is: in response to the county Party committee and government, the seven strategy ‘stand ing industrial county, stabling agricultural county, tourism booms county, vigorous expansion of the city, strong education of the county, harmony and stability, and solid this strong base ’. The aim to promote local economic development, the starting point is to improve their own functions and development needs, and we take superior geographical location and transportation advantages as an opportunity, through reasonable planning. Xiantang District will become functional organization, reasonable way smooth, perfect facilities, service facilities, beautiful environment, with local characteristics and individual identification of the living environment, so it will become the center of the town of high quality demonstration ecological community. In the development of the industry, we are planning to cultivate and developing high technology industry (new energy saving and environmental protection building materials, electronic information materials direction), new materials, new electronic information industry agglomerate in the same area.

The development goal is to build the planning area into a reasonable layout, perfect matching, convenient transportation, beautiful environment city combined with function orientation and development trend of the planning area into the district planning and construction. In the planning of the layout ,we can form a structure of ‘one heart one axis and three corridor four groups’.

(1) Build an integrated service center

In the Planning district center ,we can layout a public service center, form the business center of the planning district, public leisure center and integrated service center, promote the

development of surrounding land and enhance the value

(2) build an integrated service axis

Across the integrated service center, constituting a comprehensive service axis along the new district and commercial mixed land area.

(3) build three landscape corridors

That is, to build the green belt area landscape axis on both sides of Xu Dong Avenue and both sides of 205 National Road , and the area along the river will be the public corridor.

(4) three groups

There are three groups, a commercial group, a municipal service group and an industrial group.

4.3.2 Enterprise Situation Settled and Land use planning

There are some enterprises in the New District, the main are Jinjie Industry Co., Ltd., Heyuan Rotary Cement Co., Ltd., Fertilizer (Heyuan) agricultural materials Co., Ltd., Heyuan xinqiang gas cylinder testing Co., Ltd., lisheng tree lights (Heyuan) Limited company and so on.

According to the Dongyuan County Xiantang District control detailed planning (in October 2013), the land use planning of Xiantang District is mainly based on industrial and commercial land, accounting for 46.99% of planning total land, followed by residential land, accounting for 22.71% of total land area. The land use planning of the new district is shown in figure 4.3-1 and 4.3-2.

Figure 4.3-1 Land use planning map of the new district of cents Tang District

Table 4.3-2 Summary of land use planning in the New District of cents Tong District

number	Land code		Land name	Land area(Million square meter)	Proportion of urban construction land
	large	middle			
1	R		Residential land	70	22.71%
	Among them	R2	Two categories of residential land	12.12	3.93%
		R+C	Commercial and residential land	55.88	18.13%
		R22	Land for public service facilities	2.0	0.65%
2	C		Commercial land	31.85	10.33%
	Among them	C2	Commercial land	31.85	10.33%
3	S		Road square land	27.69	8.98%
	Among them	S1	Road land	27.69	8.98%
4	M		Industrial and commercial land	144.81	46.99%
	Among them	M	Industrial land	48.19	15.63%
		C2+M	Commercial and	96.62	31.36%

			industrial land		
	G		Green land	12.44	4.03%
5	Among them	G1	Public green land	9.0	2.92%
		G2	Production protection green space	3.44	1.14%
6	E		Waters and other land	21.37	6.93%
	Among them	E1	Water land	21.37	6.93%
7	Total land use planning			308	

4.4 Social Environment Impact Assessment and Protective Measures

4.4.1 The Impact Range and Compensation Measures of the Land Acquisition Demolition

(1) The extent of impact

This project has land acquisition and removal work of land acquisition ,without the work of land acquisition and removal , the project in the construction of the initial period, there will have a negative social impact. According to the immigration placement plan which Dongyuan County, Heyuan City Xiantang town use World Bank loan to build economic comprehensive development demonstration town project , in the project ,three roads need to levy Xu Dong village 12.6 mu paddy, 37 mu hilly in Xu Dong village, 2 mu hilly red village, 7.05 mu Xu Dong collective mountain, 22.5 mu collective mountain of HongGuang village; 17 mu pond in Xudong village, 4 mu pond in Hongguang Village. For the collective land , 226.2 mu in total.

The construction of rural residents housing demolition is Xudong Village and Red Village , rural residents in the demolition of housing account to area of 4105 square meters, 14 families, 66 people. Among them, the rural residents housing demolition of Xu Dong village is 2730 square meters, accounted for 66.5% in the total area of the demolition, there are 13 affected households, influence 62 persons, the demolition of housing are hilly land and paddy field next to the fields of temporary housing, no permanent residents and most of the housing has been vacant, only as tools to pile up for storage, does not involve homestead compensation. The need to remove the ground attached include: Fruit 943 (135 litchi tree, 796

longan tree), 300 meters drains, 3000 meters of the tap water pipe, 11 wire rod, 1 irrigation facility, 20 graves.

This project has 3 roads to build,and it affects a total of 34 households, 185 persons. Among them, the collective land expropriation impact 34 households, 185 people; rural housing residents affected 14 households, 66 people; both land acquisition and removal of 14. The project is the basic effect of Xu Dong village, the red village only affected 2 households, 9 people. Xu Dong village affected 32 households, 176 people.

(2) Land requisition compensation measures

Residents who involved in the demolition can get money placement, the allocation of homestead, homestead shares, relocation resettlement grants and other ways of resettlement. Project unit compensate to the property unit for the affected infrastructure and ground attachments ,reconstructed by property rights unit.

For vulnerable groups, we take measures to provide low-cost housing, professional skills training and temporary employment opportunities and other measures for resettlement.

According to the content of the immigration placement plan which Dongyuan County, Heyuan City Xiantang town use World Bank loan to build economic comprehensive development demonstration town project , all immigrants who are influenced in the project are aware of the project, the awareness rate is 100%, and 100% of the immigrant support the implementation of the project and willing to have varying degrees of understanding to the project implementation and demolition and land requisition. 90.9% of immigrants are aware of the compensation for resettlement policy, That the township government and some of the promotion of the village committee is effective ,100% of the immigrants believe that the construction of the project is conducive to the development of the village collective, and another 36.4% of people believe that this benefit the country, 36.4% of people think that benefit individuals.

4.4.2 Social Environment Analysis and Evaluation

In Guangdong Province, this project is established on using the world bank loan to build economic development demonstration town project. Construction of the project will effectively solve the regional infrastructure supporting imperfect, lack the impetus to the

development and investment difficult situation.

On the whole, due to the road construction and investment operations, it will make the area transportation more convenient and thus will effectively promote the people's income levels significantly improved along the region. Also with improvement of the traffic conditions and the people's living standards, communities will continue to rise along the route to the social infrastructure demand. Accordingly, such as transportation, communication, culture, entertainment, education, health will get greater emphasis directly in turn and we will focus on investment and construction, the development of various social undertakings will improve and promote the improvement of the level of people's cultural life. So economy and culture, material and spiritual civilization construction supplement exist side by side and play a part together, and they develop healthily.

5 Environmental Impact Assessment and Environmental Protection Measures

5.1 Analysis on Safeguard Policies of the World Bank

5.1.1 Selection of Safeguard Policies

Firstly, the correlation between the part of WIADP to be financed by the World Bank and its associated works and the safeguard policies of the World Bank is analyzed. The results are shown in Table 5.1-1.

Table5.1-1 Correlation On between XIEDSTP and Safeguard Police of t e h WorId B kk an

Num	Safeguard policies of the World Bank	Correlated or not	Explain
1	Environmental Assessment （OP4.01）	Correlated	Certain impact on surroundings will produced during construction and operation,EIA for the project is needed. Through environmental screening, This project is classified as a Category B
2	Natural Habitats（OP4.04）	Not correlated	项目影响区域无自然保护区，不涉及珍稀濒危物种。
3	Pest management（OP4.09）	Not correlated	本项目不涉及农药的使用和贮存。
4	Indigenous Peoples（OP4.10）	Not correlated	项目影响范围内无少数民族居民
5	Physical Cultural Resources（OP4.11）	Not correlated	项目建设区域不涉及国家、省市级文物保护单位。
6	Involuntary Resettlement（OP4.12）	Correlated	征地影响34户185人，房屋拆迁影响14户66人
7	Forest（OP4.36）	Not correlated	本项目不资助任何涉及对林地、关键栖息地产生重大转换和退化的活动，故本项目不适用林业政策。
8	Safety of Dams（OP4.37）	Not correlated	本项目不涉及大坝。
9	Project III Dlsputed Area（OP7.60）	Not correlated	本项目不涉及有争议地区。
10	Projects on International Waterways（OP7.50）	Not correlated	本项目不涉及国际水道。

5.1.2 Analysis

（1）Environmental Assessment (OP4.01)

Based on the requirements of Environmental Assessment (OP4.01), the World Bank safeguard policy, the scope of the assessment for this project include: potential environmental impact and risk prediction analysis; alternatives analysis, mitigation measures for adverse environmental impacts and guarantee measures of favorable environmental conditions; environmental management and monitoring plan.It is concluded that the proposed project will not pose significant adverse environmental impacts based on the analysis on the type, location, sensitivity, scale, and characteristics and degrees of the potential environmental impacts of this project. This project is classified as a Category B project according to the requirements of environmental screening and classification specified in the Policy OP4.01.

（2）Natural Habitats（OP4.04）

The area of the project is planned for the construction land of the city, and it is not related to the rare earth protection animals and plants in the engineering area, also it does not involve the habitat of the important species.In summary, the World Bank safeguard policy, Natural Habitats (OP4.04) doesn't apply to XIEDTSP

（3）Pest management（OP4.09）

XIEDTSP is a road project,it will not change the local farming methods , not increase the agricultural production in the new crop nor introduced poisoning product or processes of Pest control, according to the the provisions of pest management(OP4.09), the project is not applies to the security policy.

（4）Indigenous Peoples（OP4.10）

It is investigated that no minority in the project area will be impacted by the land acquisition and resettlement of XIEDTSP.

（5）Physical Cultural Resources（OP4.11）

According to the distribution of cultural relics and monuments in Dongyuan county ,also visited the site to verify the investigation,we found there was no cultural relics distributed in the project area.But during construction,Construction Unit should protect the

scene and report to the local cultural relics administrative department immediately,only afer the heritage sites have been identified and the protection measures have been approved by the cultural relics administrative department,construction can be continued.

（6）Involuntary Resettlement(OP4.12)

Two Village of Xudong and Hongguang will be impacted by XIEDSTP,the total area to be acquired for construction of the projecet is about 239.7mu.Land occupied by project are the main types of paddy field, hilly and mountain and the collective public, a small part of the state-owned construction land.185 persons in34 households wiIl be impacted by land acquisition,resettlement including66 persons in 14 households for land acquisition.

It can be seen that the Involuntary Resettlement (OP4.12), the World Bank safeguard policy, applies to this project.

Xiantang Town Government entrusted China Immigration Research Center of Hehai University to prepare a comprehensive Resettlement Action Plan (RAP) in accordance with the OP4.l2 policy in order to completely recover life for the immigrants, adequately compensate the losses, and not lower even improve the quality of life. The details are covered in the RAP. An agency will be entrusted to monitor the implementation of RAP for this project.

（7）Forest (OP/BP 4.36)

XIEDTSP does not grant any activity involving major conversion and degradation of forest land, key habitat and real estate, so the project is not applied to forestry policy(OP/BP 4.36).

（8）Safety of Dams

There is no dams in the project area,the project is not applied to Safety of Dams（OP/BP 4.37）.

（9）Project III Disputed Area(OP/BP 7.60)

XIEDTSP is not located in any known disputed area.

（10）Projects on International Waterways(OP/BP 7.50)

No international waterways are concerned in the irrigated areas of XIEDTSP.

5.2 Analysis of environmental impact factors

5.2.1 Analysis of environmental impact factors during construction period

A large number of earthwork excavation, filling will be produced during the construction of this project, if not timely removal, treatment, which will not only affects the landscape, but also prone to soil erosion in the rainy season.

The project will produce a large amount of earthwork excavation and filling during construction period, if not transported and handed timely, will not only affect the landscape, also prone to soil erosion in the rainy season. In the process of road construction, the main effect on environment include the destruction of vegetation and landscape, soil and water loss and affect the water quality, etc.. In addition, noise, dust, large amount quantity of domestic wastewater and garbage produced by constructors also have certain impact on to the surrounding environment. Among them, some of the effects are permanent, but the others some effects will end up with the accomplish complete of construction, and can be restored by the environmental protection measures.

According to the characteristic of the project and combined with the field investigation, environmental impact identification during the construction are as follows:

(1)The Project will produce a large amount of earthwork excavation and filling during construction period, if not timely transporting and handling not timely, not only affect the landscape, also prone to soil erosion in the rainy season. In the process of road construction, the main influence on environment including the destruction of vegetation and landscape, soil and water loss and affect the water quality, etc.,. in In addition, noise, dust, a quantity of domestic wastewater and garbage produced by constructors also have certain influence to the surrounding environment. Among them, some effect is permanent, some effects will end with the complete of construction, and can be restored by the environmental protection measures.

According to the project characteristic and combined with field investigation, to identify environmental impact during the construction are as follows:

Permanent environmental impact factors

①Reduction of biomass：occupation of the road itself and temporary stacking soil field, construction of the camp structures will cause vegetation destruction and biomass reductioned, which cannot it’s not recovery and , which belongs to the permanent damage, and the temporary stacking soil field, if construction camp caused the destruction of vegetation and the biomass reduction caused by construction campced if the end of the construction can’t get better recovery at the end of the construction, it will also cause permanent damage.

②The change of terrain and geomorphology：The roadbed, pavement construction and slope protection during road construction will cause the permanent changes of the terrain and geomorphology during road construction..

③Occupationpancy of land：Land occupied by road construction is permanent, the land occupied mainly for forest land, garden land, etc.

(1)Temporary environmental impact factors

① Soil erosion：in this project, the easy occurrence of soil erosion of the link include：subgrade excavation and subgrade construction will destroy the original surface structureand other damage to the original surface structure，if not taken perfect protection measures, the bare area of the ground surface enlarge and the temporarybare slag field are bare ，If no perfect protective measures, in the rainy season or rainstorm pronee to produce water and soil erosion.

② Construction dust, asphalt smoke：Construction machinery, the vehicle disturbance to the surface disturbance, will lead to the increaser aises of the dust quantitythe dust amount .of increase. Asphalt smoke is a special factor that affects the environment in the road construction, generally occurs only in the construction period or maintenance period, the impact is relatively transitoryshort.

③ Construction noise：The noise of the construction stage has a large effect on the sensitive points along the route, but the effect of the construction noise is temporary and disappears with the application of the construction period.

④ Waste water：Mainly comes from water and soil erosion caused non-point pollution to water body and domestic wastewater produced by constructors. Because of the project located near Xu Dong River, Xu Dong River import to Dongjiang River merged which is in

the drinking water source protection zones of Dongjiang River, the construction period of water pollution prevention and control should be paid enough attention.

⑤ Solid waste：Including the construction of garbage, life garbage, if handled improper improperlydisposal, the pollution of the environment near the region will be generated. Therefore, strict management measures must be developed to limit the emissions of solid wastes, so that it is not a new pollution source of the regional environment.

⑥ Landscape influence：Subgrade construction level the part of the vegetation, the road construction of roadside slope is one of the main area influence the landscape area. In addition, the disorder of the construction site and the corresponding structures along the way may have some effect on the landscape environment.

⑦Social environment influence：In and out of the Construction of vehicles in and out, the occupancy of the road, will affect the residents' travel along the road. The project of construction vehicles will cause dust pollution, which may reduce the quality of life of residents nearby. In addition the construction noise and traffic noise will affect road on both sides of the residents.

5.2.2 Analysis of environmental impact factors in operation period

① Traffic noise：The project road grade according to the city branch construction standards, less traffic, traffic noise may have impact on sensitive points of the Happiness Village, Meizikeng Village, the Dongyuan County second primary school, the Dongyuan County high school.

② Automobile tail gas：The main pollutants of automobile tail gas include CO, NOx, THC and PAHs, etc. These substances have certain damage to human and animals.

③ Surface water pollution：The operating period of wastewater mainly comes from several aspects：

a) Rainwater takes automobile exhaust harmful substances on the surface of the road and atmospheric particulate matter into the form of surface runoff into the water body.

b) Oily wastewater caused by leakage of oil system of motor vehicle.

c) The toxic and harmful substances contained in the motor vehicle caused by the sudden accident are leaksing into the water body.

④ Vibration

When the motor vehicle is driving on the road, the vehicle’s own vibration will can cause the ground to vibrate of the road and radiate to the road side. The size of the vibration is related to the type of vehicle, speed and pavement condition. The project for the city branch, after the completion of the proposed construction project, the vibration does not generally exceed bid on both sides. Therefore, this report will not take deeperis no more in-depth evaluation of the vibration, only to discuss the measures should be taken measures to discuss.

⑤ Environmental risk

Operation period with the carriage of hazardous and noxious cargo, oil special vehicle exploded, overturned, or leakage events can cause harm to along the water, Xu Dong River merged in the drinking water source protection zones of Dongjiang River, it should make corresponding measures of environmental risk prevention.

5.3 Forecast and assessment of noise environment impact and environmental protection measures

5.3.1 Analysis of Noise Impact During Construction

5.3.1.1 Noise Prediction during construction

Noises in the construction stage mainly represent the interruption of surrounding sensitive points such as resident and schools from traffic noise and noise of construction machines. Major sources of noise in the construction stage are crusher, transport truck, excavator, air compressor and other large construction machines in the process of construction. In accordance with Specification for Environmental Impact Assessment on Highway Construction Project (JTG B03-2006), noise source and strength for construction machines are given in Table 5.3-1.

Table 5.3-1 Noise Value of Construction Machinery (Unit: dB (A))

No.	Type of machinery	Mode	Distance between measuring point and construction machinery (m)	Maximum sound level Lmax
1	Wheel loader	ZL40	5	90
2	Wheel loader	ZL50	5	90
3	Land leveler	PY16A	5	90
4	Vibrating type road roller	YZJ10B	5	86
5	Dual-wheel double vibrating	CC21	5	81
6	Three-wheel road roller	/	5	81
7	Pneumatic tyred roller	ZL16	5	76
8	Bulldozer	T140	5	86
9	Rubber-tyred hydraulic	W4-60C	5	84
10	Paver (UK)	Fifond311 ABGCO	5	82
11	Paver (German)	VOGELE	5	87
12	Generator set	FKV-75	1	98
13	Impacted well drill	Type 22	1	87
14	Crusher	/	5	100

5.3.1.2 Analysis of impact on acoustic environment

1.Noise of construction machines

(1) Pollution source of noise of construction machines and its characteristics

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

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

①Foundation construction: mainly including foundation treatment, foundation roadbed

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

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

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

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

(2) Forecast technique

Approximate noise during construction period can be calculated according to point acoustic source, and calculation formula is as follows:

$$L_{Ap} = L_{P0} - 20 \cdot \lg \frac{r}{r_0} - L_c$$

Where: LAP——Sound level A of acoustic source at forecast position (r m from acoustic source), dB;

Lp0——Sound level A of acoustic source at forecast position (r0 m from reference source), dB;

Lc——Amendment of sound level, as confirmed in HJ2.4-2009 Technical Guidelines for Noise Impact Assessment and HJ/T17247.2-1998 Acoustics—Attenuation of sound during propagation outdoors--Part 2: General method of calculation, including decrement of air absorption and ground reflection and absorption which are detailed as follows:

$$Lc= \alpha /100 \cdot （r-r0）+5 \cdot lg(r/r0)$$

A is air absorption coefficient per hectometer.

For simultaneous operation of more than one piece of equipment, sound level shall be calculated in accordance with the following formula:

$$L_{总} = 10 \log \sum_{i=1}^{N} 10^{Li/10}$$

Where: Ltotal——total sound level through superposition, dB;

Li——sound level of the i sound source.

(3) Forecast result

How noise of single construction machinery or vehicle attenuates is shown in Table 5-1-2.

Table 5.3-2 Forecast Results of Main Construction Mechanical Noise Unit: dB(A)

No.	Distance from construction site / Type of machine	5	10	20	40	60	80	100	150	200	300
1	Wheel loader	90	84	78	72	69	66	65	61	58	55
2	Land leveler	90	84	78	72	69	66	65	61	58	55
3	Vibrating road roller	86	80	74	68	65	62	61	57	54	51
4	Bi-wheel bi-vibrating road roller	81	75	69	63	60	57	55	52	49	46
5	Tri-wheel road roller	81	75	69	63	60	57	55	52	49	46
6	Pneumatic tyre road roller	76	70	64	58	55	52	50	47	44	41
7	Earthmover	86	80	74	68	65	62	61	57	54	51
8	Rubber-tyred hydraulic excavator	84	76	73	71	69	61	57	54	51	49
9	Generator set (2)	84	78	72	66	63	60	59	55	52	49
10	Impact-type well drill	73	67	61	55	52	49	47	44	41	38
11	Crushing machine	100	94	87	79	75	70	67	64	60	57

Note: Noise level at the distance of 5m is actual measured value

(4) Impact analysis

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

Through calculation in Table 5-1-2, when single machine operates, noise of all single machine such as earthmover, excavator and loader at 60m from sound source can be in conformity to standard as sound level no higher than 70dB(A) at boundary of construction site during day time. To achieve a sound level no higher than 55dB (A) as required for night time, construction equipment shall be 200m or more from sound source. Construction noise

of crusher has the most sever impact, requiring a distance of 80m from sound source during day time and such distance should be greater than 300m from sound source to meet the requirement of 70dB(A) during day time and 55dB (A) during night time.

During actual construction process, diversified machines work together frequently and with mutual superposition of radiation from various noise sources, noise level would be higher with larger radiation scope. Rules of superposition value of multiple machinery noises at boundary of construction site are shown in Table 5.3-3.

Table 5.3-3 Rules of Superposition Value of Multiple Machinery Noises at Boundary of Construction Site

Quantity of construction machinery (set)	1	2	3	4	5	6	7	8	9	10
ΔLdB(A)	0	3	4.7	6	7.0	7.8	8.5	9.0	9.5	10

When 10 pieces of construction equipment operate within the site simultaneously, noise value at boundary of the site will increase by 10dB compared to such value when single construction equipment operates (A). On the one hand, mobility of construction machinery may cause distance from noise source close to boundary of construction site at some time frame; on the other hand, due to variation of mechanical equipment combination during each stage of building construction, the extent of impact by noise radiation can be different. The abovementioned situations ultimately result in the difficulty to meet requirements on limiting value Emission Standard of Environment Noise for Boundary of Construction Site.

Seen from field investigation, a number of sensitive spot spread intensively at both sides of the Project including residents, hospitals and schools. Daytime and nighttime construction will disturb normal life and rest for abovementioned dwelling sites, especially noise during nighttime will cause even greater interference which requires corresponding protective and management measures.

As completion of the work, impact by construction noise will no longer exists and adverse impact on environment by construction noise is temporary and short-term.

2.Noise of transport and traffic

During transport process of construction materials and construction spoils of the Project,

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

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

In this project, there are some residents (happy village) in both sides of the edge of the range of 50m，during construction ,these people will be impacted by construction noise (noise in the daytime excessive 22dB). Therefore, some measures should be adopted to mitigate the impact such as high noise construction machine is prohibited operation in night and setting up sound barrier in sensitives(happiness Village) where impacted heavily by noise in daytime.

5.3.2 Analysis of Noise Impact During Operation

5.3.2.1 Noise Level

Noises of road works of the project during the operational period mainly are noises generated by motor vehicles passing on roads, such noises mainly include engine noises, exhaust noises, vehicle vibration noises, machine motion noises, brake noises and frictional noises generated by vehicle wheels and roads, of which engine noises are the main noises sources. The average radiation sound levels for all kinds of vehicles shall be calculated by the following formula in accordance with JTGB03-2006 Specifications for Environmental Impact Assessment of Highways Construction.

Small vehicle: $L_S = 12.6+34.73\lg V_s$;

Middle-size vehicle: $L_M = 8.8+40.48\lg V_m$;

Large vehicle: $L_L = 22.0+36.32\lg V_{L.}$

Whereas: S, M, L represent small vehicle, middle-size vehicle and large vehicle respectively;

Vi—the average running speed for this kind of vehicle(km/h),This calculation uses the design speed, that is, 40km/h.

After calculation, the average radiation grade of vehicle on the pavement of this project is showed in table5.3-4.

Table 5.3-4 Average radiation grade of vehicle for XIEDSTP unit：dB（A）

Vehicle type	Noise level(40km/h)
Small vehicle	71.6
Middle-size vehicle	77.6
Large vehicle	83.7

5.3.2.2 Road traffic noise assessment method

Highway (road) traffic noise prediction mode in Appendix A of Technical Guidelines for Noise Impact Assessment (HJ 2.4-2009) is adopted.

Road traffic noise prediction mode

(1) Prediction mode

①Prediction mode for equivalent sound level of Class i vehicle

$$L_{eq}(h)_i = \overline{(L_{0E})}_i + 10\lg(\frac{N_i}{V_i T}) + 10\lg(\frac{7.5}{r}) + 10\lg[\frac{\psi_1+\psi_2}{\pi}] + \Delta L - 16$$

Where:

$L_{eq}(h)_i$ -Hour equivalent sound level of Class i vehicle. dB(A);

$\overline{(L_{0E})}_i$ -Speed of Class i vehicle is V_i, km/h; Energy with horizontal distance of 7.5m is sound level A, dB(A);

N_i-Hour average traffic flow for Class i vehicle which passes certain prediction point in daytime and nighttime, vehicle/h;

r-distance between road axis to prediction point, m; It is applicable to noise prediction with r＞7.5m.

V_i -Average velocity speed of Class i vehicle, km/h;

T -Time for calculation of equivalent sound level, 1h;

Ψ_1、Ψ_2-Field angle and radian from prediction point to both ends of limited road section, as shown in Fig. 5.3-1.

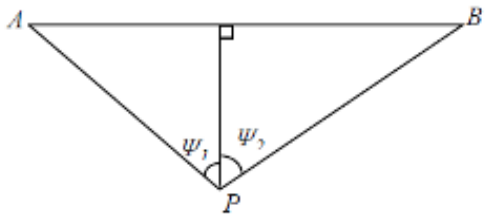


Fig. 5.3-1 Modified Function of Limited Road Section. A-B is Road Section and P is Prediction Point.

ΔL-correction due to other factors, dB(A); It can be calculated according to the following formula:

$$\Delta L=\Delta L_1-\Delta L_2+\Delta L_3$$

$$\Delta L_1=\Delta L_{slope}+\Delta L_{pavement}$$

$$\Delta L_2=A_{atm}+A_{gr}+A_{bar}+A_{misc}$$

Where:

ΔL_1-Correction due to line factors, dB(A);

ΔL_{slope}-Correction of highway longitudinal slope, dB(A);

$\Delta L_{pavement}$-Correction due to pavement material, dB(A);

ΔL_2-Attenuation in route of sound wave transmission, dB(A);

ΔL_3- correction due to reflection, dB(A)

②Equivalent sound level of total traffic flow is:

$$L_{eq}(T)=10\lg\left(10^{0.1L_{eq}(h)_H}+10^{0.1L_{eq}(h)_M}10^{0.1L_{eq}(h)_L}\right)$$

If certain prediction point is influenced by traffic noise of several lines (for example, prediction point near viaduct is influenced by many lanes on and under the bridge. High-rise building prediction point is influenced by many lanes on the ground), sound level of each lane on the prediction point shall be calculated respectively and then the results shall be added to gain the contribution value.

Where:

$L_{eq}(T)$-Hour equivalent sound level of total traffic flow, dB(A);

$L_{eq}(h)_H$、$L_{eq}(h)_M$、$L_{eq}(h)_L$-Hour equivalent sound level of large, middle and small

vehicles, dB(A).

(2) Calculation parameter

①Speed of motor vehicle:

Design speed for the principal line is 40-60km/h and for auxiliary road is 30-40km/h according to feasibility study report of the Project.

②Radiation noise level of single vehicle L_{oi}

Average radiation noise level (dB) L_{oi} of vehicles on reference point (at position of 7.5m) is calculated according to the following formula:

Small vehicle $L_{OS}=12.6+34.73LgVs+\Delta L_{pavement}$

Middle vehicle $L_{OM}=8.8+40.48lgV_M+\Delta L_{longitudinal\ slope}$

Large vehicle $L_{OL}=22.0+36.32lgV_L+\Delta L_{longitudinal\ slope}$

Where: label S, M, L on the lower right corner refers to small, middle and large vehicle.

V_i- average running speed of this type of vehicle, km/h

③Calculation of correction and attenuation

a) Correction (ΔL_1) due to line factors

◆Longitudinal slope correction (ΔL_{slope})

Traffic noise source strength correction ΔL longitudinal slope due to road longitudinal slope shall refer to values of Table 5.3-5.

Table 5.3-5 Corrected Value for Noise Level of Pavement Longitudinal Slope

Longitudinal slope β (%)	≤3	4-5	6-7	＞7
Corrected value [dB(A)]	0	+1	+3	+5

Notes: the table only corrects large and middle vehicles rather than small vehicles.

◆Pavement correction ($\Delta L_{pavement}$)

Noise correction for different pavements is described in Table 5.3-6.

Table 5.3-6 Noise Correction for Common Pavement

Pavement	$\Delta L_{pavement}$
Asphalt concrete pavement	0
Cement concrete pavement	+1~2

Notes: the table only corrects large and middle vehicles rather than small vehicles.

b) Attenuation in route of sound wave transmission (ΔL_2)

◆Barrier attenuation A_{bar}

i) Sound barrier attenuation (A_{bar})

Unlimited sound barrier can be calculated according to the following formula:

$$Abar = \begin{cases} 10\times\lg\left(\dfrac{3\times\pi\times\sqrt{(1-t^2)}}{4\times\tan^{-1}\sqrt{\dfrac{(1-t)}{(1+t)}}}\right) & t=\dfrac{40f\delta}{3c}\le 1 \quad dB \\ 10\times\lg\left(\dfrac{3\times\pi\times\sqrt{(t^2-1)}}{2\times\ln(t+\sqrt{(t^2-1)})}\right) & t=\dfrac{40f\delta}{3c}>1 \quad dB \end{cases}$$

Where:

f-frequency of sound wave, HZ;

δ-sound path difference, m;

c-sound speed, m/s.

Calculation of limited sound barrier:

A_{bar} is still calculated according to unlimited sound barrier attenuation formula and then it shall be corrected according to Fig. 5.3-2. Corrected A_{bar} depends on defilade angle β/θ.

Projection and reflection correction of sound barrier can be calculated according to HJ/T90. Limited

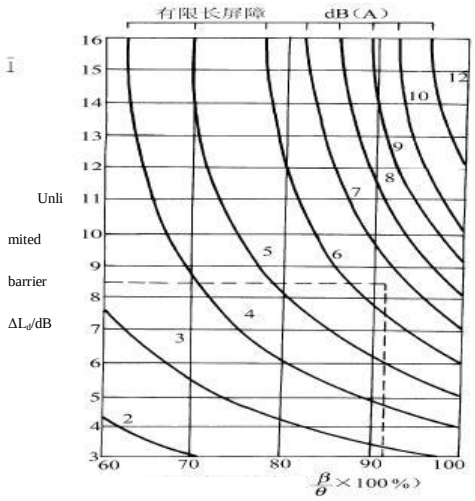


Fig. 5.3-2 Sound Barrier with Limited Length and Correction of Linear Sound Source

ii) Attenuation calculation for sound shadow area beside high embankment or low cutting

Sound shadow area attenuation A_{bar} beside high embankment or low cutting is the additional attenuation incurred by prediction point in sound shadow area beside high embankment or low cutting.

When prediction point is located in sound emission area, $A_{bar}=0$

When prediction point is located in sound shadow area, A_{bar} is decided by sound path difference δ.

Calculate sound path difference δ (δ=a+b-c) according to Fig. 5.3-3, then calculate Fresnel number N. Then calculate A_{bar} according to above formula.

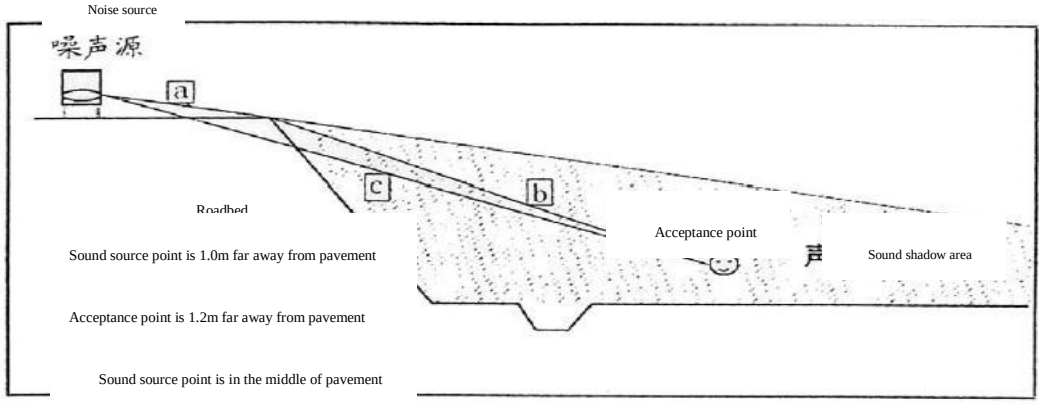


Fig. 5.3-3 Schematic Diagram for Sound Path Difference Calculation

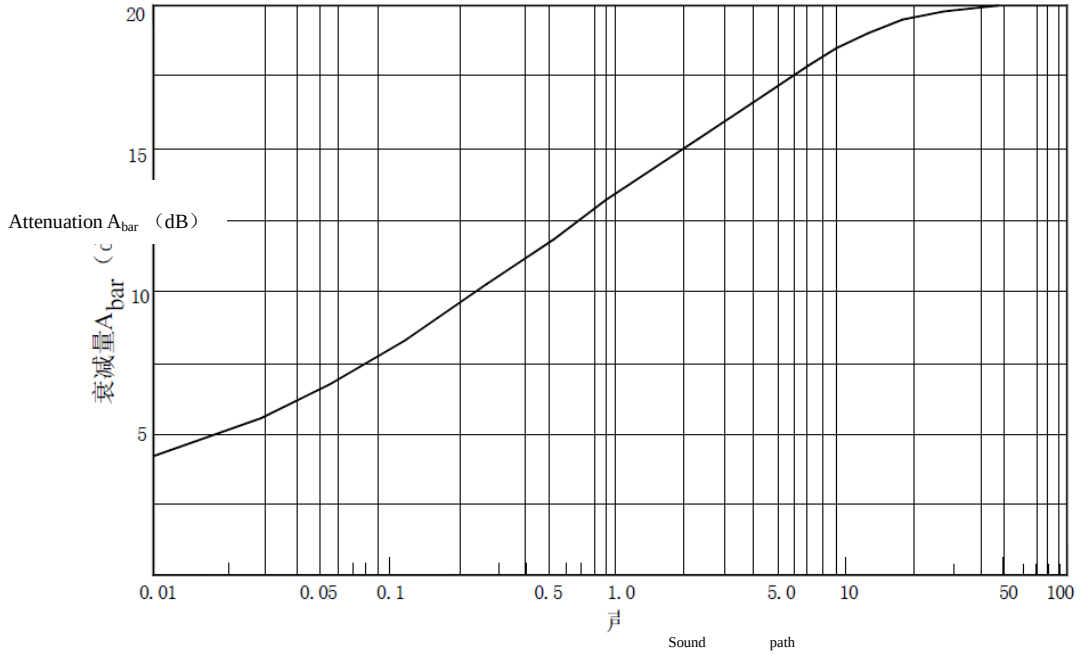
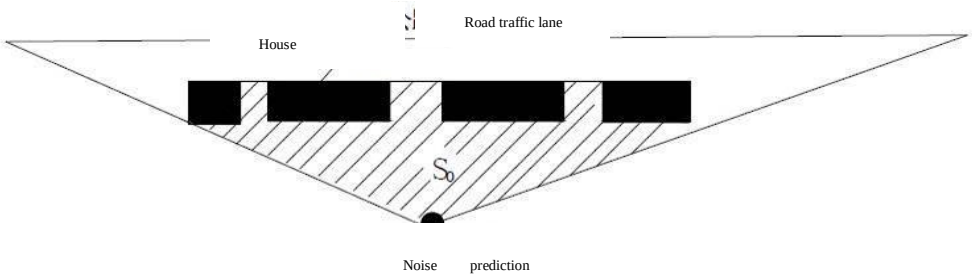


Fig. 5.3-4 Relation Curve between Noise Attenuation A_{bar} and Sound Path Difference δ (f=500Hz)

iii) Additional attenuation prediction of rural house

Rural house attenuation can be calculated according to Appendix A, GB/T17247.2. approximate calculation can refer to values in Fig. 5.3-5 and Table 5.3-17 within sound shadow area scope for first row of houses along highway.



S is the area sum of first row of houses. S_0 is area of dash area (including floor area)

Fig. 5.3-5 Schematic Diagram for Rural House Noise Reduction Prediction

Table 5.3-7 Estimation for Additional Attenuation of Rural House Noise

S/S0	Abar
40-60%	3dB(A)
70-90%	5dB(A)
Once a row of house is added	1.5dB(A) Maximum attenuation ≤10dB (A)

iv) Green belt noise attenuation calculation

Additional attenuation of green belt is related to varieties of trees, belt structure and density. Green belt near sound source or near prediction point or both above conditions can reduce sound wave, as shown in Fig. 5.3-6.

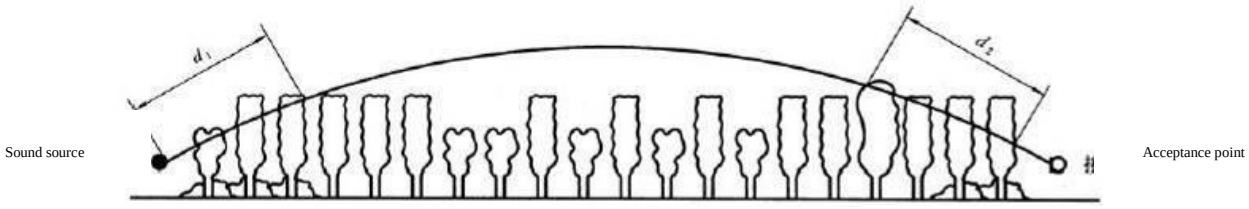


Fig. 5.3-6 Noise Attenuation Diagram through Trees and Shrubs

Attenuation of noise which transmits through leaf increases along increase of leaf transmission distance. $d_f=d_1+d_2$. In order to calculate d_1 and d_2, radius of curve path can be supposed to be 5km.

First line in Table 5.3-18 shows attenuation due to dense leaves when the noise goes through the dense leaves with total length between 10m and 20m. The second line shows attenuation coefficient when the noise goes through the dense leaves with total length between 20m and 200m. When dense leave path length is over 200m, attenuation value for 200m can be used.

Table 5.3-8 Attenuation When Octave Frequency Band Noise Goes Through Dense Leaves

Item	Transmission distance (m)	Central frequency of octave frequency band (Hz)							
		63	125	250	500	1000	2000	4000	8000
Attenuation (dB)	10≤df＜20	0	0	1	1	1	1	2	3
Attenuation coefficient (dB/m)	20≤df＜200	0.02	0.03	0.04	0.05	0.06	0.08	0.09	0.12

◆Attenuation due to air absorption (A_{atm})

Attenuation due to air absorption is calculated according to the following formula:

$A_{atm}=a(r-r_0)/1000$

Where: a is function of temperature, humidity and frequency of sound wave. Corresponding air absorption coefficient is selected according to average temperature and humidity of the area where construction project is located in prediction calculation. See Table 5.3-9.

Table 5.3-9 Air Absorption Attenuation Coefficient α of Octave Frequency Band Noise

Temperature ℃	Relative humidity %	Air absorption attenuation coefficient α							
		Central frequency of octave frequency band Hz							
		63	125	250	500	1000	2000	4000	8000
10	70	0.1	0.4	1.0	1.9	3.7	9.7	32.8	117.0
20	70	0.1	0.3	1.1	2.8	5.0	9.0	22.9	76.6
30	70	0.1	0.3	1.0	3.1	7.4	12.7	23.1	59.3
15	20	0.3	0.6	1.2	2.7	8.2	28.2	28.8	202.0
15	50	0.1	0.5	1.2	2.2	4.2	10.8	36.2	129.0
15	80	0.1	0.3	1.1	2.4	4.1	8.3	23.7	82.8

◆Ground effect attenuation (A_{gr})

Ground type can be divided into:

i) Firm ground, including paved road surface, water surface, ice surface and punning road.

ii) Loose ground, including ground covered by grass or other plants and ground suitable for growth of plants such as farmland.

iii) Mixture ground which is made up of firm ground and loose ground.

When sound wave is transmitted across the ground, or most of the ground is mixture ground with loose ground, under the premise that only A sound level is calculated in prediction point, octave frequency band attenuation due to ground effect can be calculated according to the following formula:

$$A_{gr}=4.8-(\frac{2h_m}{r})\left[17+\frac{300}{r}\right]$$

Where:

r-distance between sound source and prediction point, m;

h_m-average terrain clearance of travel path, m; it can be calculated according to Fig. 5.3-7, h_m=F/r;

F: area, m^2; r, m.

If negative value appears in A_{gr} calculation, A_{gr} can be replaced by "0".

For other conditions, calculation can refer to GB/T17247.2.

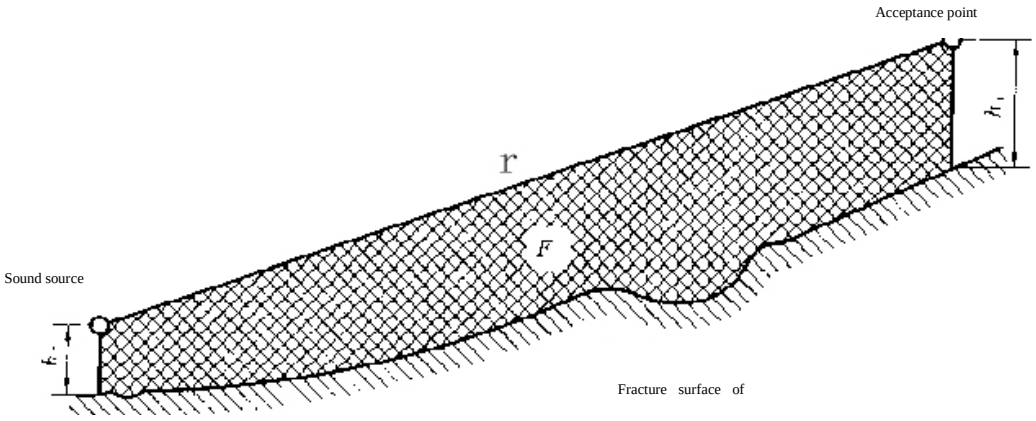


Fig. 5.3-7 Method to Estimate Average Height h_m

◆Attenuation due to other reasons

Attenuation due to natural condition (such as wind, temperature gradient, mist) change will not be taken into consideration generally.

c) Correction due to reflection (ΔL_3)

◆Urban crossroad noise (impact) correction

Noise correction (additional value) of crossroad is in Table 5.3-10.

Table 5.3-10 Noise Addition in Crossroad

Distance between point influenced by noise and intersection of nearest fast traffic lane axis	Crossroad (dB)
≤40	3
40＜D≤70	2
70＜D≤100	1
＞100	0

◆Reflection correction of buildings on both sides

Reflection of landform and buildings on both sides of sound source influences correction of factors. When distance between both sides of line is less than 30% of total

calculation height, the reflection correction is:

When buildings on both sides are reflectors: $\Delta L_{reflection}=4H_b/w$ $\leq 3.2dB$

When buildings on both sides are general absorptive surface: $\Delta L_{reflection}=2H_b/w$ $\leq 1.6dB$

When buildings on both sides are total absorptive surface: $\Delta L_{reflection}\approx 0$

Where:

w-distance between reflection surface of buildings on both sides of line, m

H_b-average height h of structures. Average value of the lower height on both sides shall be used in the calculation, m.

④Traffic flow and day-night ratio

Different traffic volume and day-night ratio results of different road sections in each prediction year are in Table 3,。7-4.

Ambient noise level calculation mode

Calculation formula for ambient noise prediction $(LAeq)_{prediction}$ at calculation prediction point is:

$$(LAeq)_{prediction}=10lg[10^{0.1(LAeq)traffic}+10^{0.1(LAeq)background}]$$

Where: $(LAeq)_{prediction}$-ambient noise prediction of prediction point, dB(A);

$(LAeq)_{traffic}$-road traffic noise of prediction point, dB(A);

$(LAeq)_{background}$-ambient noise background value of prediction point, dB(A).

Parameter selection

The Forecast parameters of XIEDSTP is showed in table 5.3-11。

Table5.3-11 The Forecast parameters of XIEDSTP

Num	parameter	Parameter sense	Value	Explain
1	$(\bar{L}_{0E})_i$	Reference energy mean radiation level of Class Ⅰ（dB (A)）	See table 3.2-3	According to project analysis
2	N_i	Number o f car class Ⅰ passed through specific point within specific time per / hour	See table2.9-4	According to project analysis
3	V_i	Average speed of car class Ⅰ	40km/h	Design speed

Num	parameter	Parameter sense	Value	Explain
4	T	Time of equivalent sound level calculation ， h	1	Requirements of forecast mode
5	ΔL_1	Longitudinal slope correction dB (A)	Xudongyi Road:Large/middle/little=1.5/1.1/0.8 ,Industry Road and Xinquyi Road:Large/middle/little=0.98/0.73/0.50	The largest longitudinal slope of Xudongyi Road is 1.5%，Industry Road and Xinquyi Road is 1.0%
		Pavement correction dB (A)	1.5	Asphalt concrete pavement
	ΔL_2	Acoustic shadow fading caused by cutting	0 dB（A）	All the sensitive points are located in the sound area of the project.
		Housing addition decline	considering when Predict	The first row of sensitive buildings is 0, and the rear building attenuation is dB 3~5 (A)
		Forest attenuation	0 dB（A）	Do not consider
		Attenuation of surface effect	Calculate by formula	There are loose ground of farmland, grassland, fish ponds and so on along the road
		Air absorption attenuation	Calculate by formula	a=2.8
	ΔL_3	Reflection sound correction for buildings	0 dB（A）	The reflection correction of the buildings is not considered

5.3.2.3 Prediction and Assessment of Traffic Noise

1、预测内容

（1）Prediction of Road Traffic Noise

The proposed road operation period of 2016, 2021, 2027, The traffic noise forecast results of proposed roads in 2016, 2021, 2027 shows in table 5.3-12.

（2）Noise Prediction of Sensitive Points

The relationship between buildings and road of XIEDSTP is as follows.

①Xingfu Village：Located on both sides of west of Industrial Road and New Road , the

nearest distance between residential buildings and center line of Xinquyi road,and Industrial Avenue respectively is 25m, 27m.

②The Second Primary School of Dongyuan:Locate on west of Xingfu Village Road,the nearest distance from Xinquyi Road is 135m;

③High School of Dongyuan:Locate on west of Xingfu Village Road,the nearest distance from Xinquyi Road is 85m;

④Meizikeng Village：Locate on east of Xudongyi Road,the nearest distance from Xudongyi Road is125m;

Predicted value of traffic noise contribution and environmental noise prediction (overlapping the background noise) in year2016,year2021,year2027 of four sensitive points within evaluation range is showed in Table5.3-13

Table5.3-12（a） Prediction results of traffic noise contribution of the two sides of Xudongyi Road Unit：dB(A)

预测时段		Distance from the central line of the proposed road (m)													
		20	30	40	50	60	70	80	90	100	120	140	160	180	200
Recent 2016	Day	60.11	56.22	54.08	52.63	51.53	50.64	49.90	49.26	48.70	47.74	46.93	46.24	45.63	45.08
	Night	57.29	53.40	51.26	49.81	48.71	47.82	47.08	46.44	45.88	44.92	44.11	43.42	42.81	42.26
	Peak	62.35	58.46	56.32	54.87	53.77	52.88	52.14	51.50	50.93	49.97	49.17	48.48	47.87	47.32
medium 2021	Day	61.66	57.77	55.63	54.18	53.08	52.19	51.45	50.81	50.25	49.29	48.49	47.79	47.18	46.64
	Night	58.50	54.61	52.48	51.02	49.93	49.04	48.30	47.67	47.10	46.15	45.35	44.66	44.06	43.51
	Peak	63.90	60.01	57.87	56.42	55.32	54.43	53.69	53.05	52.49	51.53	50.72	50.03	49.42	48.88
forward 2027	Day	63.33	59.44	57.30	55.84	54.74	53.86	53.12	52.48	51.91	50.95	50.15	49.46	48.85	48.30
	Night	60.42	56.54	54.40	52.95	51.86	50.98	50.24	49.61	49.05	48.10	47.31	46.62	46.02	45.49
	Peak	65.57	61.68	59.54	58.09	56.99	56.10	55.36	54.72	54.16	53.20	52.39	51.70	51.09	50.54

Table5.3-12（b） Prediction results of traffic noise contribution of the two sides of Industry Avenue Unit：dB(A)

Forecast period		Distance from the central line of the proposed road (m)													
		20	30	40	50	60	70	80	90	100	120	140	160	180	200
Recent 2016	Day	59.10	55.21	53.07	51.61	50.51	49.63	48.89	48.25	47.68	46.72	45.92	45.23	44.62	44.07
	Night	56.29	52.40	50.26	48.81	47.71	46.82	46.08	45.44	44.88	43.92	43.11	42.42	41.81	41.26
	Peak	61.34	57.45	55.31	53.86	52.76	51.87	51.13	50.49	49.93	48.97	48.16	47.47	46.86	46.31
medium 2021	Day	60.61	56.72	54.58	53.13	52.03	51.14	50.40	49.76	49.20	48.24	47.43	46.74	46.13	45.58
	Night	57.56	53.67	51.53	50.08	48.98	48.10	47.36	46.72	46.16	45.20	44.40	43.72	43.11	42.57
	Peak	62.84	58.96	56.82	55.36	54.26	53.38	52.63	51.99	51.43	50.47	49.67	48.98	48.37	47.82
forward 2027	Day	62.30	58.41	56.27	54.82	53.72	52.84	52.09	51.45	50.89	49.93	49.13	48.43	47.82	47.28
	Night	59.43	55.54	53.41	51.96	50.86	49.98	49.24	48.61	48.05	47.10	46.31	45.63	45.03	44.49
	Peak	64.54	60.65	58.51	57.05	55.95	55.07	54.33	53.69	53.12	52.16	51.36	50.67	50.06	49.51

Table5.3-12（c） Prediction results of traffic noise contribution of the two sides of Xinquyi Road Unit：dB(A)

Forecast period		Distance from the central line of the proposed road (m)													
		20	30	40	50	60	70	80	90	100	120	140	160	180	200
Recent 2016	Day	58.85	54.96	52.82	51.36	50.26	49.38	48.63	47.99	47.43	46.47	45.67	44.98	44.37	43.82
	Night	55.61	51.72	49.58	48.13	47.03	46.14	45.40	44.76	44.20	43.24	42.43	41.74	41.13	40.58
	Peak	60.96	57.08	54.94	53.48	52.38	51.50	50.75	50.11	49.55	48.59	47.79	47.09	46.48	45.94
medium 2021	Day	60.19	56.31	54.17	52.71	51.61	50.73	49.98	49.34	48.78	47.82	47.02	46.33	45.72	45.17
	Night	57.36	53.47	51.33	49.88	48.78	47.90	47.16	46.52	45.96	45.00	44.20	43.52	42.91	42.37
	Peak	62.54	58.66	56.52	55.06	53.96	53.08	52.33	51.69	51.13	50.17	49.37	48.68	48.07	47.52
forward 2027	Day	61.98	58.09	55.95	54.49	53.39	52.51	51.77	51.13	50.56	49.60	48.80	48.11	47.50	46.95
	Night	58.97	55.09	52.95	51.50	50.41	49.53	48.79	48.15	47.60	46.64	45.85	45.17	44.57	44.03
	Peak	64.15	60.26	58.12	56.67	55.57	54.68	53.94	53.30	52.74	51.78	50.98	50.28	49.67	49.13

Table5.3-13 Noise forecast results of the proposed road Unit：dB(A)

Num.	Section	Sensitive points	①Nearest distance from the central line of the proposed road ②The nearest distance from the road lane line	floor	Standard	Time	Background value	Year2016			Year2021			Year2027		
								Contribution value	Stacking value	superscale	Contribution value	Stacking value	superscale	Contribution value	Stacking value	superscale
1	Start point of Industry Avenue and Xinquyi Road	Xingfu Village	The first row of Monitoring point N1 ①27②18	First floor	Class 2	Day	53.0	56.10	57.83	Standard	57.61	58.90	Standard	59.30	60.21	0.21
						Night	47.5	53.29	54.31	4.31	54.56	55.34	5.34	56.43	56.95	6.95
				Second floor	Class 2	Day	52.8	55.90	57.63	Standard	57.41	58.70	Standard	59.10	60.01	0.01
						Night	47.3	53.09	54.11	4.11	54.36	55.14	5.14	56.23	56.75	6.75
				Third floor	Class 2	Day	52.6	55.60	57.36	Standard	57.11	58.43	Standard	58.80	59.73	Standard
						Night	47.1	52.79	53.83	3.83	54.06	54.86	4.86	55.93	56.46	6.46
			The first row of Monitoring point N2 ①27②18	First floor	Class 2	Day	48.1	56.10	56.74	Standard	57.61	58.07	Standard	59.30	59.62	Standard
						Night	44.0	53.29	53.77	3.77	54.56	54.93	4.93	56.43	56.67	6.67
				Second floor	Class 2	Day	47.9	55.90	56.54	Standard	57.41	57.87	Standard	59.10	59.42	Standard
						Night	43.8	53.09	53.57	3.57	54.36	54.73	4.73	56.23	56.47	6.47
				Third floor	Class 2	Day	47.6	55.60	56.24	Standard	57.11	57.57	Standard	58.80	59.12	Standard
						Night	43.6	52.79	53.28	3.28	54.06	54.43	4.43	55.93	56.18	6.18
			The first row of Monitoring point N4 ①25②16	First floor	Class 2	Day	50.8	56.54	57.57	Standard	57.89	58.67	Standard	59.67	60.20	0.20
						Night	48.0	51.11	52.84	2.84	55.05	55.83	5.83	56.67	57.22	7.22
				Second floor	Class 2	Day	50.6	56.34	57.37	Standard	57.69	58.47	Standard	59.47	60.00	Standard
						Night	47.8	50.91	52.64	2.64	54.85	55.63	5.63	56.47	57.02	7.02
				Third floor	Class 2	Day	50.3	56.04	57.07	Standard	57.39	58.17	Standard	59.17	59.70	Standard
						Night	47.5	50.61	52.34	2.34	54.55	55.33	5.33	56.17	56.72	6.72
			The first row of Monitoring point N5	First floor	Class 2	Day	53.2	56.54	58.19	Standard	57.89	59.16	Standard	58.85	59.90	Standard
						Night	45.2	51.11	52.10	2.10	55.05	55.48	5.48	56.67	56.97	6.97
1	Start point of Industry Avenue and Xinquyi Road	Xingfu Village	The first row of Monitoring point N5 ①25②16	Second floor	Class 2	Day	53.0	56.340	57.99	Standard	57.69	58.96	Standard	58.65	59.70	Standard
						Night	45.0	50.910	51.90	1.90	54.85	55.28	5.28	56.47	56.77	6.77
				Third floor	Class 2	Day	52.7	56.040	57.69	Standard	57.39	58.66	Standard	58.55	59.55	Standard
						Night	44.7	50.610	51.60	1.60	54.55	54.98	4.98	56.17	56.47	6.47
2		The Second Primary	Nearest teaching building ②135	Using value of monitoring point N5	Class 2	Day	53.2	45.860	53.94	Standard	47.21	54.18	Standard	48.99	54.60	Standard
						Night	45.2	40.410	46.44	Standard	44.39	47.82	Standard	46.04	48.65	Standard
3		Senior Middle School	Nearest teaching building②85			Day	53.2	48.300	54.42	Standard	49.65	54.79	Standard	51.44	55.42	Standard
						Night	45.2	42.860	47.20	Standard	46.83	49.10	Standard	48.46	50.14	0.14
4	Final point of Xudongyi Road	Meizikeng Village	First row of buildings①125②116	Calculated according to N7 point data	Class 2	Day	53.7	47.520	54.64	Standard	49.07	54.99	Standard	50.74	55.48	Standard
						Night	47.9	44.500	49.53	Standard	45.82	49.99	Standard	46.72	50.36	0.36

2 Analysis of road traffic noise results

Contribution to the proposed road traffic noise prediction results were shown in table 5.3-12（a）~5.3-12（c）. Due to the traffic volume，There are some differences between the forecast years of the operating period and the forecast period of the traffic noise. With the increase of traffic flow, the noise has become increasingly serious.

Through the prediction results , we can see that in the absence of preventive measures, no shade building, without background noise, refer to the standards of class 2 in"Sound environment quality standards"（GB3096-2008），This project recently, mid, and long-term three road in the distance on both sides of the road red line 10 meters range all can meet the standard at daytime；Recently, mid, and long-term within 85 meters on both sides of the road red line will exceed the standard at night，Therefore, after the completion of the project ,it will have certain influence on along t residents on both sides of the line of the night, certain precautions should be taken for sensitive points along the line to reduce the project after the completion of the traffic noise impact.

3 Analysis of the noise result of sensitive point

Planned roads along the sensitive noise prediction results are shown in table 5.3-13.

From the table, it can be seen that affected by the status of happiness village road traffic noise, happiness Village Industrial Avenue, the new road and happiness Village Road intersection of the first row of buildings, long-term daytime excessive noise, superscalar around 0.2db(A). While happiness village　near, far away from the happiness village road well-being in the long term, daytime noise could reach the standard, the first row of buildings near the proposed road in happiness village, the noise at night, medium and long-term are overweight, superscalar is between 2.10 ~ 7.22 db(A).

The second primary school of Dongyuan and The senior middle school of Dongyuan recently, long-term daytime and nighttime noise are standard; of Dongyuan late night noise slightly exceeded (exceeding 0.14 dB (a)), the rest can meet the standard.

Meizikeng Village, the first row of buildings' medium and long-term daytime noise can meet with the standard, late night noise slightly overweight, superscalar 0.36db (a).

Combined with the results of table 5.3-12 and table 5.3-13, the distance statistics of the road characteristics are shown in table 5.3-14.

Table 5.3-14 The statistical table of all the characteristics of the proposed road from the standard distance

Forecast section	Forecast time	Distance from the center line of the standard distance (meter)		
		2016	2021	2027
1、Xu Dong Road	Daytime	>25	>30	>35
	Night	>60	>80	>120
2、Industrial Avenue	Daytime	>20	>25	>30
	Night	>50	>65	>90
3、New district Road	Daytime	>20	>25	>30
	Night	>45	>60	>80

5.3.3 Prevention and control measures of noise pollution

5.3.3.1 Prevention and control measures of noise pollution during construction period

Forecast result shows：The noise produced during the construction exceeds "the noise standard of the construction field", although road construction noise is inevitable, but to reduce the impact of noise on the surrounding environment, especially to reduce its influence on the sound environment sensitive. Therefore, the construction unit shall be strictly in accordance with "the law of the people's Republic of China environmental noise pollution prevention law "and "the Guangdong province implementation of "the law of the people's Republic of China environmental noise pollution prevention law" measures "(revised 2004) requirements of the construction and from the following several aspects of the hands, take appropriate measures to mitigate the impact of the noise.

"the Guangdong province implementation of "the law of the people's Republic of China environmental noise pollution prevention law" measures "(revised 2004) the relevant construction noise provisions:

Fifteenth, in the noise sensitive buildings concentrated area, the construction units have serious noise nuisance and by the deadline of governance, it still can’t eliminate the environmental noise pollution of industrial production project unit must be in an

administrative punishment, Consultation with the units and residents contaminated by their pollution, adjust production operation time and other compensation measures, and the agreement will be reached to the location of the environmental protection administration department for the record.

Seventeenth, in the urban construction using mechanical equipment, the construction unit that may produce environmental noise pollution should apply for the noise discharge license.

Fails to submit the noise emission permits, construction administrative departments shall not be issued to permit the construction project; construction administrative departments should will provide the engineering project construction permit to inform the competent administrative department of environmental protection at the same level.

Eighteenth, in the urban area, if the construction noise exceeds the state standard, and the environmental protection administrative department can limit its working time.

Nineteenth, urban areas within the limits of using concrete mixer.

Twentieth, in the area of city noise sensitive building, the construction operation is forbidden in the night except for the repair and rescue operation. Near the construction of residential construction, construction units should take isolation measures to reduce noise pollution.

Twenty-first, this project prohibits the use of steam piling machine, hammer pile machine during the construction of the urban area. Affected by the geological and topographical conditions, if it is really necessary to use ,then must be approved by the competent departments of Environmental Protection Administration, and the construction job location must reported, the operating time must be limited at 7 o'clock to 12, 14 to 20.

Noise pollution control measures in construction period are as follows:

The Prevention and control measures of noise pollution during construction period

(1)In the construction arrangement, transportation plan, layout and so on, considering to reduce the impact of the construction on the life of the surrounding residents, taking the sound environment of sensitive areas at the sensitive moment into account，reasonable

arrangement of working time must be arranged .Excessive serious construction site shall have the necessary noise control measures, such as the high noise equipment as far as possible from the sensitive areas, etc.

The construction site, within about 150 m away from sensitive noise of construction machinery (12:00~14:00) at noon and night (22:00~06:00) to stop the construction.

(2)When building materials transportation vehicles passing by residential area, village, they should slow down and don't trumpet.

(3) Construction period noise mainly from construction machinery and transport vehicles. The construction unit must choose the construction equipment and transportation vehicles which meet with the relevant national standards. As far as possible choose low noise of construction machinery and technology, such as site use generators to sound insulation and noise elimination. The use of low noise equipment can fundamentally reduce the sound intensity, reasonably arrange for equipment position。

This project prohibits the use of concrete mixers, steam piling machine, hammer pile machine.

(4)Aiming at the noise of road construction machinery construction has the characteristics of sudden, irregular, discontinuous, high strength etc, measures can be taken to ease the construction process and so on. As a strong noise source operation can be put in the daytime (7 pm to 12 pm, 14pm to 20 pm).

(5)Taking the construction of civil engineering construction period into account is longer, the construction arrangement should minimize the impact of the construction of the residents, reasonably arrange the construction time and the construction site, the high noise operation area should be away from the sensitive point mentioned in the report, and regular maintenance to equipment, and strict operation standard, temporary acoustic enclosure structure need to be taken or acoustic noise barriers. May also be considered in the near side of the sensitive points to build temporary housing to replace the sound insulation wall effect, reduce the influence of noise；Earthwork should try to take more than a number of equipment at the same time, shorten the impact time.

In the construction of each sensitive point, the mobile noise barrier should be set, so as to reduce the impact of the construction noise on the project sensitive points.

(6) The construction transportation vehicles entering and leaving the field should be arranged far from the side of the sound sensitive point.

(7) Construction units shall instruct the construction unit indicate the piece of cloth notice and telephone complaints numbers at the construction site, the construction unit after receiving the report should be promptly get in touch with the local environmental protection department, to the timely processing of various environmental disputes.

5.3.3.2 Prevention and control measures of noise pollution in operation period

1 Technical policy for the implementation of the ground traffic noise environment

According to "the ground traffic noise pollution control technology policy "([2010] num.7) on the ground traffic noise pollution prevention and liability clarified as follows:

（1）Prevention and control ground traffic noise pollution should follow the following principles:

①Adhere to the principle of prevention, reasonable planning ground transportation facilities and the layout of the adjacent buildings;

②The noise source, transmission ways, sensitive buildings should be hierarchical controled and responsibility;

③In the technical and economic feasibility condition, give priority to the noise source and transmission path to take engineering measures, the implementation of active noise control;

④Adhere to the principle of people-oriented, focusing on the noise sensitive buildings for protection.

（2）Pollution prevention and control of ground traffic noise should be blamed clearly and control objectives requirements:

① In the planning or existing ground traffic facilities adjacent area to build noise-sensitive structures, the construction unit shall take necessary measures between distance and sound transmission way effective such as noise reduction, and to make the

outdoor sound environment quality standards.

②Because of the construction or operation of the ground transportation facilities cause environmental noise pollution, construction unit and operation units shall take the necessary distance between, noise control, sound transmission way effective measures such as noise reduction, and to make the outdoor sound environment quality standards. Through technical and economic argumentation, if it is think unfavorable for traffic noise active control, the construction unit and the operational unit should take effective noise prevention measures to guarantee the reasonable sound environment quality indoors.

2 Noise pollution control measures

At present, the main noise reduction measures of domestic engineering mainly include green noise reduction forest and low noise pavement etc. Table 5.3-15 lists the noise reduction effect and the cost, advantages and disadvantages , and the analysis of feasibility of the measures of various control engineering measures for reducing the impact of traffic noise.

Table 5.3-15 Comparison of environmental protection engineering measures for reducing noise impact

Mitigation measures	Noise reduction (dB)	Advantages and disadvantages analysis	Estimated expenses (Yuan/m^2)
Double hollow sound insulation window	20~25	Does not have the ventilation function, the cost is lower	500
Natural ventilation window	25~28	With ventilation function and sound insulation function, the cost is low, no power is needed, ventilation indexes can't be quantified, ventilation quantity is restricted by weather conditions and environment. Ventilation quantity can’t be guaranteed.	800
Mechanical ventilation window	25-36	Advantages: with ventilation and sound insulation function, the best noise reduction effect, ventilation quantity can be quantified, guaranteed, not other factors, the number of indoor air exchange can meet the national standards.	1000

		Disadvantages: high cost, need power (each ventilation system for 0.03kw)	
Demolition	Well	Noise pollution disposable, investment large.	Large investment

Noise pollution control target of this project is to ensure along the influence range of sensitive indoor sound environment can achieve "civil building acoustic design specification" (GB50118-2010) to the requirement of indoor noise value(daytime less than 45db(A),nights less than 37db(A)). By table 5.2-15 combined with the distribution of the sensitive spots along the road and project engineering characteristics, the noise of the feasible prevention measures are put forward.

1）Common pollution control measures

（1）Strengthen traffic management measures

Macro management measures to gradually improve the government management department and improve motor vehicle noise emission level. Strictly implement a regular detection system, the noise of vehicles for the vehicle which over standard execute forcibly maintenance, until the noise standard can be driven on the road. It is the most direct and effective measures to reduce the noise of the road by make noise of motor bicycle control plan and target. At the same time, measures should be developed to install efficient muffler to reduce engine exhaust noise. And in the sensitive point of the distribution of more sections, strictly limit the speed of driving, especially at night speeding should be monitored. Strengthen supervision, timely correction or punishment of illegal vehicles.

（2）Green noise reduction measures

Road green belt not only reduces the road traffic noise pollution, but also can purify the air, beautify the environment.

The principle and effect of green space noise reduction: According to the relevant research data，green plant has some sound insulation effect，the sound insulation properties of different plants are different, This is related to the morphological characters of plant itself, such as the size of plant, the shape of tree, the leaf area and the amount of leaves. The

main factor affecting the sound insulation performance of plants is the leaf area and leaf quantity, This is because that the main site of the plant's reflection and absorption of sound waves is the branch and the leaf. When sound waves through the branches and leaves plants produce damping vibration, eventually translate into its natural vibration frequency, sound attenuation. Therefore, the design of noise reduction green space should give priority to the use of large and dense tree species.

Mainly affecting the effects of plant community noise reduction are community tree layer height, crown density and community canopy location and width. The average height and average under branch height show that the major position of community canopy, the noise attenuation is mainly plant canopy of reflection and absorption of sound energy. If the community with the same area and the height of the tree layer, when community canopy density is higher, and the reflection and absorption of sound waves through the community is more, then the noise reduction result is better. Therefore, the height of the tree layer can achieve, community canopy density, as well as full crown after formation of the height and leaf area should be considered when designing the noise reduction green space after two or three years of growth and with gradually stability structural.

The project will set up the green belts, green belts mainly for banyan tree, planting interval of 3 to 5 meters each. Green belt width is about 2 meters, mainly rise to beautify the landscape and the effect of noise reduction. Calculate according to the guideline, this project with 2 meters wide green belt' noise attenuation is about 0.20 db (A).

2）Characteristic pollution control measures

Analysis of the noise reduction measures for the project to be used The proposed

Noise reduction effect and compliance analysis of the sensitive section of the installation of sound barrier

Through the analysis of chapter 7, after the project put into operation, road running forward, Xu Dong Road, Industrial Avenue and New district Road on both sides, respectively, in the 120 m, 90, 80 m within the scope of excess noise at night. This range of residential areas especially close to the proposed road first, two rows of buildings should be

building sound insulation design, in order to make the indoor sound environment quality meets the standard requirements. This project required sound insulation measures of sensitive points of happiness and the Mei Zikeng village.

The measures to reduce the noise of sensitive point in the item are shown in table 5.3-16.

Table 5.3-16 The list of noise reduction measures for the sensitive point of the project

Serial number	Sensitive point	Standard of implementation	Time	Status monitoring value	Forward noise value	Change quantity	Exceed amount	Noise reduction measures	Engineering quantity	Cost	Effect of noise reduction	Compliance situation	Subject of responsibility
1	Happiness Village	45	Daytime	50.8	60.20	9.4	15.2	Install double insulated window	32families,the estimated size of each household in the road side window of about 18m^2	About 288000	Reduce noise by 25dB(A)	Daytime≤45 dB(A) Nights≤37 dB(A)	From the project construction side to bear the cost of governance
		37	Nights	49.0	57.36	8.36	20.36						
2	Mei Zi keng Village	45	Daytime	53.7	55.48	1.78	10.48	Install double insulated window	1families,the estimated size of each household in the road side window of about 6m^2	About 3000	Reduce noise by 25dB(A)	Daytime≤45 dB(A) Nights≤37 dB(A)	From the project construction side to bear the cost of governance
		37	Nights	47.9	50.91	3.01	13.91						
		37	Nights	68.2	73.9	5.7	36.9						

3 Tracking and monitoring noise sensitive point

Because the prediction mode of the noise is based on the statistical situation, Practical application with traffic volume prediction, speed distribution, type and proportion, etc. all have associated closely. Especially, the change of the distance of sensitive point is very common due to the adjustment of line position. Therefore, the forecast error caused by the uncertainty of the environmental impact assessment stage is inevitable.

Practical experience of analogous road, As long as the construction unit to strengthen the noise pollution prevention and control work, to ensure that the implementation of environmental protection investment, after taking a series of noise pollution prevention and control measures, the influence of the noise caused by the vehicle on the road can be reduced.

5.4 Forecast and evaluation of atmospheric environment impact and environmental protection measures

5.4.1 Analysis of atmospheric environment impact during construction period

In construction stage, the pollution of the air environment mainly from the construction dust. In this engineering construction projects ,due to pavement milling planer and sand in the process of loading and unloading, and transportation ,a lot of dust escapes into the surrounding environment. At the same time, the road construction of the transport of material for the operation of the material, the material piled up during the wind lead to the dust pollution, Especially in the case of high wind speed, loading and unloading, high speed of the car traveling, the dust pollution is particularly serious. Compared with similar highway construction, road construction strong atmospheric

pollution sources generally shown as: Dust generated by transport vehicles (generally the road surface): The flux of fifty meters, hundred meters and one hundred and fifty meters on the down wind direction is 12mg/m^3 , 9.6 mg/m^3 and 5.1 mg/m^3 respectively. If in the gravel road in the range of about 200m.

During the construction stage, if the car road sprinkling water frequently (4 ~ 5 times a day), you can reduce the amount of dust by 70%, we can receive a good dust drop effect, TSP pollution distance caused by dust can be reduced to 20 ~ 50m . According to the distribution of residents' points on both sides of the proposed road, some residents point along the road in the range of 50m, Therefore, during the road construction, if management is poor, construction vehicles traveling dust will cause varying degrees of dust pollution along the residents,which will bring bad effct on the normal life and learning of the residents . Therefore, road construction should keep the surface clean, limit construction vehicle running speed and reduce piled up in the open air or ensure the piled material moisture rate, so as to minimize dust for the influence of sensitive points along the line.

Construction unit should arrange construction plan reasonably. In the part of the important construction process, the vehicle passing through the road is required to ease the impact of the vehicle emissions from the construction process.

5.4.2 Forecast and evaluation of atmospheric environment impact in operation period

5.4.2.1 Main meteorological data

（1）Characteristics of surface wind

The dominant wind direction of He yuan is N wind, frequency with 16% and NNW －NNE wind frequency with 29%.The Second dominant wind direction for S wind，

frequency with 10% and SSE-SSW wind frequency with 29%.September to march in blowing the N wind while April to August in blowing the S wind. The frequency of the calm wind each month is 31%-44% and the annually wind frequency is 37%.Months average wind speed between 1.2 to 1.7 m/s, the annual average wind speed 1.5 m/s, as shown in table 5.4-1.The wind direction rose diagram see figure 5.4-1.

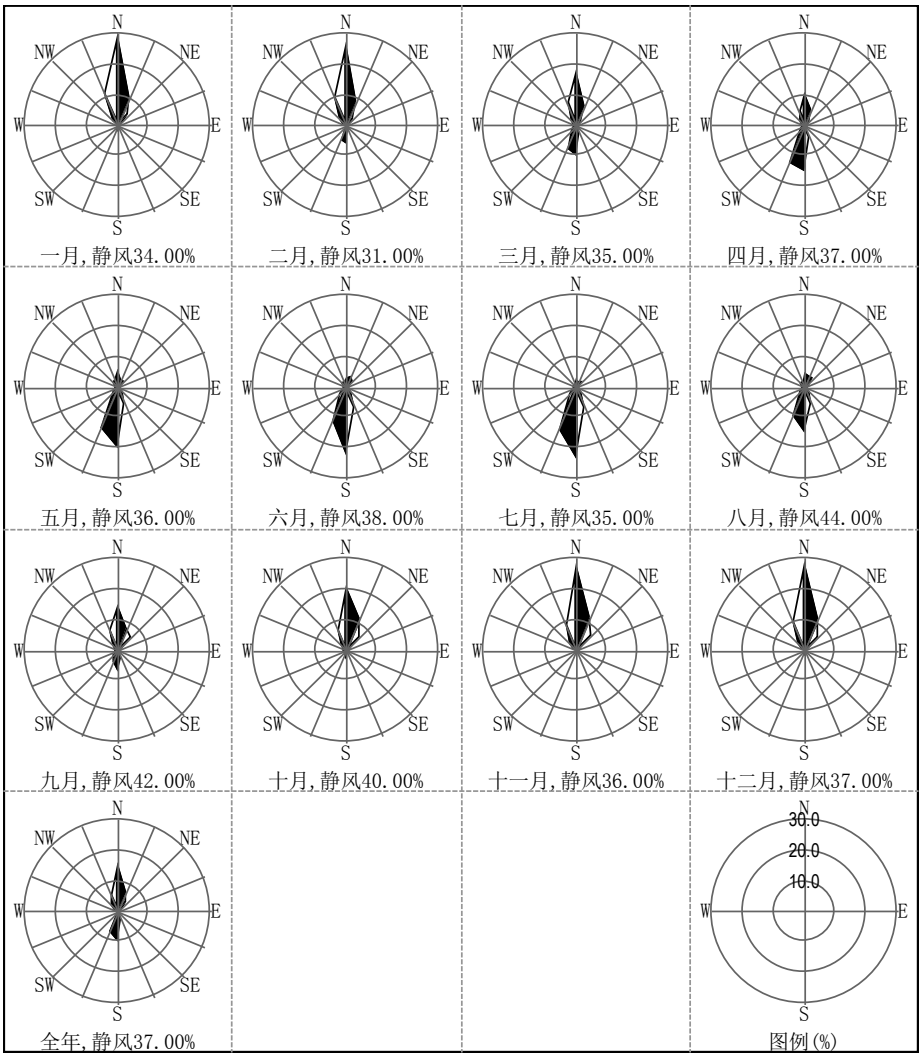


Figure 5.4-1 He yuan city wind rose diagram

（2）The atmospheric stability

Atmospheric stability for the whole year is given priority to with neutral (class D), frequency of 51.699%, stability (E - F class) and unstable (A - C) frequency is small, 28.955%, 19.376% respectively. Each season (spring, summer, autumn and winter months for January, April, July and October) of the atmospheric stability, in addition

to the autumn to stabilize (E - F class) is given priority to, the rest of the season is given priority to with neutral (class D), as shown in table 5.4 2.

Table 5.4-2 Atmospheric stability frequency (%)

Stability	Spring	Summer	Autumn	Winter	Annually average
A～C	10870	24.348	26.923	15.376	19.376
D	10870	24.348	26.923	15.376	51.669
E～F	16.033	29.891	40.330	29.701	28.955

（3）The wind direction

Different wind direction frequency statistics listed in table 7.1 3. Visible, the dominant wind direction of the year is N wind, the frequency is 12.698%, NNW-NNE direction frequency is 39.324%. S wind frequency is also large, SSE-SSW direction frequency of 18.158%. The wind frequency of the calm wind is 37.726%, in April and July the prevailing wind is S wind, and the prevailing wind is N wind in October and January.

（4）The wind speed

The statistical results of different wind speed grades are listed in table 5.4-4, The table shows, the seasonal and annual wind speed of maximum frequency is less than or equal to 1.0m/s grades, with the increase of wind speed, and its frequency is smaller.

Table 5.4-4 Different wind speed rating frequency (%)

Wind speed（m/s）	spring	summer	autumn	winter	Annually average
≤1.0	67.337	58.913	57.637	57.024	60.249
1.1～2.0	18.913	23.098	22.527	24.336	22.209
2.1～3.0	9.185	15.587	12.912	13.219	12.219
3.1～4.0	3.967	3.207	5.275	4.038	4.119

Wind speed（m/s）	spring	summer	autumn	winter	Annually average
4.1～5.0	0.435	0.435	1.319	1.106	0.821
5.1～6.0	0.163	0.272	0.165	0.277	0.219
>7.0	0.163	0.000	0.000	0.000	0.000

Table 5.4-1 Mensal wind rate (%), maximum wind direction and average wind speed

Month	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	C	Maximum wind direction		Wind speed(m/s)
																		Posit-ion	Rate	
1	30	10	5	1	1	0	1	1	2	2	1	0	0	0	2	11	34	CN	34.30	1.7
2	27	9	3	1	0	0	1	2	6	5	1	0	0	1	3	10	31	CN	31.27	1.7
3	18	7	2	1	0	1	1	3	10	8	2	1	1	1	2	8	35	CN	35.18	1.6
4	11	6	2	1	1	1	1	4	15	13	2	1	1	1	2	5	37	CS	37.15	1.6
5	6	3	3	1	1	1	2	6	20	14	2	1	1	1	2	3	36	CS	36.20	1.5
6	3	4	3	1	1	1	2	7	22	12	3	1	1	1	2	2	38	CS	38.22	1.4
7	3	2	3	1	1	1	2	7	23	15	3	1	1	1	1	1	35	CS	35.23	1.5
8	5	4	4	2	1	1	2	6	15	10	2	1	1	1	2	2	44	CS	44.15	1.2
9	15	8	6	2	1	0	1	3	7	4	2	0	1	1	2	7	42	CN	42.15	1.2
10	21	11	6	2	1	1	1	1	3	2	1	1	1	1	2	7	40	CN	40.21	1.4
11	28	12	7	2	1	0	0	1	1	1	1	0	0	1	3	9	36	CN	36.28	1.6
12	29	11	6	1	0	0	0	1	2	1	1	0	0	1	3	10	37	CN	37.29	1.5
Annual	16	7	4	1	1	0	1	3	10	7	1	0	1	1	3	6	37	CN	37.16	1.5

Table 5.4-3 Wind direction rate (%)

season	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	C
spring	5.707	3.913	1.467	0.815	0.652	0.326	1.793	6.685	9.130	8.207	1.304	0.326	0	0.326	4.402	6.484	48.098
summer	2.717	1.467	2.391	1.630	0.815	1.807	3.098	10.326	14.674	14.076	50217	2.069	0.489	0	1.414	2.554	35.707
autumn	22.143	13.242	6.429	20143	1.484	0.495	0.989	0.989	2.527	0.824	0.495	0.330	0.659	0.330	2.802	11.429	32.692
winter	20.465	11.449	1.936	2.710	0.996	0.166	0.498	1.604	2.544	0.664	0.498	0.332	0.498	0.664	4.812	15.874	34.292

Annually average	12.698	3.051	3.051	1.820	0.985	0.520	1.601	4.926	7.252	5.980	1.888	0.903	0.411	0.328	3.284	9.141	37..725

5.4.2.2 Influence analysis of atmospheric environment

1 Atmospheric pollution source intensity

The main pollutants of the vehicle emissions are HC, CO and NOx, NO_2.

（1）The formula of the source of gaseous pollutant is as follows:

$$Q_j = \sum_{i=1}^{3} \frac{A_i E_{ij}}{3600}$$

Type：Q_j—gaseous-J pollutant emission source intensity ， mg/(s· m)；

A_i—type-I of car to predict the traffic volume of the year, the car /h;

E_{ij}—type-I of car and gaseous-J in the prediction of bicycle in emission factor, mg/(m. car).

（2）Single vehicle emission factors

Bike pollutant discharge coefficient: China's auto emission standards are basically the European standard system. "The emission limits and measurement methods of pollutants emitted" by China (China III, IV stage) (GB1852.3-2005) are equivalent to the standard of "Euro III" and "EU IV". The standard was implemented in July 2007. The city of He yuan began to implement the China phase IV standard which is IV national standards in 2013.

Considering the evaluation of small and medium-sized car adopts the light vehicle emission limits and measurement methods (China Ⅲ, Ⅳ stage) (GB18352.3-2005) in the discharge coefficient of the prescribed limit calculation for a bicycle, Large cars using the vehicle compression ignition spark ignition engines, gas, fuel and car exhaust emission limits and measurement methods (Chinese Ⅲ, Ⅳ, Ⅴ stage) "(GB17691-2005), and refer to the standard of "Euro III" and "EU IV". Considering the old model can be used for a period of time, and emission standards in gradually. Recently (2015), motor vehicle exhaust pollutant emissions factor about 50%of vehicles are using the Ⅲ standard, and 50% of vehicles using the Ⅳ standards. Middle stage (2021),motor vehicle exhaust pollutant emissions factor about 20% of vehicles are using the Ⅲ standard, 80% of vehicles using the Ⅳ standards. Forward (2027), using the Ⅳ standards emissions limits.

This project adopts the bike pollutants discharge coefficients are shown in table 5.4-5.

Table 5.4-5 Report adopts the bike coefficient of pollutant discharge unit: mg/m.

Car models	Pollutant type	2016	2021	2027
Small cars	CO	1.65	1.26	1.00
	THC	0.15	0.12	0.10
	NOx	0.12	0.09	0.08
Midsize cars	CO	2.99	2.28	1.81
	THC	0.19	0.15	0.13
	NOx	0.14	0.12	0.10
Large car	CO	3.75	2.86	2.27
	THC	0.23	0.19	0.16
	NOx	0.16	0.13	0.11

（3）Calculation of air pollution emission sources intensity

According to the above formula and forecast of traffic volume, calculated the project of atmospheric pollutant source intensity prediction results are shown in table 5.4-6.

Table 5.4-6 Features in peak hour atmospheric pollutants emission source intensity

unit: mg/m. s

Characteristic	Road name	CO	THC	NOx	NO2
2016	Xu Dong Road	0.161	0.013	0.010	0.006
2021		0.174	0.015	0.012	0.007
2027		0.203	0.019	0.015	0.009
2016	Industrial Avenue	0.127	0.011	0.008	0.005
2021		0.137	0.012	0.009	0.006
2027		0.161	0.015	0.012	0.007
2016	New district Road	0.117	0.010	0.007	0.004
2021		0.127	0.011	0.009	0.005
2027		0.147	0.014	0.011	0.007

Note: the concentration of NO_2 is 60% of the NOx.

2 Impact prediction

（1）Predictors

According to the characteristics of the pollutants emitted from the project, as well as "the requirements of the environmental impact assessment" (JTJ 005-96) of the highway construction projects, the evaluation and CO, NO2 as the atmospheric environment impact forecast factors.

（2）The vehicle emission source intensity

According to the engineering analysis, the project is the source of the motor vehicle exhaust pollutant, seen in table 5.4-7.

Table 5.4-7 Features in peak hour atmospheric pollutant emission source intensity

unit: mg/m. s

Characteristic year	Road name	CO	THC	NOx	NO_2
2016	Xu Dong Road	0.161	0.013	0.010	0.006
2021		0.174	0.015	0.012	0.007
2027		0.203	0.019	0.015	0.009
2016	Industrial Avenue	0.127	0.011	0.008	0.005
2021		0.137	0.012	0.009	0.006
2027		0.161	0.015	0.012	0.007
2016	New district Road	0.117	0.010	0.007	0.004
2021		0.127	0.011	0.009	0.005
2027		0.147	0.014	0.011	0.007

Note: the concentration of NO2 is 60% of the NOx.

（3）Forecast mode

In the present report, the atmospheric pollutant dispersion concentration forecast and analysis is carried out by using the recommendation mode of the highway construction project environment impact assessment (JTJ 005-96).

1）When the wind and the line source Angle of$0<\theta<90°$, calculation of arbitrary shaped line source integration mode shown in the following type:

$$C_{PR}=\frac{Q_j}{U}\int_A^B \frac{1}{2\pi\sigma_y\cdot\sigma_z}\exp\left[-\frac{1}{2}\left(\frac{y}{\sigma_y}\right)^2\right]\left\{\exp\left[-\frac{1}{2}\left(\frac{z-h}{\sigma_z}\right)^2\right]+\exp\left[-\frac{1}{2}\left(\frac{z+h}{\sigma_z}\right)^2\right]\right\}dl$$

Type: CPR ——Pollutant concentrations in forecasting point R0 generated by the *A,B* segment, mg/m^3.

U ——Average wind speed of the high altitude of the effective emission source of the road section, m/s.

Q_j ——Gaseous-J pollutant discharge source，mg/car. m.

σ_y ，σ_z ——The level of crosswind and vertical diffusion parameters，m.

x ——Line source element midpoint to the forecasting point downwind distance，m.

y ——Line source element point to the forecasting point across the distance，m.

z ——The height from forecast points to ground，m.

h ——Effective source height，m.

A，B ——Line source starting point and destination.

2）Diffusion mode geometry parameter relationship：

①Straight line source measuring point to element point X and Y are shown in figure 7.1-2, calculated as follows.

$$x = L\cos\theta$$

$$y = L\sin\theta - S/\cos\theta$$

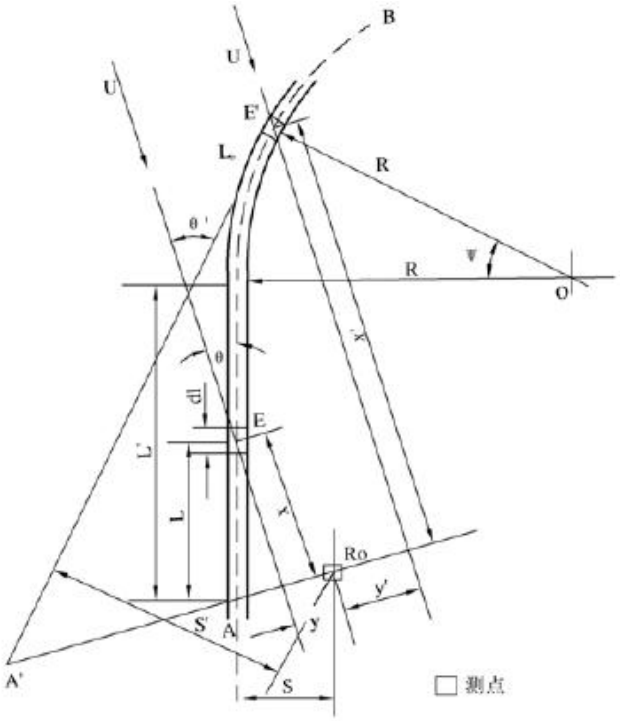


Fig. 5.4-2 Diagram of pollutant concentration diffusion of highway as the source of line source

②Circular line source measuring point to element point x' and y' calculated as follows:

$$\theta' = \varphi + \theta = \frac{L_P}{R}\frac{180}{\pi} + \theta$$

$$x' = L'\cos\theta + R\sin(\varphi + \theta) - R\sin\theta$$

$$y' = R[\cos\theta - \cos(\varphi + \theta) + L'\sin\theta - \frac{S}{\cos\theta}$$

Type: L_P——Curve line arc length，m.

φ——Corresponding to the LP central Angle，(o).

3) When the wind direction and the source are vertical, the pollutant concentration in the

ground is as follows:

$$C_{垂直}=\left(\frac{2}{\pi}\right)^{1/2}\frac{Q_j}{U\sigma_z}\times\exp\left[-\left(\frac{h^2}{2\sigma_z^2}\right)\right]$$

The infinite long term source approximation of concentration has nothing to do with transverse wind position. Type in the symbolic meaning with before.

4) When the direction of the wind direction is parallel with the source, the diffusion mode of the pollutant concentration is as follows:

$$C_{平行}=\left(\frac{1}{2\pi}\right)^{1/2}\frac{Q_j}{U\sigma_z(r)}$$

$$r=\left(y^2+\frac{z^2}{e^2}\right)^{1/2}$$

$$e=\sigma_z/\sigma_y$$

The concentration of infinite source is independent with the position of the wind.

Type: γ——the equivalent distance from element to the measurement points, m.

e——Conventional diffusion parameters ratio.

The rest of the symbolic meaning with the former.

Notes: θ or θ' ——Wind velocity vector and line source (road central Angle) Angle, hereinafter referred to as wind direction Angle（℃）.

L ——The distance from micro point to starting point A of line sources, m.

L' ——The distance from the starting point of the curve to the starting point of the line source，m；

R ——Radius of curvature of curve highway, m；

Ψ ——the central angle of the starting point of the curve element to the midpoint, (o).

S(S')——The vertical distance from the center line prediction and micro tangent line to point source center, m。

（4）Selection of prediction parameters

a．The diffusion parameters were selected according to "the technical guidelines for environmental impact assessment - atmospheric environment" (2.2-2008 HJ) and "the method of formulating the technical method for formulating the standard of local air pollutant

discharge".

b．The wind speed according to the statistical results of meteorological data in He yuan. Select the wind parameters: dominant wind direction (N), wind frequency (12.7%), wind speed (1.70 m/s). Second dominant wind direction (S), wind frequency (7.25%), wind speed (1.50m/s).

As the area of perennial atmospheric stability to the neutral class (class D), the frequency of 51.7%, so the highest frequency of D is called stability.

c．The height of ground effective emission source intensely is 0.5m.

（5）Forecast contents

Under the above mentioned meteorological conditions, the distribution of the contribution of CO and NO2 to the landing concentration of the two sides of the road during the peak traffic flow of the highway in 2015, 2021 and 2029 was predicted respectively.

（6）Forecast range

According to the scope of environmental air quality assessment, prediction and distance from the center line of the road horizontal respectively 10 meters, 20 meters, 30 meters, 40 meters, 50 meters, 60 meters, 70 meters, 80 meters, 90 meters, 100 meters, 110 meters, 120 meters, 130 meters, 140 meters, 150 meters, 160 meters, 170 meters, 180 meters, 190 meters, 200 meters of exhaust pollutants concentration contribution value.

（7）Analysis and evaluation of forecast results

Due to the atmospheric stability is given priority to with neutral, under the condition of the dominant wind direction (N), the second dominant wind direction (S) ,respectively to predict different operating periods (2016, 2021, 2021) , on both sides of road the ground concentrations of CO and NO_2 contribution value. Prediction results are shown in table 5.4-6-5.4-8.

1）Evaluation criteria

This project environment air quality assessment area belongs to "the second category". The regional environmental air quality implementation regulations of grade II standards in the GB 3095-2012. The limit value of one hour of NO_2 concentration is 0.20 mg/m³, while 0.08 mg/m³ for Twenty-four hours. The limit value of one hour of CO concentration is 10 mg/m³, while 4 mg/m³ for Twenty-four hours.

2）Analysis and evaluation of forecast results

① Pollutant concentration along with distance decay law

From the prediction result of table 5.4-8~5.4-10, CO and NO_2 of the exhaust pollutants emitted by the vehicle on the road have a certain concentration contribution to the 200m of both sides of the road. Meanwhile, within the range of 10 meters of the mobile drive, the concentration of pollutants is rapidly declining.

②Distribution of NO_2 concentration on both sides of the road

From the forecast results, the maximum concentration of NO2 of the project car exhaust emissions is only 0.013mg/m3.Compared with background value，it is almost negligible, so in generally speaking, the completion of the project will not lead to the increase of NO_2 , whose influence is slightly.

③Distribution of CO concentration on both sides of the road

From the forecast results, the maximum concentration of CO of the project car exhaust emissions is only 0.0301mg/m^3. Its contribution value is only 0.30% of the two levels of the standard limit (10 mg/m3), and has little influence on the environment of the road side.

④Impacts of sensitive points on both sides of the road

The closest sensitive point of the project to the road red line is 10m. From the forecast results, it can be seen that the impact of the emission of the project car on the distance can be ignored. Therefore, after the completion of the project, the CO and NO_2 of the automobile exhaust gas have little effect on the environment of the two sides and the environment.

Table5.4-8 The maximum Landing contribution concentration of NO_2 and CO under peak hour volume of Xudongyi Road during operation

Distance (m)		NO_2（mg/m^3）						co（mg/m^3）					
		Year 2016		Year 2021		Year 2027		Year 2016		Year 2021		Year 2027	
Midline distance	road sideline.	N	S	N	S	N	S	N	S	N	S	N	S
10	1	0.0009	0.0009	0.0010	0.0010	0.0013	0.0013	0.0230	0.0239	0.0249	0.0258	0.0290	0.0301
20	11	0.0008	0.0008	0.0009	0.0009	0.0011	0.0012	0.0203	0.0218	0.0220	0.0235	0.0256	0.0274
30	21	0.0006	0.0007	0.0007	0.0008	0.0010	0.0010	0.0170	0.0186	0.0184	0.0201	0.0215	0.0234
40	31	0.0005	0.0006	0.0006	0.0007	0.0008	0.0009	0.0144	0.0159	0.0156	0.0172	0.0182	0.0200
50	41	0.0005	0.0005	0.0005	0.0006	0.0007	0.0008	0.0124	0.0138	0.0134	0.0149	0.0157	0.0174
60	51	0.0004	0.0005	0.0005	0.0005	0.0006	0.0007	0.0109	0.0121	0.0117	0.0131	0.0137	0.0153
70	61	0.0004	0.0004	0.0004	0.0005	0.0005	0.0006	0.0096	0.0108	0.0104	0.0116	0.0121	0.0136
80	71	0.0003	0.0004	0.0004	0.0004	0.0005	0.0005	0.0086	0.0097	0.0093	0.0105	0.0109	0.0122
90	81	0.0003	0.0003	0.0003	0.0004	0.0004	0.0005	0.0078	0.0088	0.0085	0.0095	0.0099	0.0111
100	91	0.0003	0.0003	0.0003	0.0004	0.0004	0.0005	0.0072	0.0081	0.0077	0.0087	0.0090	0.0102
110	101	0.0002	0.0003	0.0003	0.0003	0.0004	0.0004	0.0066	0.0074	0.0071	0.0080	0.0083	0.0094
120	111	0.0002	0.0003	0.0003	0.0003	0.0003	0.0004	0.0061	0.0069	0.0066	0.0075	0.0077	0.0087
130	121	0.0002	0.0002	0.0002	0.0003	0.0003	0.0004	0.0057	0.0064	0.0062	0.0070	0.0072	0.0081
140	131	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0054	0.0060	0.0058	0.0065	0.0067	0.0076
150	141	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0050	0.0057	0.0054	0.0061	0.0063	0.0072
160	151	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0048	0.0054	0.0051	0.0058	0.0060	0.0068
170	161	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0045	0.0051	0.0049	0.0055	0.0057	0.0064
180	171	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0043	0.0048	0.0046	0.0052	0.0054	0.0061
190	181	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0041	0.0046	0.0044	0.0050	0.0051	0.0058
200	191	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0039	0.0044	0.0042	0.0048	0.0049	0.0055

Table5.4-9 The maximum Landing contribution concentration of NO2 and CO under peak hour volume of Industry Road during operation

Distance (m)		NO_2（mg/m3）						co（mg/m3）					
		Year 2016		Year 2021		Year 2027		Year 2016		Year 2021		Year 2027	
Midline distance	road sideline	N	S	N	S	N	S	N	S	N	S	N	S
10	1	0.0008	0.0008	0.0010	0.0010	0.0011	0.0012	0.0202	0.0209	0.0218	0.0226	0.0256	0.0266
20	11	0.0007	0.0007	0.0008	0.0009	0.0010	0.0010	0.0174	0.0187	0.0188	0.0202	0.0221	0.0237
30	21	0.0006	0.0006	0.0007	0.0007	0.0008	0.0009	0.0143	0.0156	0.0154	0.0169	0.0181	0.0198
40	31	0.0005	0.0005	0.0006	0.0006	0.0007	0.0007	0.0119	0.0132	0.0128	0.0142	0.0151	0.0167
50	41	0.0004	0.0004	0.0005	0.0005	0.0006	0.0006	0.0101	0.0113	0.0109	0.0122	0.0129	0.0143
60	51	0.0003	0.0004	0.0004	0.0005	0.0005	0.0005	0.0088	0.0099	0.0095	0.0106	0.0112	0.0125
70	61	0.0003	0.0003	0.0004	0.0004	0.0004	0.0005	0.0078	0.0087	0.0084	0.0094	0.0099	0.0111
80	71	0.0003	0.0003	0.0003	0.0004	0.0004	0.0004	0.0070	0.0078	0.0075	0.0084	0.0088	0.0099
90	81	0.0002	0.0003	0.0003	0.0003	0.0003	0.0004	0.0063	0.0071	0.0068	0.0077	0.0080	0.0090
100	91	0.0002	0.0003	0.0003	0.0003	0.0003	0.0004	0.0058	0.0065	0.0062	0.0070	0.0073	0.0082
110	101	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0053	0.0060	0.0057	0.0064	0.0067	0.0076
120	111	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0049	0.0055	0.0053	0.0060	0.0062	0.0070
130	121	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0046	0.0052	0.0049	0.0056	0.0058	0.0065
140	131	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0043	0.0048	0.0046	0.0052	0.0054	0.0061
150	141	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0040	0.0045	0.0043	0.0049	0.0051	0.0058
160	151	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0038	0.0043	0.0041	0.0046	0.0048	0.0054
170	161	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0036	0.0041	0.0039	0.0044	0.0046	0.0052
180	171	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0034	0.0039	0.0037	0.0042	0.0043	0.0049
190	181	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0033	0.0037	0.0035	0.0040	0.0041	0.0047
200	191	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0031	0.0035	0.0033	0.0038	0.0039	0.0045

Table5.4-10 The maximum Landing contribution concentration of NO_2 and CO under peak hour volume of Xinquyi Road during operation

Distance (m)		NO_2（mg/m3）						co（mg/m3）					
		Year 2016		Year 2021		Year 2027		Year 2016		Year 2021		Year 2027	
Midline distance	road sideline	N	S	N	S	N	S	N	S	N	S	N	S
10	1	0.0006	0.0006	0.0007	0.0008	0.0002	0.0011	0.0170	0.0176	0.0184	0.0191	0.0036	0.0221
20	11	0.0005	0.0005	0.0006	0.0007	0.0002	0.0010	0.0149	0.0160	0.0162	0.0174	0.0037	0.0201
30	21	0.0004	0.0005	0.0005	0.0006	0.0002	0.0008	0.0125	0.0136	0.0136	0.0148	0.0039	0.0171
40	31	0.0004	0.0004	0.0005	0.0005	0.0002	0.0007	0.0106	0.0116	0.0115	0.0126	0.0041	0.0146
50	41	0.0003	0.0003	0.0004	0.0004	0.0002	0.0006	0.0091	0.0101	0.0098	0.0109	0.0043	0.0126
60	51	0.0003	0.0003	0.0003	0.0004	0.0002	0.0005	0.0079	0.0088	0.0086	0.0096	0.0046	0.0111
70	61	0.0002	0.0003	0.0003	0.0003	0.0002	0.0005	0.0070	0.0079	0.0076	0.0085	0.0049	0.0099
80	71	0.0002	0.0002	0.0003	0.0003	0.0002	0.0004	0.0063	0.0071	0.0068	0.0077	0.0052	0.0089
90	81	0.0002	0.0002	0.0002	0.0003	0.0003	0.0004	0.0057	0.0064	0.0062	0.0070	0.0056	0.0081
100	91	0.0002	0.0002	0.0002	0.0003	0.0003	0.0004	0.0052	0.0059	0.0057	0.0064	0.0060	0.0074
110	101	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0048	0.0054	0.0052	0.0059	0.0066	0.0068
120	111	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0045	0.0050	0.0048	0.0055	0.0072	0.0063
130	121	0.0001	0.0002	0.0002	0.0002	0.0004	0.0003	0.0042	0.0047	0.0045	0.0051	0.0079	0.0059
140	131	0.0001	0.0002	0.0002	0.0002	0.0004	0.0003	0.0039	0.0044	0.0042	0.0048	0.0088	0.0055
150	141	0.0001	0.0001	0.0002	0.0002	0.0005	0.0002	0.0037	0.0041	0.0040	0.0045	0.0100	0.0052
160	151	0.0001	0.0001	0.0001	0.0002	0.0005	0.0002	0.0035	0.0039	0.0038	0.0042	0.0114	0.0049
170	161	0.0001	0.0001	0.0001	0.0002	0.0006	0.0002	0.0033	0.0037	0.0036	0.0040	0.0133	0.0047
180	171	0.0001	0.0001	0.0001	0.0001	0.0007	0.0002	0.0031	0.0035	0.0034	0.0038	0.0157	0.0044
190	181	0.0001	0.0001	0.0001	0.0001	0.0009	0.0002	0.0030	0.0034	0.0032	0.0036	0.0188	0.0042
200	191	0.0001	0.0001	0.0001	0.0001	0.0010	0.0002	0.0028	0.0032	0.0031	0.0035	0.0213	0.0040

5.4.2.3 Prevention and control measures of atmospheric environmental pollution during construction period

In order that the influence of the construction project on the surrounding environment period is reduced as small as possible during the construction, the following environmental pollution control measures is suggested:

(1) In the process of the construction site and temporary road digging, boring holes and car transport by road, it needs sprinkling water to regular cleaning, keep work certain humidity, reduce the road dust（Water can make the dust reduced by 70%）.

(2) Truck and construction material truck shall be equipped with anti-spill equipment according to the regulations, not over loading, and ensuring the transportation process not scattered. And reasonable planning transportation vehicles running routes and time, the traffic peak time and the residents' house and other sensitive areas are avoided.

(3) On the construction site, loose and dry soil, should also be regularly watering When backfill earthwork, the surface soil should be appropriate sprinkler, prevent dust flying.

(4) Strengthen the management of backfill soil pile, sure the earth surface compaction, water regularly, coverage and other measures. The soil and building materials slag does not need, should be promptly removed, that can’t have long time accumulation.

(5) Storage of bulk material yard, should cover. Carrier need a stamp, in and out of the ground before is rinsed clean, reduce the wheels, chassis, such as carrying soil scattered to the pavement.

(6) Material mixing station should be chosen in the place where there is a shelter.

(7) The main roads should be hardened and kept clean. The site should set up temporary closed garbage, using for storage the garbage and waste which can’t be cleaned in time.

(8)At the end of the construction, the Construction unit should be timely take measures to recover the ground road and vegetation by covering the bare mud and so on.

5.4.2.4 Prevention and control measures of atmospheric environmental pollution during operation period

Control of vehicle exhaust pollution involves many problems, a separate project is unable to control motor vehicle emissions, which needs to rely on the economy and technological progress of the whole society to complete.

Impact prediction of atmospheric environment quality shows that after this project put into operation, driving motor vehicle exhaust pollutant discharge on the surface of the construction project on either side of the road is not polluted.

Pavement dust may also affect the ambient air quality. The possible pollution of the environment air pollution can be prevented and the following measures can be taken as follows:

1 Control measures of pollution sources

For motor vehicle exhaust pollution is a systems of control engineering, it is impossible to solve the exhaust pollution only alone single or a few road motor vehicle exhaust pollution control fundamentally. Therefore, the vehicle exhaust pollutant control of the project is closely related to the vehicle emission control policies of the whole He yuan city and even the country of Guangdong province and even the country. Therefore, the construction unit of this project should actively cooperate with the local government and environmental protection department to jointly improve the vehicle exhaust pollution control work. Specifically, the following measures are recommended for this report:

A. The excess emissions of exhaust pollutants motor vehicles is forbidden

After forecast, the traffic flow of this section is better than the big city. Therefore, as long as the national and local policies and effectively control the driving of serious pollution vehicles, we can effectively control the air pollution caused by motor vehicles.

B. Reduce dust particles in pavement

Because the road particles come from the settlement on the road, a reduction in the number of these dust particles means that reduces the pollution sources. According to the relevant regulations, the sprinkler of sanitation bureau of The He yuan must regularly sprinkler cleaning. At the same time, the relevant units and the sanitation department of The He yuan city should better to do a good coordination, to ensure that the project belongs to the pavement in a timely manner, to reduce the impact of dust on the environment.

C. Support for local government to do a good job of vehicle exhaust pollution control

For motor vehicle exhaust pollution is a systems of control engineering, it is impossible to fundamentally solve the exhaust pollution only alone single or a few road motor vehicle exhaust pollution control. Therefore, the construction unit of this project should actively

cooperate with the local government and environmental protection department to jointly improve the vehicle exhaust pollution control work.

2 Purification air by vegetation

The experiment shows that the broad-leaved tree of both sides of the road has a certain dust and pollutant purification. The construction unit shall, in accordance with relevant regulations, make afforestation on both sides of the road, especially through the road near the sensitive point, and take full advantage of the purification of the environment air by the vegetation.

5.5 Forecast and evaluation of water environmental impact and environmental protection measures

5.5.1 Analysis of surface water environmental impact during construction period

1、Source of water pollution

In construction period, the main resource of water pollution is construction wastewater and domestic sewage.

（1）Domestic wastewater

The construction period of this project is 2 years, 600 working days. The average construction number of about 50 people every day, and the water standard according to the 150 L/ (person and day). Sewage discharge coefficient is 0.9, then the sewage emissions is 6.75t/d during construction period. The sewage water which is produced by workers during the construction of this engineering, according to the typical life in the drainage engineering (part ii) in sewage water quality estimate, the construction of sewage pollution load in table 5.5-1.

Construction personnel' sewage through the construction camp of septic tank processing, then enter into the municipal sewage pipe network by the temporary sewage pipe State Road 205, and ultimately into the Dong yuan County sewage treatment plant for treatment. After reaching the standard before discharge.

Table 5.5 1 Pollutant emissions concentration of untreated sewage

Category		COD	BOD5	SS	AN	TP	Oil
Domestic wastewater（6.75t/d）	Primary concentration (mg/L)	400	200	220	25	8	100
	Emissions (kg/d)	2.7	1.35	1.485	0.168	0.054	0.675
	Emissions(t/a)	0.81	0.405	0.447	0.048	0.015	0.204

（2）Construction wastewater

Because construction sand, stone, concrete is outsourcing, so there is no application of washing wastewater. Washing wastewater during construction period mainly from construction machinery production wastewater. This project is based on mechanical construction, construction machinery repair and washing will produce certain wastewater, mainly containing sediment and oil and other pollutants. The maximum concentration of soil was 2000mg/L, while oil is 20mg/L. Each hydropower construction machinery has an average of about 2.1 ton washing wastewater a week. According to the construction machinery usage, during the construction period, the average daily water consumption is 5m3/d.

2 The influence and treatment measures of waste water in construction stage :

（1）Domestic wastewater：Construction personnel' sewage through the construction camp of septic tank processing, then enter into the municipal sewage pipe network by the temporary sewage pipe State Road 205, and ultimately into the Dong yuan County sewage treatment plant for treatment. After reaching the standard before discharge. It will not affect the project along the water, will not cause water quality deterioration of drinking water source protection area of Dongjiang River.

（2）Construction wastewater：In consideration of the sensitivity of the Dongjiang drinking water source reserves, if the production way of wastewater discharge is not correct, can cause, suspended matter, oil content in water body and higher pH value, at the same time affect the surrounding water and soil environment. So the waste water produced by the project after a series of process, to achieve the water quality standard of urban water mixed (GB/T18920-2002), then used in the construction site, implement production wastewater zero discharge. Water quality pollution caused by construction is temporary and main reverse

impact on water source is temporarily caused by partial elevation of suspended solids in water body. Such impact will no longer exist as the work is completed.

5.5.2 Analysis of underground water environmental impact during construction period

5.5.2.1 Regional hydrogeological survey

1、Soil structure

According to the Shenzhen Yan tian (Dong yuan) industrial transfer park detailed geotechnical investigation report. In the area of project, the rock and soil layer are respectively quaternary respectively artificial filled soil, alluvium, eluvial slope and tertiary Dan Xia group of glutenite. Now from top to bottom according to the sequence points above are as follows:

（1）Quaternary artificial filling soil layer Qm1

①Plain fill

Brown red, slightly wet, loose. It is mainly composed of cohesive soil, partially containing small amount of debris, gravel diameter between 20~70mm, not compacted. It is newly backfill, soil depth is 0.5~8.0m.

（2）Cenozoic quaternary alluvial soil layer Qa1

②Silty clay

Dark grey，plastic, and the main components is clay, silt, sand, and a small amount of humus. Soil depth is 1.0~6.4m. The top depth of the layer is between 2.1~8.0m, and the top elevation is between 49.26~42.22m.

（3）Cenozoic quaternary alluvial eluvium layer Qd1+ e1

③Conglomeratic silty clay

Brown red, plastic, and the main components is clay, silt, sand, and a small amount of humus. Soil depth is 0.5~3.2m. The top depth of the layer is between 0~8.2m, and the top elevation is between 51.22~42.52m.

（4）Cenozoic paleogene Dan Xia group of gravel layers Edn

④-1 The whole weathering glutenite

Brown red, the weathering and fracture of rock are very development, and the structure

of the rock is recognizable. The soft rock, it is core soil, knead by hand easily. Soil depth is 0.5~3.6m. The top depth of the layer is between 0~12.0m, and the top elevation is between 52.05~38.68m.

④-2 The high weathering glutenite

Brown red, he weathering and fracture of rock are very development, and the structure of the rock is recognizable. The soft rock, it is core soil, knead by hand easily. Soil depth is 0.3~15.3m. The top depth of the layer is between 0~12.8m, and the top elevation is between 53.48~37.34m.

④-3 The medium weathering glutenite

Brown red, good cementation of the soil, medium thickness and layered structure, the core is short columnar and hard rock mass. Soil depth is 0.7~11m. The top depth of the layer is between 4.6~15.9m, and the top elevation is between 45.47~33.54m.

2、Hydrogeological conditions

According to the Shenzhen Yan tian (Dongyuan) industrial transfer park survey report. The whole weathering glutenite and high weathering glutenite in the site is medium water bearing stratum. Groundwater occurrence types is weathering crevice water, regional hydrogeology unit is shown in figure 5.5 1. The remaining strata are weak water cut and weak permeable strata, which can be regarded as the relative water separation layer. Groundwater is mainly accepted by ground water infiltration recharge. During the investigation, the water level of the stable depth is about 1.00~7.40m, and the elevation of about 43.84~49.48m.

The diagram of regional hydrogeological unit area the as shown in figure 5.5 1.

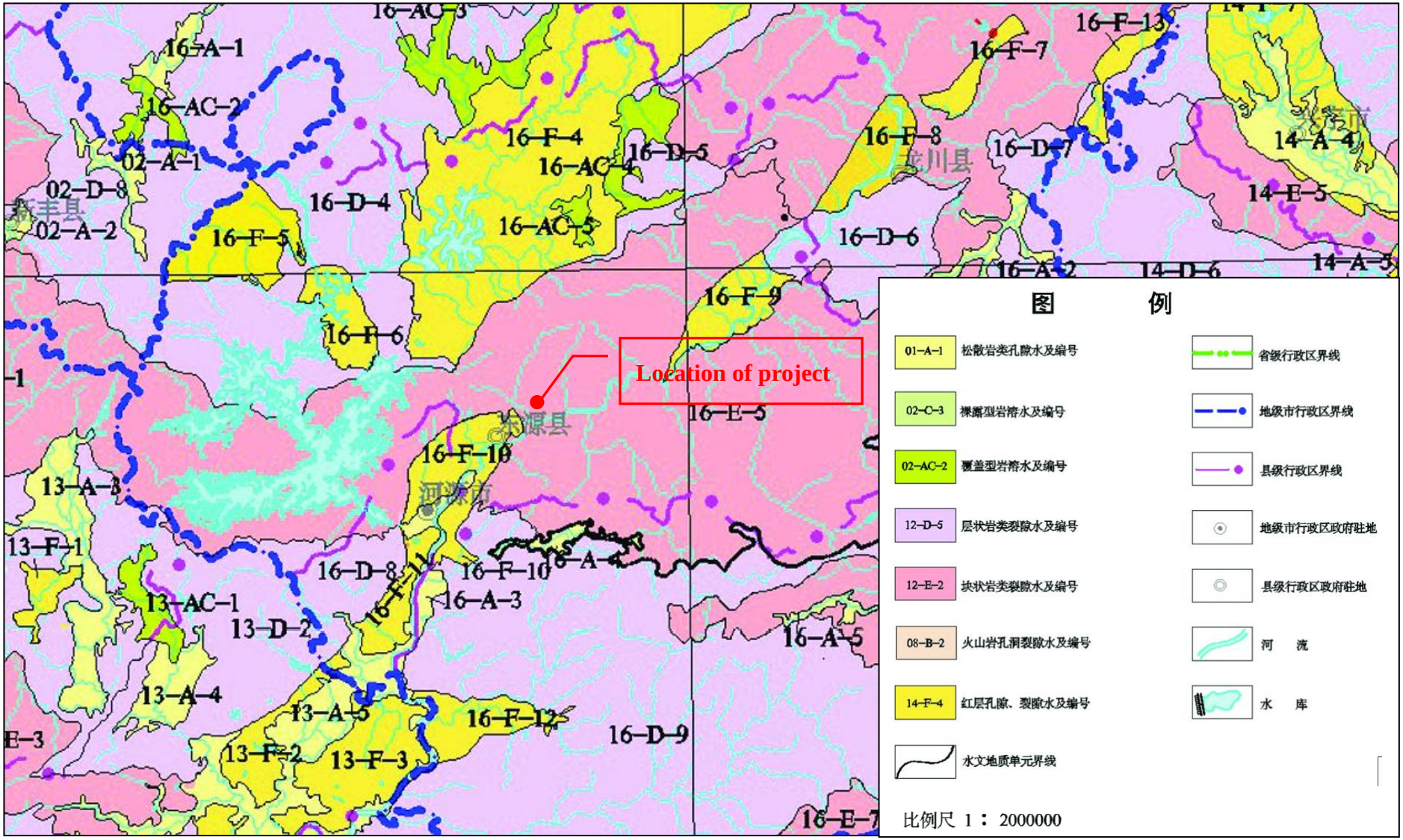


Figure5.4-1 Regional hydrogeological unit

5.5.2.2 Analysis of water environment impact

This project is all in the form of subgrade, not set up the tunnel. The influence of groundwater during construction mainly exists in two links, which are the road pile foundation, pipe network construction and the construction phase of the waste water discharge. Among them, during the pile foundation construction stage, this project pile foundation is in the filling layer or the sand soil layer range, is not the destruction the impermeable layer. So it won't pollution the impermeable layer because of the water quality of the ground water.

This project is supporting the drainage pipe network buried deep in the 1.0m, the most unfavorable place of rain water pipeline coating is 1.5 ~ 1.7m. The groundwater level of the project site is about 1.00~7.40m. Take the height of the subgrade into account, the laying of the project pipeline network will not destroy the impermeable layer. Therefore, the pipe network construction will not pollute groundwater quality because of beat the water impermeable.

In the construction period, the main wastewater of this project is the construction personnel's life sewage and the construction machinery oil run, run, drip, leakage etc. The sewage of the construction personnel is discharged after treatment. By strengthening the construction site mechanical management, can effectively reduce the leakage of oil. The waste oil should be recovered by the person, and the disposal of the waste oil shall be handled by the competent units and shall not discharge the. Overall, this project has little effect on the groundwater environment during construction period.

5.5.3 Analysis of surface water environmental impact in operation period

（1）Runoff pollution of road surface

Highway construction project itself does not produce sewage, wastewater mainly comes from the road rain water during the operating period. By precipitation, it is discharged into the receiving water body, so that it can have some effect on the water quality.

There are many factors that affect the water quality of road runoff, and the randomness is very large. In general, the road runoff water quality related to traffic and season. The water quality increases with the increase of vehicle flux, and changes with the increase of rainfall time. It is also related to the city's road health situation, generally, the road runoff water

quality of the municipal road is superior to the road, and the municipal road is superior to the sub trunk road. According to the Southern China Institute of environmental science and other units of environmental impact assessment's runoff pollution test data which is for the road of Guangdong province. In traffic and rainfall known cases, 1 hour rainfall duration, rainfall intensity is 81.6 mm. Within an hour according to the different period of time to collect water samples, analysis of the change of road surface runoff pollution, determination of analysis results are shown in table 5.5 2.

Table 5.5-2 pollutant concentration in pavement runoff

Project \ Duration	5～20 min	20～40 min	40～60 min	Mean value	DB44/26-2001 Level I(level II) standard
pH	6.0～6.8	6.0～6.8	6.0～6.8	6.4	6～9
SS（mg/L）	231.4～158.5	158.5～90.4	90.4～18.7	125	60（100）
BOD5（mg/L）	6.34～6.30	6.30～4.15	4.15～1.26	4.3	20（30）
*CODcr（mg/L）				19.35	110(90)
Petroleum（mg/L）	21.22～12.62	12.62～0.53	0.53～0.04	11.25	5.0（8.0）

Note: * : here CODcr without measurements, according to the BOD_5 of 4.5 times the coefficient estimates.

As can be seen by the determination results: Within 20 minutes from the initial rainfall to the formation of pavement runoff the concentration of suspended substances and petroleum substances in the rain is relatively high. After 20 minutes, the concentration decreased with the rainfall duration. The amount of biochemical oxygen demand in the rain was slower than the rainfall duration, pH value is relatively stable. After the rainfall lasted for 40 minutes, the pavement was basically washed clean, the main emission targets can reach a basic level of standards after the pre-treatment.

（2）The calculation of runoff on the road

According to the experience, for the road surface runoff can be calculated by the following formula:

$$Qm=Q\times C\times A$$

Type：Qm——Road surface runoff，m^3/a；

Q——Average annual precipitation along the project is 1930mm；

C——The runoff coefficient is 0.9.

A——Pavement area is 158100m2，total length of this road is 5.27 km，while the width of roadbed is 50 meters.

By the calculation, this project operating period of road surface runoff is 27500 m3/a. According to the concentration of pollutants in table 3.2 4, can calculate the total carrying number of road surface runoff pollution that SS is 34.38t/a, petroleum is 3.09 t/a，CODcr is 5.32t/a ，and BOD_5 is 1.18 t/a, during operating period.

The road construction project itself does not produce sewage, wastewater mainly comes from the road rain water during the operating period. By precipitation, it is discharged into the receiving water body, so that it can have some effect on the water quality.

According to the relevant analogy monitoring data，the main pollutants of pavement runoff are COD_{Cr}, petroleum and SS. The pollutant concentrations reached the maximum within the 0-15 minutes of the rainfall, and then decreased gradually. After an hour of rain ,the road rainwater contained pollutants can reach national and provincial emission standards.

Rain through into the Xu Ming dong River rain pipes, and then into the Dongjiang River. From the above analysis, we can see that the road rainwater contained pollutants can reach national and provincial emission standards, taking into account the natural degradation of rivers, think of the rainwater will not cause significant effect on river water quality.

5.5.4 Assessment of underground water environmental impact in operation period

The operating period of the project may give rise to the pollution caused by groundwater, sewage pipe leakage or rupture, resulting in rain, sewage through the impermeable layer into the underground water body, thereby affecting the groundwater quality.

According to the regional hydrogeological conditions and the analysis contents of groundwater environment during construction, the laying of the project will not destroy the water table, and the depth of the buried pipe is less than the groundwater level. Therefore, the evaluation of the project operating period will not cause the disturbance of the underground water, and the seepage of a few pavement sewage will not affect the groundwater. In addition, during the road construction ,attention should be paid to the collection and drainage of pavement rain, the rainwater should be imported into the municipal sewer to avoid directly

into the nearby water body to reduce the impact on the water quality.

5.5.5 Prevention and control measures of water pollution during construction period

1、Common measures to prevent and control pollution

During the construction, the construction unit should strictly implement the "construction site civilization construction and environmental management Interim Provisions", organization design of the discharge of surface water, it is forbidden to row, turbulent road pollution, environment.

（1）The construction sewage contains a lot of silt and petroleum in the course of road construction, if not handle directly into waterways will affect water quality, in soil will pollute the soil. Surface drainage discharge opening should be far away from the water around, avoid directly into farmland and fish ponds.

（2）The prevention and control of environmental water should be in the construction period, no residue discharged directly into the ditch dug base, in order to reduce the pollution of the waters.

（3）The construction and management of the sink basin

Must build sand basin, construction drainage and surface runoff after setting basin precipitation and sediment discharge, avoid the sediment directly into the water. Note the increase in the amount of sediment settling basin, clear in time, prevent sediment overflow into the water.

（4）Because of the traffic accident leakage of oil should be collected as soon as possible, reduce the pollution of surface water and field crops.

2、Characteristic pollution control measures

（1）Construction personnel sewage through the construction camp of septic tank processing, then enter into the municipal sewage pipe network by the temporary sewage pipe State Road 205, and ultimately into the Dong yuan County sewage treatment plant for treatment. After reaching the standard before discharge. It will not affect the project along the water, will not cause water quality deterioration of drinking water source protection area of Dongjiang River.

（2）Because construction sand, stone, concrete is outsourcing, so there is no application of washing wastewater. Washing wastewater during construction period mainly from construction machinery production wastewater. This project is based on mechanical construction, construction machinery repair and washing will produce certain wastewater, mainly containing sediment and oil and other pollutants. The maximum concentration of soil was 2000mg/L, while oil is 20mg/L. Each hydropower construction machinery has an average of about 2.1 ton washing wastewater a week. According to the construction machinery usage, during the construction period, the average daily water consumption is 5m3/d. If the production way of wastewater discharge is not correct, can cause, suspended matter, oil content in water body and higher pH value, at the same time affect the surrounding water and soil environment. So the waste water produced by the project after a series of process, to achieve the water quality standard of urban water mixed (GB/T18920-2002), then used in the construction site, implement production wastewater zero discharge. Water quality pollution caused by construction is temporary and main reverse impact on water source is temporarily caused by partial elevation of suspended solids in water body. Such impact will no longer exist as the work is completed.

5.6 Forecast evaluation of solid waste environmental impact and environmental protection measures

5.6.1.1 The impact analysis of solid waste during construction period

1 Source of solid waste in construction period

The solid waste in the construction period of the project are mainly produced by building waste slag and waste residue, garbage and construction machinery repair scrap cloth, waste oil and other.

① Abandoned earthwork

The proposed roads across the excavation volume of 420500 m3, fill volume of 424700 m3, the project to produce discard 5100 m3,both topsoil ,later all land road green belts and construction site temporary land greening turns the soil. Project won’t set up soil and abandon slag separately.

②Domestic garbage

During the construction, there are fifty people with the construction stage of the whole process, the per capita living garbage generated amount according to 1.0 kg every day, and the total amount of personnel garbage is 0.05 ton every day. The total domestic waste generated during the construction period is about 30.0 ton, which should be collected after the sanitation department of the local sanitation department unified treatment.

③Hazardous waste

In addition to the construction waste and garbage, construction machinery maintenance will produce hazardous wastes with a small amount of oil, oil cotton yarn. This kind of waste must be unified collection and sent to a qualified hazardous waste processing department to strengthen the management.

2、Impact and protection measures

Construction waste will in accordance with the requirements of the "urban construction waste management regulations" (the Ministry of construction 139th orders in 2005), reporting to the He yuan City Environmental Sanitation Administration Bureau in the mud sediment management and reasonable disposal to prevent environmental pollution. The daily living garbage of the construction workers is transported from the local sanitation department to the municipal solid waste landfill site for disposal.

5.6.1.2 Assessment of solid waste environmental impact in operation period

In the project operation period, while solid waste mainly from both sides of the road greening plants from the material and parts of vehicles.

Greening plants from the material and parts of vehicles on the roadside if not timely cleaned , will affect the landscape and air quality when it encounter with winds. The project is the regional planning of ecological demonstration area, if dusty, will seriously affect the landscape and regional air quality.

5.6.2 Prevention and control measures of solid waste pollution

1、Common of pollution control measures

For the garbage and construction wastes and the maintenance of a refuse, since entering the water body will cause pollution, so it require relevant organization to recycling, classification, storage and handling those can be used, should focus on using or submitted to

the acquisition of, such as the majority of paper, wood, metal and glass waste for acquisition station reuse.

2、Characteristic of pollution control measures

The project will produce a certain amount of construction waste, construction waste will in accordance with the requirements of the "urban construction waste management regulations" (the Ministry of construction 139th orders in 2005), reporting to The He yuan City Environmental Sanitation Administration Bureau in the mud sediment management and reasonable disposal to prevent environmental pollution. The daily living garbage of the construction workers is transported from the local sanitation department to the municipal solid waste landfill site for disposal.

5.7 Forecast and evaluation of ecological environmental impact and environmental protection measures

5.7.1 Analysis of ecological environmental impact during construction period

Because the project route is short, excavation surface is small, less impact on the ecological environment along the railway, so it can be divided into the impact of construction period and operation period, among them the impact of the construction period is the main ecological environmental impact.

5.7.1.1 Damage to terrestrial vegetation during construction period

During the construction period of the project, the direct perturbation to the surface vegetation mainly occurs in the construction activities of cleaning, filling, excavation, soil excavating, surface stampede etc, which form the permanent or temporary occupancy. And the permanent occupancy mainly includes: the vegetation regions occupied by the subgrade, the auxiliary facilities, etc. this part of the vegetation will disappear permanently. Temporary occupation includes vegetation area occupied by the sidewalk and construction sites, this part of the plant can be restored after the completion of the construction. The permanent site of the project and temporary vegetation sites will be permanently destroyed ,thus causing soil erosion and environmental damage.

(1)Estimation of biomass loss in permanently occupied region of vegetation

Vegetation is the most important natural factor to maintain the ecological environment and ecological balance, which have decisive influence on ecosystem changes and its stability. Net production of vegetation refers to the amount of organic matter accumulated in the unit area and unit time. It is the remainder of the total amount of organic matter produced by photosynthesis after the consumption of respiration. It directly reflects the production capacity of plant communities in natural environment, but also an important parameter for the quality assessment of ecological status.

The direct impact of the construction of the project on the ecological environment mainly reflected on the expropriation of land, and changed the use of part of regional land, directly as a result of ecological impacts.

According to the project soil and water conservation program, the total area of the project is 16.42hm2. Among them, the permanent occupation is 15.98hm2, and temporary land is 0.44hm2.

Temporary land occupied mainly refers to temporary dump of soil and construction zone. Temporary floor area is 0.44hm2, of which the construction area is 0.20hm2, the area of temporary heap of soil is 0.24hm2.

Because that it is not industrial projects, after the preliminary precipitation treatment, the sewage will be discharged into nearby rivers. Because of the river used in industrial and agricultural way, there will have little influence on growth and reproduction of aquatic creatures.

Table 5.7-1 Statistics of the project covers area

Control partition	the types of construction land（hm2）								Land property
	Woodland	Garden plot	Cultivated land	Mining storage	Residential land	Land for water conservancy facilities	Other land	Total	
Main road area	8.21	2.60	0.84	0.69	0.41	1.53	1.70	15.98	Permanent occupation

Construction zone	-	-	-	0.20	-	-	-	0.20	Temporary occupation
Temporary dump zone	-	-	-	0.40	-	-	-	0.24	Temporary occupation
Total	8.21	2.60	0.84	1.29	0.41	1.53	1.70	16.42	

The project does not belong to the fruit of forestland, occupying an area of 0.06 hm2. According to our field survey and visit results, The fishing pond yield 650 kg / year, roughly can calculate the amount of loss in the fisheries in the region were as: 0.585 ton, converted into money, the economic loss is respectively: 0.468 million yuan / year. This project has not occupied the basic farmland protection zone.

（2）Impacts of protecting plants and ancient trees

There are no rare and endangered plants in the scope of the project. Therefore, the construction of the project does not focus on the protection of the plant and the migration of ancient and famous trees.

（3）Impacts of plant resources

Because of the influence of the construction, some plant species along the relevant range will disappear, and the vast majority of plants will reduce the number. The affected plants are not rare and endangered species, but also extremely common in the surrounding areas.Along with the end of the construction, the restoration of the afforestation facilities and the vegetation can make up the loss of plant species diversity. Although ecological compensation measures are taken in the construction, such as planting trees on both sides of the highway, planting turf to restore vegetation. The loss of the ecological environment will eventually be restored, but the time of the tree growth will be difficult to achieve the original ecological environment effect in the short term, and the impact will continue into the operation period.

5.7.1.2 Impacts of construction stage on terrestrial animals and their habitat

The construction period work machinery sends out the noise, produces the vibration as well as constructor's activity can cause construct the region and nearby land animal migrates

temporarily to where far from the construction far , the birds can fly away temporarily. The construction produces massive abandons destroy the land to live animal's habitat . Generally, terrestrial animals will move back to the road on both sides of the region with the end of the highway construction, so the construction of the project had little effect on them. But the construction of road will permanently cut off reptiles, amphibians and rodents' migration channels on the both sides of the road, and reduce their living space. In the excavation of earth and the filler direct damage local vegetation and soil, cause pieces of lack of vegetation coverage of bare land, destruction of the environment for the survival of the local wildlife. Dust generated by excavation and filler will become particulate matter suspended in air. These particles can cause allergy or asthma. In addition, the construction period of noise, vibration, light, rays, dust, air and water will have a certain impact on the animals along the line. If the construction personnel lack the awareness of environmental protection, do not cherish the wildlife, capture, kill, attack them at will. If the living environment of the wild life is not considered in the construction, the influence is the biggest.

In short, the construction may have a certain impact on the habitat environment of the local wildlife, but these effects can be reduced or relieved by strengthening the construction management. In the case of strengthening the construction management, the construction of the project has a little influence on the surrounding land animals.

5.7.1.3 Impacts of construction period on soil

In the construction period, due to the mechanical rolling and workers' stepping, the soil around the construction area will be compacted. The topsoil in part of construction area will be to shovel, and other regions of the surface soil will likely be landfilled, which result in the construction of the surface soil lacking in fertility after the completion and being bad for plant growth and recovery.

5.7.1.4 Impacts of construction period on Agriculture

（1）The impacts of expropriation of agricultural land

The permanent land of construction projects is the original soil road , therefore, there is no effect on agriculture after the land reconstruction.

The temporary construction area can recover its original function gradually after the completion of the project. Therefore, the temporary occupation of land for agricultural

production adverse impact is temporary.

（2）Impacts on crop growth

In the process of the construction site and temporary road digging, boring holes and car transport by road, needs sprinkling water to regular cleaning, keep work certain humidity, reduce the road dust.

Mixing plant is the field of building materials mixing, easy to produce dust in the process of mixing, can produce adverse effect to the agricultural ecological environment. The leaf will be blocked by the long time accumulation of particulate matter, so that the photosynthetic intensity and respiratory intensity decreased. The agricultural ecological environment can be destroyed if the dust prevention measures are not taken in the construction process. Especially in crop growth period, if dust adhere to leaf and stem for a long time, affect crop photosynthesis, will lead to the output of crops on either side of a highway. Therefore, dust prevention measures must be taken to reduce the harmful effects of dust on the crops during the construction period. According to the experience, if you take the necessary measures to prevent dust, pollution degree will significantly reduce, and generally will not result in a mixing plant crops the obvious decrease on either side of the road.

5.7.1.5 Impacts of construction period on landscape

During the construction, the impact for the surrounding landscape will be mainly manifested in the following aspects:

（1）Construction in the process of foundation excavation and earthwork, construction materials piled up, especially the construction waste soil and waste temporary stacking, etc., will affect the surrounding health environment and landscape.

（2）In the construction process, some temporary buildings or mechanical equipment, as well as the fence and the surrounding cloth and other isolation measures will also bring about the surrounding landscape factors.

（3）The noise generated by construction equipment and temporary sheds, dust, waste gas and waste as well as the construction of drainage and other pollution to the surrounding environment, impact and interference with daily activities of residents on both sides of the road, and have some damage on the surrounding landscape.

（4）The construction projects occupy the land, which brings the landscape fragmentation, and the pattern of the land use types mosaic.

5.7.2 Assessment of ecological environmental impact in operation period

This section discusses the impact of this project on the changes of landscape pattern as the surface structures, the long-term impact of project construction on the landscape, and this project construction effects on the landscape is mainly reflected in the impact of landscape pattern change.

This project in the landscape pattern change embodied in two aspects.

①The new landscape elements and plaques will appear in landscape system, increase the landscape fragmentation degree.

From the perspective of landscape, the road construction will add a landscape disturbance corridor in the natural scenery of this region. In addition, the construction temporary covers also add new patches on the background of the natural landscape.

②The destruction of vegetation changed the proportion of landscape elements.

Road construction will inevitably lead to the natural degree of the region along lower and the artificial degree increase. Due to construction, some of the natural vegetation will be stripped, destruction, soil structure will also change at the same time, Therefore, we should take corresponding measures of governance and greening, slow down the impact of road construction on the natural landscape.

To sum up, this project during the construction of landscape along the route has certain negative effects. So as far as possible do a good job in the construction of landscape in the road construction, there should have strict measures for government and compensation. During operating period after certain protective measures, to guarantee impact on landscape within the control.

5.7.3 Prevention and control measures of ecological environmental pollution

1 Road greening measures

Road greening can play a role of shading dust, anti-pollution, reducing traffic noise,it is an important measure to reduce the ecological impact of project construction. Highway the

land within the scope of comprehensive green plant, can rise to protect embankment, prevent soil erosion, beautify the landscape effect, compensation for highway land loss of green space at the same time, rise to adjust the ecological environment in the area of strip along the function. In addition to ensuring the larger green area, the establishment of a multi-level, high-quality green system, improve the ecological benefits of green space is also very important. Green funds should be adequate, all green need to greening, in order to build the road into a modern ecological corridor. The combination of engineering measures and biological measures, and dominated by biological measures. It is suggested that the green space system construction, especially the green space of the road should be combined with arbor, shrub and grass. Because of the serious pollution of automobile tail gas, the road greenbelt system should choose the plants that have good anti-pollution performance. The proposed green plants are as follows:

（1）Arbor

Ficus altissima, aleurites moluccana, Acacia auriculaeformis, Bauhinia blakeana, Aleurites moluccana, Bombax malabaricum, Magnolia grandiflora, Syzygium jambos, Lagostroemia indica, Ficus microcarpa, Chukrasia tabularis, Mangifera indica, Nerium indicum, Ficus annulata.

（2）Shrub

Murraya paniculata, Hibiscus rosa-sinensis, Trema orientalis, Melastoma candidum, Excoecaria cochinchinenses, Pittosporum tobira, Carmona microphylla, Gardenia jasminoides, Agoaia odorata, Codiaeum variegatum.

（3）Herbal

Canna indica, Zoysia tenuifolia, Hymerocallis Americana, Ophiopogon bodinieri, Cynodon dactylon, Axonopus compressus.

Aimed at the air pollution caused by road traffic, we can plant some protective plants with the ability to resist pollution,for example Salix babylonica, Ginkgo biloba, Nerium indicum etc., which have strong absorption of SO2. Punica granatum, Lespedeza bicolor Turcz, Medicago sativa Linn.etc., which have strong absorption of NO2. Broussonetia papyrifera, Ligustrum lucidum etc., which have strong absorption of plumbum. Agoaia odorata, Syringa oblata, etc., which have strong absorption of CO. And some have strong dust

retention ability of plants，such as plants with rough leaves, plants with downy leaves.

In addition, the large and hard leaves with overlapping arrangement, and reasonable plant population, have the function of reducing noise. Generally, small trees and shrubs for branch is dense, having larger ability to reduce the noise than the typical tree, hardwood sound-absorbing effect is better than conifers. Composed of the multilayer sparse forest which are consist of arbor, shrub and herb plants, sound-absorbing effect are more significant than the effect of a layer of dense forest.

2 Strengthen ecological protection of slope greening

The highway construction can seriously affect the ecological vegetation and water and soil, in order to prevent seriously soil erosion, earthwork should be arranged at the dry season, a duplex retaining wall with the combination of engineering and vegetation should be established when the earthwork is excavated, in order to reduce soil and water loss in construction. During the construction period, the soil erosion is relatively short, and with the completion of the project construction, the restoration of the vegetation will be disappeared or decreased obviously. While the slope protection engineering is the key to the long-term soil and water conservation of the construction project. Because of the large rainfall of South Asia, heavy rain and rainstorm can easily lead to slope erosion and soil erosion, causing soil erosion.

3 Wildlife protection measures

During the construction period, various construction activities can that the the land animals at and near the construction region to migrate to the distant place temporarily, the birds will fly away temporarily. Construction produced a large number of abandoned slag which will destroy the habitat of terrestrial animals. While ,in the operation time, the vehicle noise and tail gas will have a certain impact on the survival and reproduction of the animals along the route, and block the migration channels on both sides of the line of reptiles, amphibians, reduce their living space. Therefore, strict precautions should be taken to reduce the construction noise and vibration, in order to reduce the impact of the construction to land animals.

Areas along the project after a long period of human disturbance, which result in the scarcity of wild animals and there are no key protected wild animals could be found.

5.8 Impact Assessment and Protect Measures of Social Environment

5.8.1 Impact Range and Compensation Measures of Land Acquisition Demolition

(1)Impaction range

This project has land acquisition and removal work of land acquisition ,without the work of land acquisition and removal , the project in the construction of the initial period, there will have a negative social impact. According to the resettlement plan of XEDSTP,three roads need to levy Xudong village 12.6 mu paddy, 37 mu hilly in Xudong village, 2 mu hilly red village, 7.05 mu Xudong collective mountain, 22.5 mu collective mountain of Hongguang village; 17 mu pond in Xudong village, 4 mu pond in Hongguang Village. For the collective land , 226.2 mu in total.

The construction of rural residents housing demolition is Xudong village and Red Village , rural residents in the demolition of housing account to area of 4105 square meters, 14 families, 66 people. Among them, the rural residents housing demolition of Xudong village is 2730 square meters, accounted for 66.5% in the total area of the demolition, there are 13 affected households, influence 62 persons, the demolition of housing are hilly land and paddy field next to the fields of temporary housing, no permanent residents and most of the housing has been vacant, only as tools to pile up for storage, does not involve homestead compensation. The need to remove the ground attached include: Fruit 943 (135 litchi tree, 796 longan tree), 300 meters drains, 3000 meters of the tap water pipe, 11 wire rod, 1 irrigation facility, 20 graves.

This project has 3 roads to build,and it affects a total of 34 households, 185 persons. Among them, the collective land expropriation impact 34 households, 185 people; rural housing residents affected 14 households, 66 people; both land acquisition and removal of 14. The project is the basic effect of Xu Dong village, the red village only affected 2 households, 9 people. Xudong village affected 32 households, 176 people.

(2) Land requisition compensation measures

Residents who involved in the demolition can get money placement, the allocation of homestead, homestead shares, relocation resettlement grants and other ways of resettlement.

Project unit compensate to the property unit for the affected infrastructure and ground attachments ,reconstructed by property rights unit.

For vulnerable groups, we take measures to provide low-cost housing, professional skills training and temporary employment opportunities and other measures for resettlement.

According to the content of the immigration placement plan which Dongyuan County, Heyuan City Xiantang town use World Bank loan to build economic comprehensive development demonstration town project , all immigrants who are influenced in the project are aware of the project, the awareness rate is 100%, and 100% of the immigrant support the implementation of the project and willing to have varying degrees of understanding to the project implementation and demolition and land requisition. 90.9% of immigrants are aware of the compensation for resettlement policy, That the township government and some of the promotion of the village committee is effective ,100% of the immigrants believe that the construction of the project is conducive to the development of the village collective, and another 36.4% of people believe that this benefit the country, 36.4% of people think that benefit individuals.

5.8.2 social environment analysis and evaluation

In Guangdong Province, this project is established on using the world bank loan to build economic development demonstration town project. Construction of the project will effectively solve the regional infrastructure supporting imperfect, lack the impetus to the development and investment difficult situation.

On the whole, due to the road construction and investment operations, it will make the area transportation more convenient and thus will effectively promote the people's income levels significantly improved along the region. Also with improvement of the traffic conditions and the people's living standards, communities will continue to rise along the route to the social infrastructure demand. Accordingly, such as transportation, communication, culture, entertainment, education, health will get greater emphasis directly in turn and we will focus on investment and construction, the development of various social undertakings will improve and promote the improvement of the level of people's cultural life. So economy and culture, material and spiritual civilization construction supplement exist side by side and play

a part together, and develop healthily.

5.9 Impact Analysis of Water Loss and Soil Erosion and Conversation of Water and Soil

According to *Soil and water conservation plan of XIEDSTP. (draft for approval) (Guangzhou Research Institute of Environmental Protection, Dec.2014)*. The following are newly increased results of predicting impact analysis of water and soil loss.

5.9.1 Newly Increased Predicting Impact Analysis of Water Loss and Soil Erosion

5.9.1.1 Prediction Scope and Prediction Time Bucket

The predicting area of water and soil loss in economy comprehensive exploration model town projection supported by World Bank Loan in Xiantang Town, Dongyuan County, Heyuan City is 19.92hm^2 and 6.05hm^2 in construction period natural recovery period respectively. The forecast time bucket including construction period and natural recovery period. See details in Table 5.9-1.

Tab. 5.9-1 Predicting scope and time bucket of water and soil loss

Prediction subarea			**Prediction scope（hm^2）**	**Predictive Duration（年）**
Construction period	Main construction zone	Road pavement	15.98	2.0
		Cutting slope area	1.27	2.0
		Embankment	1.97	2.0
	Build area of construction		0.20	2.0
	Temporal soil dump zone		0.50	2.0
	Total		19.92	2.0
Natural recovery	Main construction zone、Build area of construction、Temporal soil		6.05	1.0

5.9.1.2 Prediction Content and Method

（1）Prediction method

The prediction contents of water and soil loss in economy comprehensive exploration model town projection supported by World Bank Loan in Xiantang Town, Dongyuan County,

Heyuan City including:

1）Disturbance of origin landscape, damage of ground and vegetation cover;

2）Damage area of facilities for water and soil conservation;

3）Amount of spoil and waste slag;

4）Possible amount of water and soil loss;

5）Harm of water and soil loss.

（5）Prediction method

The project take the combination of field investigation and counting design data methods to predict the disturbance of origin landscape, damage of ground and vegetation cover, damage area of facilities for water and soil conservation, amount of spoil and waste slag, possible amount of water and soil loss and area of water and soil loss of the construction project.

The project predicts the possible amount of water and soil loss by using the prediction method of analogical investigation in sub period and partition section.

Prediction model:

$$W = \sum_{j=1}^{3}\sum_{i=1}^{n}(F_{ji} \times M_{ji} \times T_{ji}) \qquad (5\text{-}1)$$

$$\Delta W = \sum_{j=1}^{3}\sum_{i=1}^{n}(F_{ji} \times \Delta M_{ji} \times T_{ji}) \qquad (5\text{-}2)$$

In the formula:

W ——Loss of soil，t；

ΔW ——Newly increased loss of soil，t；

F_{ji}——Predictive area of certain unit in certain period，km2；

M_{ji}——Soil erosion modulus of certain unit in certain period，t/km2.a；

ΔM_{ji}——Newly increased soil erosion modulus of certain unit in certain period，t/km2.a；Only count for positive value. Negative value counted by 0.

T_{ji}——Prediction time of certain unit in certain period，a；

i——Prediction unit，i=1, 2, 3, ……, n；

j——Prediction time bucket，j=1, 2, 3, indicating formation period, construction

period and natural recovery period.

5.9.1.3 Prediction Result and Analysis of Water and Soil Loss

In the project of economy comprehensive exploration model town projection supported by World Bank Loan in Xiantang Town, Dongyuan County, Heyuan City, the prediction impact results show that: the area of disturbed origin landscape and damaged ground and vegetation cover is18.98hm^2 and damaged area of facilities for water and soil conservation is 13.90hm^2. After calculating, the project's possible amount of water and soil loss is 5655.2t and newly increased loss is 5356.4t. Considering the newly increased water and soil loss, the amount of loss in construction period is 5242t, which takes up 99.9% of the total loss; the amount of loss in the natural recovery period takes 0.1%. The newly increased water and soil loss most happens in the main construction zone, which covers 94.3% of total loss. See details of water and soil loss prediction in Table.5.9-2.

Water and soil loss is investible in the construction of the project, which will cause harm to environment. It is concretely showed as the following:

（1）The bare area caused by construction can easily give rise to water and soil loss. For example, when the bare area is not fenced, the heavy rainfall will lead to surface erosion and liner erosion which may damage the primary facility and construction and finally cause water and soil loss.

（2）Transporting earthwork and construction will affect the surrounding traffic, environment, operation safety, etc.

（3）The bare area and artificial topography built in the construction are damage to the original natural landscape and extremely inharmonious. Especially during the flood season, rainfall scours the construction area and sediment flows to surrounding areas, seriously affecting the landscape and regional investment environment

（4）During the construction, there will be temporary mound, bare ground and soil excavation surface. Suffering from flood season, these area will cause severe soil erosion and be washed into surrounding river channels as the formation of suspended sediment and bed load, finally resulting to channel siltation.

To sum up, the construction will damage ground and vegetation, change topography in the current soil use scope and cause bare area. So the soil erosion prevention and recovery of

ecological environment during the construction period should be especially pay attention to.

Tab.5.9-2 Prediction of water loss and soil erosion of the construction

Prediction object		Prediction period	Background intensity	Prediction intensity	Erosion area (hm^2)	Erosion time(a)	Background loss (t)	Prediction loss (t)	Newly increased
Main construction zone	Road pavement area	Construction period	500	12000	15.98	2	159.8	3835.2	3675.8
		Natural recovery period	500	1000	15.98	1	79.9	159.8	79.9
	Road pavement area	Construction period	500	20000	1.27	2	12.7	508.0	495.3
		Natural recovery period	500	1500	1.27	1	6.4	19.1	12.7
	Embankment slope area	Construction period	500	20000	1.97	2	19.7	788.0	768.3
		Natural recovery period	500	1500	1.97	1	9.9	29.6	19.7
	Total	Construction period			19.22	2	192.2	5131.2	4939.0
		Natural recovery period			6.05	1	96.1	208.4	112.3
Build area of construction		Construction period	500	15000	0.20	2	2.0	60.0	58.0
		Natural recovery period	500	800	0.20	1	1.0	1.6	0.6
Build area of construction		Construction period	500	25000	0.50	2	5.0	250.0	245.0
		Natural recovery period	500	800	0.50	1	2.5	4.0	1.5
		Total					298.8	5655.2	5356.4

5.9.2 Measures of Water and Soil Conservation

5.9.2.1 Prevention targets

According to *National Soil Erosion Prevention Area and Control Key Area in the Projection of National Water and Soil Conservation Reviewed Classification Results Printed by Ministry of Water Resources (Water Conservation*〔2013〕No.188) and *Announcement of Soil Erosion Control and Prevention Key Area in Guangdong Province Authorized by Guangdong Provincial People's Government*, the place of construction is in Dongjiang upstream national key area of soil erosion prevention and Guangdong provincial key area of soil erosion control. According to *Criterion of Soil Erosion Prevention and Control in Exploration Projection,* this project is the first level implementation project.

Considering precipitation is over 800mm and level of water loss and soil erosion is mostly slight in the project area, the object of water and soil loss control degree, vegetation recovery rate and vegetation cover rate and be modified by add 2 to the criterion. Soil erosion control rate in the mostly slight corroded are should be equal or more than 1. The standard used in the water loss and soil erosion control target in the project can be seen in Table.5.9-3.

Tab.5.9-3 Prevention and control target value calculation

Control criterion	Control indices	Original criterion value	Modified by rainfall	Modified by soil erosion intensity	Modified by terrain	Used criterion value
Level One	Disturbed land reclamation rate（%）	95				95
	Water loss and soil erosion total improvement rate(%)	95	+2			97
	Soil erosion control rate	0.8		+0.2		1.0
	Slag blocking rate（%）	95				95
	Vegetation recovery rate(%)	97	+2			99
	Vegetation cover rate(%)	25	+2			27

5.9.2.2 Overall Layout of Measures For Prevention of Water and Soil Loss

Water and soil conservation comprise engineering measures, vegetation measures and organized managing methods. For road construction projections, not only the implementation should be pay high attention to, but also the effect organized management.

Engineering measures include civil works and afforest. Civil works includes drainage system, grit chamber, temporal slag blocking package, etc. It is also divided into temporal measures and lasting measures. Afforest is usually late stage in the construction, including road greenbelts and ecological recovery after the site clearance. Organized management includes reasonable construction process, scientific construction methods and rigorous construction management. Unreasonable construction methods and anthropogenic waste of earth rock resources will aggravate water and soil loss.

The most water loss and soil erosion happens in the main construction zone in this project. Protection measures took in the zone including temporal drainage ditch, temporal cover, temporal grit chamber, etc. Protection measures took in the temporal dump zone covers temporal drainage ditch, temporal cover, temporal grit chamber, temporal woven bag wall, filling after blocking, etc. Besides, organization management measures, reasonable construction technology, accurate calculation of excavation and fill amount and rational earth-rock allocation are also important. Lastly, it would be better to fill roadbed with debris from cutting excavation to reduce the spoil.

Water and soil conservation measures system of the project can be seen in Figure.5.9-1 and overall arrangement in Figure.5.9-2.

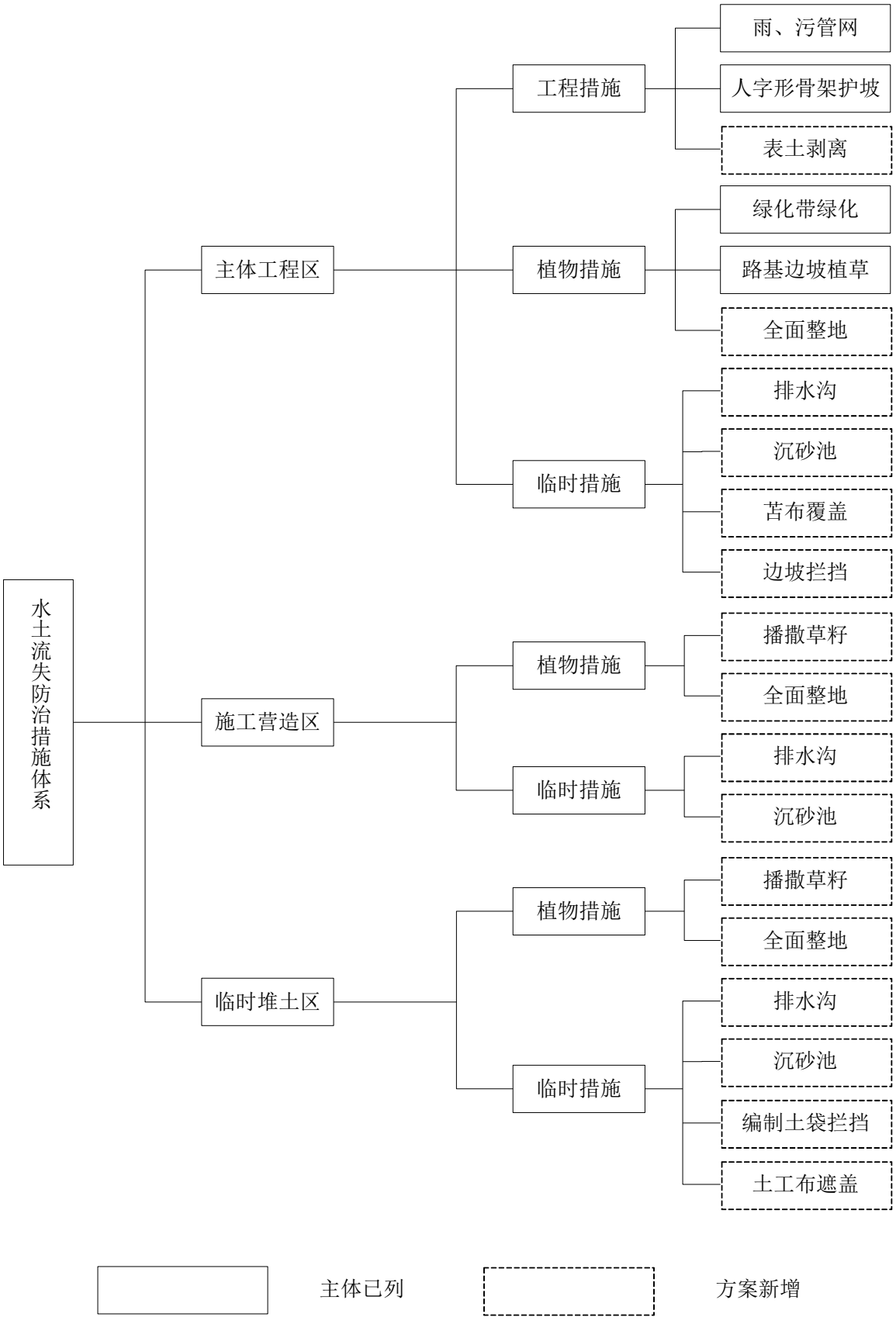


Figure5.9-1 Measures system of soil and water conservation

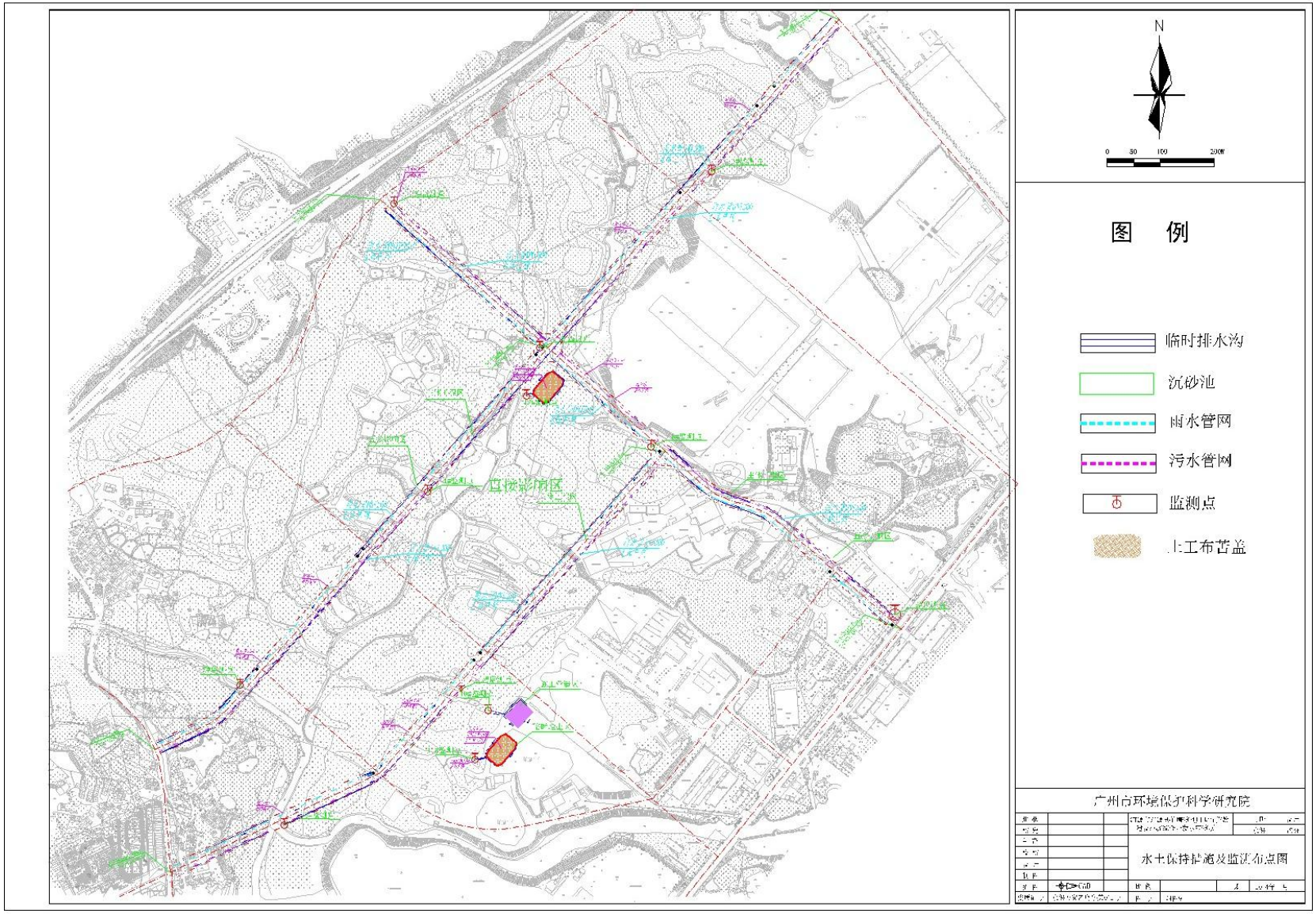


Figure5.9-2 Overall layout of measures for prevention of water and soil loss

5.9.2.3 Design of Prevention Measures in Subarea

According to the analysis assessment of the main construction's function for water and soil conservation, *Water and Soil Conservation of the Comprehensive Economy Development Model Town Supported by World Bank Loan in Xiantang Town, Dongyuan County, Heyuan City (draft for approval)* takes the following design of partitions and measures for the comprehensive control of water and soil loss:

(1)Main construction zone

Constructions in this zone, including pipeline excavation and roadbed smooth, will damage the original water and soil conservation facilities on the surface ground. Furthermore, the surface ground is incompact and bare and will easily cause water loss and soil erosion, especially in rainstorm. So the following actions should be considered to alleviate the problem:

1)Engineering measures:

①Rain, sewage pipe network (listed in the main body):

The main body of the project has designed rain, sewage drainage pipe network. The rain pipe is 4640m in total, which includes 1500m DN1500 pipe and 3090m DN1200 pipe. The sewage pipe is 5270m in total, including 1550m DN1500 pipe and 3720m DN1200pipe.

② Chevron frame slope protection

Chevron frame slope protection is used for the roadbed side larger than 6m and covers 1.20hm2.

③Topsoil stripping (newly increased measure)

Before the pipeline excavation and roadbed smooth, clear the original vegetation, then strip the surface mellow soil and finally put away them in the temporal dump zone, preparing for later afforest. The stripped soil is 11.4 thousands m^3 and covers 3.78hm^2.

2) Vegetation measures

① Afforest the greenbelts (listed in the main body)

Red line in the road of the projection is 30m. There are 2m-width greenbelt in two sides of the sidewalk. The road-side trees are mainly arbor with large crown and heavy shadow, mostly are deciduous tree. The distance between two trees is 5-8m. The total are of greenbelt is 2.11hm^2.

② Roadbed slope protection (listed in the main body)

The main construction in roadbed smooth produces many low slopes. We use 2.04 hm^2 manual grass-planting to protect the slope.

③ Overall land clearing

Before the green belt afforestation measures implemented, it is necessary to conduct a comprehensive site preparation, including plowing, topsoil covering and fertilization. The area of land clearing is about 3.24hm^2 (road greenbelt + roadbed slope).

3) Temporal measures

①Drainage layout (newly increased)

Lay temporary drainage ditches on one side of the new road to guide the rainwater discharge into ditches the project area. Gutter section uses designed section (see section 8.4) – a trapezoidal section with 1.0m up bottom width, 0,5m down bottom width and 0.5m in depth. The excavated earthworks are built into the outer soil edge of the gutter ridge, as ultra-high section for security. Then compact it with pavement geomembrane to prevent erosion. The laid temporary drainage ditches is calculated, having a total length 10.5km, geomembrane 1.81hm^2, the total amount of earth excavation 3937.5m^3.

②Grift chamber (newly increased)

To prevent the sediment goes into the current surrounding drainage ditches, a grift chamber is to be built in the access between temporary ditch gutter and current built gutter. 60 chambers will be built. The settling basin has rectangular cross-section sized in 2m (length) × 1m (width) × 1.0m (depth). The bottom brick thickness is 24cm. The calculated settling basin earth rock excavation is 264.3m^3 and the brick protection is 28.8m^3.

③ Felt tent cover (newly increased)

The bare land caused by pipeline excavated in roadbed area and the main project area cannot be easily protected by lasting protection timely during the construction. It will probably bring about water loss and soil erosion in case of heavy rain due to the loose and bare surface. Thus, temporal cover is required during the construction process when coming up with rainstorms or a sudden stop at night. This project takes geotechnical cloth cover as the temporal cover. Totally, 3.0hm^2 geotechnical cloth is needed in the project.

④Block of the down side slope of filling

When filling the road, water and soil loss is likely to happen if there are no protections in the down side slope. The project use woven rock packet to make an temporal obstruction. According to the construction schedule, the block length is counted as 1000m. The section of the block is trapezoidal one with 0.5m up bottom, 1.0m down bottom and 0.8m high. Totally, 600m^3 earth rocks in woven packet are needed.

(2) Build area of construction

1) Vegetation measures

①Sowing grass seed (newly increase)

This area should be cleaned up and plant seeds after used. The sowing area is about 0.20hm^2.

② Overall land clearing (newly increased)

Before the green belt afforestation measures implemented, it is necessary to conduct a comprehensive site preparation, including plowing, topsoil covering and fertilization. The area of land clearing is about 0.20hm^2.

2) Temporal measures

①Temporal drainage ditch (newly increased)

Temporal drainage ditches should be laid in the building area to prevent water erosion of the outer water. The cross section of the drainage ditch is trapezoid with size of 50cm×50cm (bottom width × height), slope ratio 1:0.5. It is compacted with pavement geomembrane to prevent erosion. The laid temporary drainage ditches is calculated, having a total length 200m, geomembrane 345m^2, the total amount of earth excavation 75m^3.

②Grift chamber (newly increased)

To prevent the sediment goes into the current surrounding drainage ditches, a grift chamber is to be built in the access between temporary ditch gutter and current built gutter. The settling basin has rectangular cross-section sized in 2m (length) × 1m (width) × 1.0m (depth). The bottom brick thickness is 24cm. The calculated settling basin earth rock excavation is4.4 m^3 and the brick protection is 0.48m^3.

(3) Temporal dump zone

1) Vegetation measures

①Sowing grass seed (newly increase)

This area should be cleaned up and plant seeds after used. The sowing area is about 0.50hm^2.

② Overall land clearing (newly increased)

Before the green belt afforestation measures implemented, it is necessary to conduct a comprehensive site preparation, including plowing, topsoil covering and fertilization. The area of land clearing is about 0.50hm^2.

2）Temporal measures

①Temporal drainage ditch (newly increased)

Temporal drainage ditches should be laid in the building area to prevent water erosion of the outer water. The cross section of the drainage ditch is trapezoid with size of 50cm×50cm (bottom width × height), slope ratio 1:0.5. It is compacted with pavement geomembrane to prevent erosion. The laid temporary drainage ditches is calculated, having a total length 420m, geomembrane 725m^2, the total amount of earth excavation 157.6m^3.

②Grift chamber (newly increased)

To prevent the sediment goes into the current surrounding drainage ditches, a grift chamber is to be built in the access between temporary ditch gutter and current built gutter. The settling basin has rectangular cross-section sized in 2m (length) × 1m (width) × 1.0m (depth). The bottom brick thickness is 24cm. The calculated settling basin earth rock excavation is 8.8m^3 and the brick protection is 0.96m^3

③ Block of the down side slope of filling (newly increased)

When filling the road, water and soil loss is likely to happen if there are no protections in the down side slope. The project use woven rock packet to make an temporal obstruction. The section of the block is trapezoidal one with 0.5m up bottom, 1.0m down bottom and 0.8m high. Totally, the block length is about 420m and 600m^3 earth rocks in woven packet are needed. The earth rock used in the woven packet can be dump surface soil.

④ Geotechnical cloth cover (newly increased)

The bare land caused by pipeline excavated in roadbed area and the main project area cannot be easily protected by lasting protection timely during the construction. It will probably bring about water loss and soil erosion in case of heavy rain due to the loose and

bare surface. Thus, temporal cover is required during the construction process when coming up with rainstorms or a sudden stop at night. This project takes geotechnical cloth cover as the temporal cover. Totally, 0.50hm^2 geotechnical cloth is needed in the project.

5.9.2.4 Summary of Newly Increased Measures for Water and Soil Conservation

Water and soil conservation measures include several sections, such as engineering measures, vegetation measures and temporal measures. According to the main construction design, to perfect the protection system, some engineering measures, vegetation measures and temporal measures are newly proposed. See details in Table5.9-4.

Tab.5.9-4 Summary of newly increased measures for water and soil conservation

No.	Measures	Unit	Main construction zone	Built area zone	Temporal dump zone	Total
Section one	**Engineering measures**					
1	Topsoil stripping	m^3	11400	-	700	12100
Section two	**Vegetation measures**					
1	Overall land clearing	hm^2	3.24	0.20	0.50	3.94
2	Sowing seeds	hm^2		0.20	0.50	0.70
Section three	**Temporal measures**					
1	Temporal drainage ditches	m	10500	200	420	11120
1.1	Excavation	m^3	3937.5	75	157.6	4170.1
1.2	Geotechnical cloth cover	m^2	18100	345	725	19170
2	Grift chamber	座	60	1	2	63
2.1	Excavation	m^3	264.3	4.4	8.8	277.5
2.2	Brick	m^3	28.8	0.48	0.96	30.24
3	Woven rock packets block	m	1000		420	1420
3.1	Woven rock packets earth volume	m^3	600		252	852
4	Geotechnical cloth cover	m^2	30000		4800	34800

6 Environmental Risk Analysis and Mitigation Measures

6.1 Environmental Risk Analysis

6.1.1 Identification of Environmental Risks

The environment pollution caused by road traffic accident will have the following impacts:

(1) Pollution to the earth's surface of a certain range of the accident scene and nearby

(2) Air pollution to a certain range of the accident scene and nearby

(3) Pollution to surface water and underground water.

Among them, the pollution to earth's surface is limited and its impact can be easily controlled because of the poor mobility of the soil. Unlikely, gas pollutants is hard to be controlled because of its large mobility and strong diffusion. However, due to the fast air diffusion and big environmental capacity, leakage of gas can be quickly diluted. Therefore, the accident influence will have a shorter duration and light "sequence". As for the liquid water, once pollutants are discharged into the water, the pollutants will diffuse, transport and transfer faraway along the flow direction. The area and degree of the impact is of large uncertainty. Therefore, pollution of surface water and underground water caused by the leaked pollutants in traffic accident is one of the most important aspects of the environmental risk assessment for highway construction projects.

6.1.2 Possible Environmental Pollution Accident

The explosion caused by fire explosive hazardous substance is included in the content of safety and risk prevention. The raw materials and products of industrial enterprises in our project area are not toxic, hazardous, flammable and explosive. Accordingly, the analysis and evaluation of this report of environmental risk of leakage of hazardous substance will be regarded as possible preventive measures for the introduction of related businesses in the future.

(1) Risk of environmental accidents that may arise in this project is the crash, rollovers and other accidents occurs on vehicles with dangerous chemicals, resulting in chemical spills;

chemical leakage into the atmosphere, polluting the atmosphere.

(2) When the vehicle with dangerous chemicals passing agricultural irrigation ditches get turns over, hazardous substances will leak into water in the project area, resulting in nearby water pollution.

6.1.3 Risk Type

This project is a road construction project, the main causes of the accident is car accidents, which can be classified into fire disaster, explosion and leakage according to causes.

6.1.4 Result of Risk Identification

Environmental risks of accidents that may occur in this project are mainly crashes, rollovers and other accidents of vehicles with hazardous chemicals, resulting in chemical spills; chemical leak into the atmosphere and water environment, causing air pollution and water pollution.

6.2 Analysis of Environmental Impact

According to the result of environmental risk identification, the potential environmental risk impacts of the project are analyzed as followed:

(1) Air pollution: If the vehicle with volatile or flammable hazardous chemicals is involved in a crash, rollover and other accidents, secondary air pollution will occur during the process of chemicals diffusion or combustion. Along the project are residential quarters such as Xingfu Village，therefore，lives and property safety of the surrounding population will be in great danger once air pollution produced.

(2) Water pollution: Because the project goes through the Xu Dongshui, and there are some agricultural irrigation channels along the project district, crash or traffic jams involves vehicles with hazardous chemicals will result in leakage of dangerous chemicals into water, and then these pollutants may be transported along water to Dongjiang River, inducing an impact on quality of Dongjiang.

6.3 Environmental Risk Prevention and Mitigation Measures

6.3.1 Environmental Risk Prevention During Construction

(1) During the process of road planning and design, we should pay attention to the following things: design of linear, such as linear length limit, linear and circular curve, transition and coordination with a reasonable proportion of the curve, smooth and nature of the road alignment, coordination between line and environment or landscape, longitudinal slope and its changes in the road, avoidance of reverse curve or a enough straight long line long enough added in a reverse curve increasing range of visible as much as possible and helping better drivers' psychoreaction. Warning signs and speed limit signs should also be set up in the road without enough sight.

(2) During the construction, the flatness, roughness and skid of the road surface should be kept moderate.

(3) In some special sections, the standard of road traffic safety facilities should be raised, such as the guardrail (crash barriers) heightening and reinforcement. Glare shield should be set for lighting of coming vehicle when driving at night. Central zone and the sight induced flag setting should be improved, as long as facility design standard of lighting, road signs, pavement signs, warning signs, speed limit signs or striking multiple warning markings.

(4) Installation of traffic monitoring system

Installation of traffic monitoring system can collect data and information in time, determine traffic and weather abnormalities, publish real-time information and cooperate with the patrol in traffic management and counseling. It can not only reduce overcrowding and congestion, but also discover and deal with traffic accidents, reducing vehicle delay as soon as possible, etc.

(5) Minimize the impact of construction vehicles on the pedestrian.

6.3.2 Preventive Measures of Risk During Operation

1、Traffic safety

Accidents have become one of the most important causes of global casualties. The implementation of a variety of general security measures should be taken to reduce injury and death during transport process to protect road users. By the best mode of transport, the public

injured can be minimized. General road safety initiatives should include:

(1) Emphasize safe driving and improve the requirements of the driving skills of the driver.

(2) Using publicity to avoid driver fatigue driving, avoid dangerous sections, reducing the risk of accidents.

(3) Apply speed system to regulate and monitor driver driving speed.

(4) Educate and publicity to force the owner to regular maintenance of road vehicles, to minimize accidents due to the outdated equipment.

(5) Set "slow driving, safe driving" the warning signs, take traffic safety education in important sections of the road, especially in schools and the crowded road, by the local community and school organizations.

2、Transportation of hazardous materials

（1）Strengthen management. Government departments should observe to a series of laws and regulations strictly scrutinizing qualification of business industry standardizing release process of dangerous goods transportation permit, strengthening market supervision and management. Transporters of dangerous goods should hold three certificates form public security department issued, named transport license cards, driver's licenses and security guards certificate. Vehicles with arsenic and other highly dangerous goods must inform Exchange Commission before start off and accept road safety checks at the same time. There must be eye-catching words mark “containing dangerous goods” on vehicles. Transportation of dangerous substance should be approved by traffic department and get highway transport license. Three-wheel motor vehicle and non-motor vehicle must not transport dangerous substance. Carriers of explosive and chemical substance should have transport permit provided by police. Transportation of toxic chemicals should follow the “toxic chemicals highway transportation permit” provided by the police. Transportation of dangerous goods is required to practice the system of “transport license”, “driving license” and “supercargo”. Vehicles used for transporting dangerous goods should use uniform special mark and get fixed point detection.

In addition, we should increase penalties for violations, strengthen the management of dangerous goods transport vehicles of the eliminated scrap, forbid overload and scrap vehicles.

Enterprises engaged in road transportation of dangerous chemicals should make perfect enterprise's articles of association and the safe production management system; for operators of dangerous goods, operating procedures and personnel should make corresponding operation procedures and strictly implemented. Enterprises should strengthen the drivers, supercargo, loading personnel, vehicle maintenance staff safety education, skills training, establish strict post responsibility system and operational procedures, improve the staff's service quality. Relevant personnel must be familiar with the risk of the transport of dangerous chemicals, transport properties and emergency treatment measures. System of dangerous goods transportation safety card should be built. Insist onto daily "three check" policy. Highway management departments should declare management system to the transport of dangerous goods. Cars on the highway should be checked: whether the three certificates are in readiness, whether the waybill is consistent, whether the vehicle is overload, etc. For poor packaged, damage and unclear chemicals and tanks that do not meet the safety requirements should be intercepted. Generally dangerous goods transport vehicles should be transported in the interval with less traffic accident and low traffic volume.

(2) In the process of transportation, carriers are forbidden to use the open flame and smoke and lift irrelevant personnel. Vehicles shall not stop at a gas station and public gathering places, etc. When driving, it is necessary to keep a safe distance, focus and strictly follow the traffic rules and operational procedures to keep running smoothly. Also it is required to follow "three no, five know, five prevention" (three no: no speeding, no running, no overload; five know: know people, know road, know car, know weather, know goods; five prevention: prevent cold, prevent slippery, prevent freeze, prevent explosion, prevent fire). It is forbidden to fatigue driving and drunk driving, etc. If the vehicle is broke down on the way, people are not allowed to left the car. Vehicles should be guarded and pay attention to the surrounding environment in the rest of time.

(3) The solar exposure and bumps increase container’s temperature and pressure. Overpressure explosion can occur. Explosive inflammable goods transport in summer should be arranged in the morning, evening or night. Transportation at noon should take necessary measures for shading or cooling. Dangerous chemicals easily get static should be transported with non-electrostatic chemical additives. Or other measures should be taken to prevent

electrostatic fire explosion accident. Hazardous chemicals with easy combustion and explosion or produce toxic gases when encountering damp should not be transport in rainy day, unless it has good packaging and moisture proof. Weather conditions should draw close attention. Avoid driving under the weather such as rain, snow, fog.

(4) Highway management departments should do well in highway management, maintenance and repair. Once the road has a defect, bumpy, hole concave and facilities damage, timely maintenance should be make. Otherwise a warning sign should be set up.

(5) Dangerous chemical transportation vehicles should have vehicle and container detection in accordance with the provisions. It is prohibited to let unqualified vehicles, containers, vehicles assembled of end-of-life or self-modified vehicles and self-reformed vessel engaged in dangerous goods transport. And dangerous chemical transportation vehicles must be equipped with appropriate safety devices, such as exhaust pipe spark arrester, relief valve, wave plate, sun shade, pressure gauge, level gauge, in addition to electrostatic equipment and necessary fire- fighting equipment.

(6) Transport of dangerous goods vehicles drivers must understand and obey the relevant state and local laws and regulations on dangerous goods transport. These laws, rules and regulations mainly include: 1) *The hazardous chemical materials safety management regulations* ， the State Council; 2) *The flammable and explosive chemicals fire safety supervision and management measures*, the ministry of public security; 3) *General technical conditions on the packing of dangerous goods transport* (GB12463); 4) S*tandard of road transport of dangerous goods vehicles* (GB13392); 5) *Road transport of dangerous goods regulations*， the ministry of transportation; 6)*Car dangerous goods code* (JT3130); 7) road transport of dangerous goods regulations made by Heyuan municipal government, etc.

(7) Faced with bad weather conditions (such as windy weather conditions) and the peak traffic, vehicles loading dangerous goods should be prohibited to pass through. And an effective emergency agency should be established quickly.

(8) Dangerous goods transport vehicles should be kept safe from carrier, it is forbidden to overtake and speeding.

(9) Make emergency plan

Observe to the *Law of Road traffic safety of The People's Republic of China* strictly. An

emergency management plan should be make quickly judging from the highway transportation actual risk accident. Responsibilities and tasks including: selection of emergency technology and the processing steps; equipment configuration and the layout; the guarantee of manpower, material resources and allocate; dynamic monitoring system of accidents, etc.

6.3.3 Dangerous Goods Transportation Accident Treatment Measures

(1) Pay attention to safety when go into the leaking site for processing

Workers entering the scene rescue must be equipped with the necessary personal protective equipment.

If the leaked substance is flammable and explosive, accidental zone will be prohibited from fire, power and vehicles entering. Immediate warming line should be set at the border. Determine the evacuation of people in the accident area by judging the progress and situation of accidents.

If the leakage is toxic materials, special protective clothing and isolated air mask should be used. For the correct use of facilities and adaptation in the scene, people should be strictly adaptive training. Set the alarm line at the border of central accidental area as soon as possible. Determine the evacuation of people in the accident area by judging the progress and situation of accidents.

Independent action is forbidden in emergency processing. There must be a guardian. Use water gun and water cannons to cover if necessary.

(2) Control of leakage source

Plug. Appropriate materials and techniques can be used to block the leak.

(3) Leakage management

Dike interception: Intercept the leakage of liquid or guide it to safe place. When tank liquid leakage occurs, we should block the leaks in time to prevent the outflow of material and environmental pollution.

Dilution and covering: Spray water mist to the harmful vapor cloud to accelerate gas diffusion to the upper air. For fuel, we also can spray a lot of steam or nitrogen in the field to destroy combustion conditions. For liquid leakage, in order to reduce the material to air

evaporation rate, we can cover them with the usable foam or other covering article forming a coating layer over leaked material to inhibit evaporation.

Collection: Leakage can be collected into the container or tankers. If the leakage amount is small, the available sand or other absorbent material can be used for absorption of leakage materials.

Disposal: The collected materials should be transported to the waste disposal department for management. Rinse the remaining material with a small amount of water and collect the water for further processing.

7 Demolition and Resettlement

7.1 Project Introduction

XIEDSTP is one of the six subprojects of the projection of comprehensive economy development model town supported by world bank loan in Guangdong. The project undertaking organization is People's Government of Xiantang Town, Dongyuan County, Heyuan city. The project has respectively set up "coordination leading group of the comprehensive economy development model town projection supported by World Bank loan" in the county and town. The coordination leading groups are responsible for leading, organizing and coordination the implementation of the projection.

The projection of comprehensive economy development model town supported by world bank loan in Xiantang Town, Dongyuan County, Heyuan City main construction objects include: construction of Xudong Road One, insdustry Road and Xinquyi Road; construction the three roads' the supporting drainage, lighting and afforest; enhancement of the soft power like management and monitoring ability.

To guarantee people who are affective by the land acquisition of public construction can access to legal compensation that can ensure their living standard not lower than current one and probably be better, National Research Center for Resettlement (NRCR) Hehai University made the resettlement plan report of the project according to relevant laws and regulations of the People's Republic of Guangdong Province and the World Bank Safeguard Policies -- OP4.12/BP4.12 *Involuntary Resettlement*.

To compile the plan, the compilation unit has finished regional socio-economic survey and physical loss of land acquisition and relocation of investigation in 2014 July-August. And in August 2014, they enriched the above materials and supplemented the surveys. They also conducted sample survey of family basic conditions and public opinion all along the affected families. Furthermore, the organization with the county district (city) government officials, village leaders and affected families. They got large amount of information of substantial problems such as land acquisition, affected number of people, labor resettlement, compensation standards, etc. On the basis of the above work, in September 2014 they

completed the resettlement plan (RAP), and revised and improved the pan in the same month. The main content of this chapter is consistent with the related content in RAP.

7.2 Project Impact

The projection of comprehensive economy development model town supported by World Bank loan in Xiantang Town, Dongyuan County, Heyuan City involves land acquisition, house removal and resettlement. These activities will inevitably affect the local current living and production condition. To reduce the construction impact on local social economy, the projection owner and the local government insist on minimizing the construction impact. They take efficient actions in choosing projection site and construction process to reduce the impact of the project on land acquisition and removal.

During the period of planning and design, the design organization and projection owner follow the principles that "Try best to avoid the compact district and housing estate and reduce amount of removal. Try best to minimize the occupation of plow and land. Decrease the excavation of earth rock and amount of waste slag". They optimized the routes and successfully reduce the damage area of water and soil conservation facilities, the excavation of soil and stone, the amount of waste slag, numbers of removal and the total cost of project. The actions all accord with the local plan and government opinions.

7.3 Legal Framework

7.3.1 Applicable Law

The resettlement project strictly observed to relevant laws and regulations of the People's Republic of Guangdong Province and the World Bank Safeguard Policies -- OP4.12/BP4.12 *Involuntary Resettlement*. The major law and polices basis are detailed in RAP.

7.3.2 Differences Among Domestic Resettlement, World Bank's Resettlement Policy and Practice

With the improvement of China's relevant policies, the current domestic policies on land acquisition and resettlement are compatible with the resettlement policy and practice of World Bank's. Especially, the implementation process of dam construction project in the country is almost consistent with the requirements of the World Bank. Undeniably there are some

differences in the following areas:

(1) Vulnerable groups. World Bank actively cares about the vulnerable groups but domestic resettlement policy has not involved them yet. Although other domestic policies (such as poverty alleviation) pay high attention to this group, but it is not active in resettlement or prospective concern after all.

(2) Illegal or unlicensed buildings. Country resettlement compensation policy stipulates the following situations access to no compensation: buildings (structures) without legal approval; using area exceed to the approval or buildings (structures) exceeding to the approved plan construction area. The above-mentioned constructions are so-called illegal or undocumented house. World Bank considered that buildings (structures) which are illegal or without approval reflects the project affected people's living standards and current life situation. The people should be given adequate compensation and convenience placement in order to avoid property damage and negative influence caused by project caused. So that World Bank can help them recover or even improve the current standard of living.

Aiming at the above to differences, the immigration organization in this project took particularly attention and statistics to the effected amount of social economy and materials.

7.4 Project Impact

7.4.1 Project Impact Survey

In order to understand physical quantities affected by the project, according to World Bank’s requirements, from May 11,2014 to Jul 1,2014, Public’s Government of Xiantang Town and feasibility study consulting unit conducted survey on physical quantities in Xudong Road One, insdustry Road and Xinquyi Road.

From July 11, 2014 to August 12, 2014, Resettlement Planning Group Hehai University and Projection Leading Group in Xiantang Government carried out survey on resettlement situation of the affected villagers. According to World Bank, structured interviews were conducted to all relocation household and spot-checked socioeconomic conditions of 20% of affected households.

7.4.2 Areas Affected by Project

The projection of comprehensive economy development model town supported by World Bank loan in Xiantang Town, Dongyuan County, Heyuan City involves Xudong Village and

Hongguang Village. See details of the impact in Table.7.4-1.

Tab.7.4-1 Areas affected by project

Village/Town	Administrated village	Project content	Impact type
Xiantang Town	Xudong Village	Xudong Road	Land acquisition and resettlement
		insdustry Road	Land acquisition and resettlement
		Xinquyi Road	Land acquisition only
	Hongguang Village	insdustry Road	Land acquisition and resettlement
		Xinquyi Road	Land acquisition only

7.4.3 Project Impact Situation

According to field investigation and physical quantity survey, the main types of impact of the project include: (1) loss of collective land acquisition; (2) demolition of rural residential properties; (3) demolition of state-owned enterprises and public institutions; (4) demolition of on property attachments; (5) demolition of ground attachments. See Table 7.4-2 for details.

Table 7.4-2 Summary of scope of construction and key resettlement impacts of the Subproject

Administrative village	Road name	Occupied collective land（mu）	Occupied state-owned land (mu)	Area of property demolition (m^2)
Xudong	insdustry Road	76	0	2310
Xudong	Xudong Road One	86.1	0	420
Xudong	Xinquyi Road	10.5	13.5	0
Xudong	Total	172.6	13.5	2730
Hongguang	Xinquyi Road	26.7	0	0
Hongguang	insdustry Road	26.9	0	1375
Hongguang	Total	51.6	0	1375
Total		226.2	13.5	4105

7.4.3.1 Acquisition of Rural Collective Land

Collective land acquisition of the project affects Xudong Village and Hongguang village. In the projection area in Xiantang, there are two kinds of cultivated land: paddy field and dry field. Also, it has two kinds of mountain land: private hilly land managed by household and

collective public hilly land owned by village.

The roads in this project occupies 12.6mu paddy field in Xudong, 37mu private hilly land in Xudong,2mu private hilly land in Hongguang, 70.5mu public hilly land in Xudong，22.5mu public hilly land in Hongguang ,17mu pond in Xudong and 4mu pond in Hongguang. The total occupied land is 226.2mu.

Tab. 7.4-3 Summary of acquired collective land (unit: mu)

Administrative village	Road name	Cultivated land	Orchard land	Unused land	Public hilly land	Pond	Total
Xudong	insdustry Road	2.6	19	14.1	23.3	17	76
Xudong	Xudong Road One	8.5	9	11.4	57.2	0	86.1
Xudong	Xinquyi Road	1.5	9	0	0	0	10.5
Xudong	Total	12.6	37	25.5	80.5	17	172.6
Hongguang	Xinquyi Road	0	2	0	24.7	0	26.7
Hongguang	insdustry Road	0	0	0	20.9	6	26.9
Hongguang	Total	0	2	0	45.6	6	51.6
Total		12.6	39	25.5	126.1	23	226.2

7.4.3.2 Lasting Occupation of State-Owned Land

In the construction of the project, Xinquyi Road goes across material dump zone of Yaohui clay processing industry. This area was converted to the state-owned construction land (about 100mu) in 2002. Since no development and construction plans have been released to this part of the state-owned construction land, the land has been leased to Yaohui clay processing plant as pile materials heap zone. Yaohui factory is industrial and mining enterprises in the region, living for clay excavation and processing. The new district will go through the company’s clay stacking area (leased state-owned construction land) without any equipment and plant. Project does not involve relocation and demolition. It only permanently occupies 13.5mu state land leased by the enterprise for construction.

7.4.3.3 Temporal Occupation of Collective Land

Stacking of building materials and mechanical equipment and erection of temporary shed for project construction will cause impact of temporary land occupation.

Half of the road construction is on the public mountain which is mostly barren with a small part of planted fruit trees. In order to reduce impact of temporary occupation of land on the surrounding people's life and production, saving cost, the temporal occupied land of the project is only the unimplemented road in red lines without any collective land. Project construction vehicles enter the construction site from the original sand stone road or dirt road. The project does not involve temporary land occupation impact.

7.4.3.4 Demolition of Rural Residential Properties

The demolition of rural residential properties in this project involve 4105 ㎡ in Xudong and Hongguang, affecting 14 families and 66 people. The demolition area of Xudong is 2730 ㎡, taking up 66.5% of the total area, affecting 13 families and 62 people. All of the demolitions of residential properties in Xudong are temporal houses left for the people caring for private hilly land and paddy field. There are no permanent residents and most of the houses are vacant for storing farm tools. It also covers 4 stys and 2 foundations. The demolition area of Hongguang is 1375 ㎡, 33.5% of the total area, affecting 1 family and 4 people(The family use the private hilly land changed with others to build 3 big houses, which primarily aimed for running farmhouse. But it failed for some reasons. Now the houses are used for parking cars and storing farm tools.). See details of demolition of rural residential properties in Table7.4-4.

Table 7.4-4 Summary of rural residential properties demolished for the project

Administrative village	Area of property demolition (m^2)				Affected family（family）	Affected population（population）
	Masonry concrete	Sty	Foundation	Total		
Xudong village	1000	1500	230	2730	13	62
Hongguang Village	1375	0	0	1375	1	4
Total	2375	1500	230	4105	14	66

7.4.3.5 Ground and Property Attachments

The attachments of project area include: 943fruit trees(135 litchi trees and 796 longan trees), 300m canal,3000m water pipe, 13 power pole, 1 irrigation facility and 20 graves.

The affected attachments are listed in table7.4-5.

Table 7.5-5 Ground and property attachments

Road name	Attachments type	Ownership	unit	Amount
insdustry Road	Electric power facilities	Xiantang Town	/	2
insdustry Road	Canal	Xiantang Town	m	300
insdustry Road	Longan tree	Liuquan, Liu Xinxiong, Liu Xinqiang, Gu Wangchuan, Liu Haiping	mu	19
insdustry Road	Grave	villager	/	13
insdustry Road	Water pipe	Xiantang Town	km	3
Xudong Road One	Electric power facilities	Xiantang Town	/	7
Xudong Road One	Water conservancy facility	Xiantang Town	/	1
Xudong Road One	Litchi tree	Liu Xinqiang	mu	5
Xudong Road One	Longan tree	He Guiming	mu	2
Xudong Road One	Grave	villager	/	5
Xinquyi Road	Electric power facilities	Xiantang Town	/	4
Xinquyi Road	Longan tree	Chen Chaqiang, Chen Xinwei, Chen Weiqiang	mu	9
Xinquyi Road	Grave	villager	mu	2

7.4.3.6 Affected Population

Three roads construction in the project affect 34 families and 185 people in total. The acquisition of collective land affects 34 families and 185 people. Demolition of the rural residential affects 14 families and 66 people. Land acquisition and relocation affect 14 families and 66 people.

Most people affected by the project are from Xudong. People affected in Hongguang are 2 families containing 9 people. The total population affected in Xudong is 176 people in 32 families. See details in table 7.4-6.

Table 7.4-6 Summary of affected population

Administrative village	Acquisition of collective land		Demolition of residential		Land acquisition and demolition		Total	
	family	population	family	population	family	population	family	population
Xudong village	32	176	13	62	13	62	32	176
Hongguang Village	2	9	1	4	1	4	2	9
Total	34	185	14	66	14	66	34	185

7.4.3.7 Affected Vulnerable People

Vulnerable people affected by the project are two families, all of whom are land acquired and relocated. It covers 6.06% of the total affected families. One family does not have man. The other one is five guarantees household. There are 24 needy household in Xudong and 8.33% are affected by the project. See details in table 7.4-7.

Tab. 7.4-7 Affected vulnerable people

Road name	Head name	Vulnerable group type	Administrative village	Village group	Vulnerable population	Family members	Family labor	Affected type
insdustry Road	Liu Yonglian g	All women	Xudong Village	Minzhu 12	2	5	4	Land acquisition, demolition
Xudong Road One	Liu Luodun	Five guarantees family	Xudong Village	Shengli 5	2	2	0	Land acquisition, demolition

7.5 Production and Livelihood Restoration Programs for Displaced Persons

7.5.1 Objectives of Resettlement

According to World Bank OP4.12, the resettlement of the Subproject is intended to compensate total losses of displaced persons, ensure reasonable resettlement and good restoration, allow them to share the project's benefits, and subsidize their temporary difficulties so that their income and living standard as well as corporate production and profitability can be improved or really restored to the high level before demolition or commencement at least.

7.5.2 Principles of Resettlement

7.5.2.1 Principle of Resettlement Minimization

By means of belt-shaped project construction characteristics, design orientation can be properly modified so as to minimize impacts on displaced persons by the Subproject and their finds input as well as the number of displaced persons.

7.5.2.2 Principle of Equivalent Compensation

Equal compensation will be implemented to ensure that the standard of living of displaced persons will not be reduced by the Subproject. It includes replacement cost compensation for property and equal compensation for other loss.

(1) In case rural land acquisition, all losses will be compensated reasonably according to policies, and compensation fees will be distributed or used in a way agreed by affected persons. Displaced persons working on the land will be given jobs by local government, project management office and village committee based on the principle of "local resettlement and multi-channel employment" so as to ensure that their standard of living will not be affected.

(2) Displaced households will be given resettlement housing with equivalent traffic, supporting facilities and surrounding environment to original ones or with value equivalent to original ones or higher compensation.

(3) Public facilities will be fully restored with their function at least no lower than original level so as to ensure normal livelihood of persons not displaced around the construction site.

(4) For displaced persons affected temporarily by the Subproject or those not displaced whose partial properties suffer from loss will be given equal compensation.

7.5.2.3 Principle of Concern About Key Points

(1)The project management office will pay attention to vulnerable groups (elder persons without family, widow, single parent family, disabled person and needy household). During the demolition, preferential policies will be given such as housing construction, social security, training and employment. Regular return visit will be paid after resettlement. Assistance will be provided to special difficulties until they are handed over to local civil administration

department.

(2)The project management office will devise development demolition and dispatch local government forces to provide employment training for displaced persons and create more jobs so that they can adapt to resettlement environment within a short time and make themselves economically independent, and promptly transfer the resettlement responsibility to the displaced persons themselves from the resettlement department.

(3)The project management office will maximize the resettlement cost benefits, improve the resettlement ability of the resettlement department, standardize the resettlement work, establish improved internal control mechanism and prevent wasting, retention, fraud and corruption of funds so as to make better use of resettlement funds, thus achieving the optimal resettlement effects.

7.5.3 Measures of Resettlement

7.5.3.1 Resettlement and Restoration for the Acquisition of Collective Land

1. Resettlement program

The field survey shows that, most affected households welcome the project; they think that, the implementation of the project will bring great convenience to their production and livelihood. According to relevant policies, there are two resettlement modes for households affected by land acquisition: cash compensation and social security. Social security will be voluntary. Displaced persons are voluntary to pay fees and financial departments at all levels will give subsidies so as to ensure the basic standard of living after they become elder.

（1）Cash contribution

Affected displaced persons can obtain cash compensation according to compensation standards and lost arable land. Through consultation between affected village committee and more than 2/3 villager representatives, at the meeting, land compensation fees and resettlement subsidies will be directly paid to affected households in full and village will not take them as retained expenses. Young crop compensation fees will be paid directly to the proprietor. Affected households can use compensation fees to plant cash crops, develop household by-business or do commodity business, develop catering and service, or purchase social insurances.

（2）Social security

In November 2009, Guangdong Province started new rural endowment insurance systems; in October 2010, Dongyuan County started pilot new rural endowment insurance systems (hereinafter referred to as "new rural endowment insurance"); according to the *Opinions on Doing a Better Job in Providing Endowment Insurance to Land-expropriated Farmers in Our Province (GPG Office [2010] No.41)* and the *Opinions on Doing a Better Job in Providing Endowment Insurance to Land-expropriated Farmers in Our City (HPG Office Letter [2011] No.41)*, rural endowment security systems of farmers affected by land acquisition should be incorporated into new rural endowment insurance systems in pilot areas of new endowment insurance in Guangdong Province.

Those who accord with the requirement of endowment insurance of farmers affected by land acquisition can participate in new rural endowment insurance (including the endowment insurance of farmers affected by land acquisition) on a voluntary basis.

2、Measures to restore livelihood

In order to properly resettle the displaced population and restore or improve their income, besides the above resettlement methods for the farmers affected by land acquisition, the following auxiliary measures will be adopted so as to restore livelihood of the affected population.

（1）Village-level reserved land

According to the *Administrative Measures of Guangdong Province for the Acquisition of Retained Rural Collective Land (GPG Office [2009] No.41)*, the Land and Resource Department and organization using land should take 10%-15% of collective land acquisition as the village-level economic development land.

Through communication between Xiantang Town Land and Resource Bureau and affected village committees, Xiantang Town project management office will return 15% of land acquisition for the affected villages as the village-level economic development land. Village-level reserved land will be merged into local industrial land use, attracting investment and developing local economy. Village collective organization get bonus from the profit of the industrial company and distributing the bonus to farmers. Villager themselves may have a personal stake in the company identity with resettlement, directly get dividends from the

company.

（2）Technical training

According to the *Notice of the General Office of the Guangdong Provincial Government on Forwarding the Opinions of the Guangdong Provincial Department of Labor and Social Security on Doing a Good Job in Providing Endowment Insurance to Land-expropriated Farmers*, and based on ages of farmers affected by land acquisition, different security modes will be used. Those aged above 16 but below 35 will be the key objects of employment training and incorporated into the "Skills Training Program of One Million of Rural Youths of Guangdong Province" and occupational skill training programs. Practical occupational skill training will be held.

（3）Employment

Farmers affected by land acquisition for the Subproject will be incorporated into public service system and urban unemployment registration management system, enjoy the consistent public employment service and relevant training support policies as urban residents, and participate in social insurance for urban employees after employment according to specifications. Farmers affected by land acquisition are encouraged to seek jobs independently or become self-employed. Those within the labor age and with employment will can enjoy the support policies from *Notice of Re-employed Technical Training for the Laid-off Workers and Unemployed People in 2013(Human Resources and Social Security in Dongyuan (2013) No.33).* The technical training can be taken for a week with no charge, including vocational technique training and entrepreneurship training. The fund of training is supported by Dongyuan County Re-employment Fund. The government will exploit public welfare positions for farmers affected by the project in the first consideration. It also encourages farmers contracting barren hills to develop plantation.

In addition, the Subproject will provide some temporary jobs for displaced persons with short-term income so as to help improve their standard of living and restore their livelihood. Through communication and consultation with Xiantang Town project management office, the project manager is committed to require construction agencies to provide non-technical posts to displaced persons affected by land acquisition and property demolition preferentially. The project can provide temporary jobs for displaced persons, which are mainly low

technique required jobs including civil operation, handling, greening and trench excavation. The daily wage is 150-200yuan. As most young and adult of affected households migrate to work and most females stay at home, the construction agency can provide posts suitable for females such as greening, cleaning and excavation. Affected rural females will be employed preferentially.

7.5.4 Resettlement for the Demolition of Rural Residential Properties

The total demolished rural resident housings of the project is 4105 m2, affecting 66 people of 14 households. According to relevant policies and consultation with project management office and representatives of affected townships, villages and villagers, cash compensation, housing land transfer for self-building and housing land shares will be used for rural residential property affected by this project. During moving and resettlement, some subsidies will be given. The three kinds of compensation are all "land and house separated"—houses compensation and housing land compensation differentiate from each other. The price of compensation for house is confirmed by the third party assessment company. The immigration can chose different setting mode of the housing land compensation depending on his or her economic situation and personal need. The following are the main kinds of setting modes:

(1) Cash resettlement. According to relevant standard, housing will be compensated to proprietors. Housing land will also be compensated to proprietors directly according to relevant compensation standards for collective land. Displacers can use compensation fees to purchase commercial housing.

(2) Transfer of housing land for self-building. The housing land will be transferred by the village collective organization according to planning and affected households will build new housing independently. The project management office and implementing agency will provide funds for water, electricity and road supply and site leveling.

15% of land acquisition will be reserved for the village-level economic development. The resettlement place is village reserved area chosen to be in the industrial parks. The land target is got from "three old reform" policy. The secondary land acquisition and resettlement of displaced persons will not be involved. Specific site will be finalized by relevant

departments.

(3) Housing land shares. The relocation household can directly take the 80m2 housing land transferred as shares of the village collective company to get dividends. Then the relocation household cannot enjoy the distribution of housing land and cash compensation. Instead, they got shares of the village collective company and get the annually dividends. The detailed methods of participation and profit allocation plan need further negotiation. Further tracking of the implementation process and effect is need.

(4) Subsidies for the resettlement. The project management office provides relevant bonus and subsidies. The temporal resettlement subsidies (interim money) are 100-150yuan monthly. The interim is usually 6 months. The amount of bonus depends on the chronological order, which is between 2000-5000yuan.

7.5.5 Resettlement and Restoration Program for Vulnerable Groups

During the whole resettlement of displaced persons, Xiantang Town project management office and the village collective organization will pay special attention to vulnerable groups within the subproject area. In addition to livelihood and production resettlement for vulnerable groups according to the implementation plan of the Subproject, certain assistance will also be provided to help them restore their income and get developed as quickly as possible.

7.5.5.1 Assessment Measures

(1) The affected poor households can receive housing reconstruction financial subsidies for the project. On the basis of the 10000yuan provincial financial subsidies per household, the financial supporting funds of city and county should not be less than 5000yuan (city and county financial ratio is 1:4).

(2) The households suffering from livelihood difficulties affected by the Subproject will be promptly incorporated into urban and rural assistance for households receiving minimum living security. Their difficulties will be overcome and livelihood subsidies (above 147yuan/month) will be provided for them.

(3) Study grant and part-time job while studying at school will be provided for school children of compulsory education from needy households. These measures will prevent them

from dropping out and needy students finish school. Relevant departments will try hard to help employed graduates receiving higher education from needy households to find jobs as early as possible

(4) The town and village will organize labor forces to help elder persons without family, disabled persons and households lacking labor force during the displacement. And they are prior to considered receiving resettlement subsidies.

(5) The low income household is in the priority of taking public welfare positions in the town.

(6) The rural minimum target, the totally disabilities, the elderly over 60 or minors in low-income families, five guaranteed households and low-income and other seriously ill patients, etc. are fully funded by the government in the individual contribution part of the basic medical insurance for rural and urban resident and help them participate in the new rural cooperative medical insurance.

(7) The poverty-vulnerable group such as five guaranteed households and household without man are free to get into nursing home in the town. Measures like the above are taken in order to solve the long-term aged-supporting problem.

7.5.5.2 Low renting House

(1) According to the *Opinions on Management of Low Renting House in Dongyuan County DPG(2005) No.74*, the permanent residents in urban area who are poor-households and have less than 6m^2 living area per person can apply for the low renting house in Dongyuan. The rent of the low renting house consists of maintenance cost and management cost and charges 1.2yuan/m^2 since 2013.

(2) Centralism construction Xianan District low renting house in Dongyuan has built 68 houses on the first stage. There are 40 houses are in construction. It has not been officially opened yet. The qualified immigration can apply for checking-in in the county housing reform office.

(3) Immigration subjected to the above conditions can chose to move into low rent house or rent other houses themselves enjoying housing allowance from the government. The subsidy area depends on practical household condition: subsidize single family 25m^2;

subsidize family with 2-3 people 45m^2; subsidize family over 4 members 65m^2. The subsidized house is 1.8yuan/m^2.

7.5.5.3 Training

The poverty reduction office of Dongyuan County will provide double transfer training for the groups who get less than 2300yuan annually. And they will prepare free and special livelihood training plans for needy persons and vulnerable groups. The training is intended to make them obtain jobs to increase income through professional skills training. Xiantang Town Office also provide free agricultural technique training of planting economic corps like litchi and longan, along with intelligent support and assistance in contracting the barren hill. Help them make a fortune in agriculture. Finally help the needy households restore income or even exceed their previous standard of living.

7.5.5.4 Employment

During project construction, the Subproject will directly create temporary job opportunities such as land leveling, handling and excavation. The PMO will coordinate the construction agency to give the priority to the vulnerable group in obtaining these employments suitable for them. At least one employment related to the Subproject will be ensured for each needy households.

7.5.6 Restoration Program for Ground Attachments

After the implementing agency compensates the proprietor, affected infrastructure and ground attachments will be restored by the proprietor.

Restoration measures for demolished facilities should be planned in advance. Actual operation should be based on actual site conditions so as to ensure safety, efficiency, timeliness and correctness, thus minimizing adverse impacts on adjacent masses.

The displacer should demolish affected municipal utilities according to the Subproject construction drawings and minimize moving without affecting project construction.

7.6 Organization and Implementation Progress

7.6.1 Organizational Setup

To lead the preparation and construction work of the Project, GDRC approved the establishment of the Leading Group and the Management Office of the Project in September

2009 as the decision-making and working agencies of the Project, headed by the CPC Branch Secretary and Director-general of GDRC. This agency is responsible for coordination, management, supervision and service during project implementation; reporting the progress of project implementation to the Guangdong Provincial Government and the World Bank; coordinating the departments concerned; organizing bid invitation and procurement; preparing annual financial plans; project quality control; providing technical assistance to, and coordinating research and training activities of the project cities.

County and town project management offices have been set up in Dongyuan. County management office takes charge of coordination and management. Town office is responsible for project implementing. The county project coordinating management organization is the "leader group of economy comprehensive exploration model town projection in Xiantang Town, Dongyuan County, Heyuan City supported by World Bank Loan", responsible for leading and coordinating, etc. The office of leader group works in the county Development and Reform Bureau, taking charge of the current management work including organization, supervision, coordination and guidance of the projection. The management group has overall arrangement of the project and settles significant problems. The implementation agency is the "leader group of economy comprehensive exploration model town projection in Xiantang Town, Dongyuan County, Heyuan City supported by World Bank Loan". The construction leading group office is in the Office of Party and Government Affairs led by Li Liangjun (the deputy secretary of Xiantang Party Committee), taking charge of organization, integration, coordination and promotion of the project construction. The specific construction is taken over by Government of Xiantang Town. Each village affected by the Subproject has one or two key leaders assisting in resettlement.

7.6.2 Implementation Progress

According to the implementation schedule of the Subproject, the land acquisition, property demolition and resettlement schedules of the components will be linked up with the construction schedules of the components; the main part of land acquisition, property demolition and resettlement will begin in December 2014 and end in June 2015. The basic principles of scheduling are as follows

(1) The land acquisition, property demolition and resettlement work shall be completed at least one month before the commencement of construction so that the affected persons have sufficient time to prepare for production resettlement and income restoration;

(2) During resettlement, the affected persons should have opportunities to participate in the Subproject; the range of land acquisition should be published, the Resettlement Information Booklet (RIB) issued, and public participation should be carried out before the commencement of construction; and

(3) All kinds of compensation should be paid directly to the affected proprietors within 3 months from the date of approval of the RAP; no organization or individual should use property compensation fees on their behalf, and such compensation should not be discounted for any reason.

7.7 Grievance Redress

Since the resettlement work is conducted with the participation of affected persons, no substantial dispute will arise. However, to ensure that affected persons have a channel to file an appeal on any issue concerning land acquisition and resettlement, a four-stage grievance redress mechanism has been established during the preparation and implementation the resettlement action plan:

◆ Stage 1: If any displaced person is dissatisfied with the resettlement action plan, he/she can file an oral or written appeal to the village committee or demolition implementing agency orally or in writing. In case of an oral appeal, the village committee or demolition implementing agency shall handle such appeal and keep written records. Such appeal should be handled within 2 weeks.

◆ Stage 2: If the displaced person is dissatisfied with the disposition of Stage 1, he/she may file an appeal to the city project management office/management agency after receiving such disposition, which shall make a disposition within 2 weeks.

◆ Stage 3: If the displaced person is still dissatisfied with the disposition of Stage 2, he/she may escalate the appeal to the competent administrative authorities level by level in accordance with the Administrative Procedure Law of the PRC after receiving such disposition for arbitration.

◆ Stage 4: If the displaced person is still dissatisfied with the arbitration award, he/she may file a suit in a civil court in accordance with the Civil Procedure Law of the PRC after receiving such award.

Displaced persons may file an appeal about any aspect of resettlement, including compensation rates, etc. The above appeal channel will be notified to the displaced persons at a meeting or otherwise, so that they are fully aware of their right of appeal. Mass media will be utilized for publicity, and opinions and advice about resettlement will be compiled into messages for study and disposition by the resettlement agencies. All agencies will accept grievances and appeals from the affected persons for free, and costs so reasonably incurred will be disbursed from the contingencies.

7.8 Monitoring and Evaluation Arrangements

To ensure the successful implementation of the RAP and resettle the displaced persons properly, periodic monitoring and evaluation (M&E) of land acquisition, property demolition and resettlement activities will be conducted in accordance with the World Bank's Operational Policy OP4.12 Involuntary Resettlement and the Operational Guide to the Monitoring and Evaluation of Resettlement of World Bank Financed Projects in China. Monitoring is divided into internal monitoring of resettlement agencies and external independent monitoring. M&E will begin in January 2015 and end in June 2018. According to the construction and resettlement schedule of the project, internal and external monitoring reports will be submitted to the World Bank semiannually, and 6 reports will be submitted in total.

7.8.1 External Independent Monitoring

The town project management office will establish an internal monitoring mechanism to monitor resettlement activities, and a database of land acquisition, property demolition and resettlement, and use it to prepare the RAP, monitor all displaced households and entities, and conduct internal supervision and inspection of the whole process of resettlement.

7.8.1.1 Implementation Procedures

During implementation, the Xiantang project office will collect and record information on resettlement from the monitoring samples, and report real-time activity records to the city project office timely to maintain continuous monitoring. The city project office will inspect

implementation regularly.

In the above monitoring mechanism, information sheets in specified formats will be prepared to realize a continuous information flow from the Xiantang Sub-district Office to the Dongyuan City Leading Group. The Dongyuan City Leading Group, the Land and Resources Bureau of Dongyuan City and the Property Demolition Management Office of Dongyuan City will perform regular inspection and verification as an integral part of the internal monitoring system.

7.8.1.2 Scope of Monitoring

- Progress of resettlement
- Payment of compensation fees
- Resettlement of labor
- Compensation and resettlement for the demolition of residential properties
- Compensation and resettlement for the relocation of enterprises and public institutions
- Restoration and reconstruction of infrastructure
- Staffing, training, working schedule and efficiency of the resettlement agencies
- Registration and handling of grievances and appeals of displaced persons

7.8.1.3 Internal Monitoring Reporting

Xiantang Town project management organization will prepare an internal monitoring report semiannually for submission to the World Bank.

7.8.2 External Independent Monitoring

7.8.2.1 Independent Monitoring Agency

Xiantang Town leader group will appoint an independent resettlement monitoring agency to conduct external monitoring. The external monitoring agency will conduct follow-up monitoring on the progress and quality resettlement, and fund disbursement, and give opinions; it will also conduct follow-up monitoring on the production level and standard of living of the displaced persons, and submit M&E reports to the city leader group, the provincial leader group and the World Bank.

7.8.2.2 Monitoring Procedure and Scope

(1) Preparing M&E terms of reference

(2) Preparing a survey outline, survey form and record card of affected residents and typical affected entities

(3) Design of sampling survey plan and sample size: not less than 15% of households affected by property demolition

(4) Baseline survey

A baseline survey required for the independent M&E of the households affected by land acquisition will be conducted to acquire baseline data on the standard of living (livelihood, production and income levels) of the monitored displaced households.

(5) Establishing an M&E information system

An M&E information system will be established, where a database will be established for different types of M&E data, in order to provide computer aid for analysis and follow-up monitoring.

(6) M&E survey

① Capacity evaluation of resettlement implementing agencies: to survey the working capacity and efficiency of the resettlement implementing agencies

② Monitoring of resettlement progress, compensation rates and payment to typical displaced households: to monitor the disbursement of compensation fees, income restoration and resettlement quality of residents; and restoration measures for vulnerable groups

③ Public participation and consultation: to monitor public participation activities during the preparation and implementation of the RAP, and the effectiveness of participation

④ Appeals: to monitor the registration and disposition of appeals of displaced persons

(7) Compiling monitoring data, and establishing a database

(8) Comparative analysis

(9) Preparing M&E reports according to the monitoring plan

7.8.2.3 Monitoring Indicators

(1) Resettlement activities: progress of land acquisition and property demolition, variation in quantities, funds and disbursement

(2) Socioeconomic indicators: per capita income, household income and expenditure, employment rate;

(3) Institutional indicators: staffing, staff competencies, rules and regulations, equipment, completion rate of transactions;

(4) Infrastructure: availability of compensation fees and functional recovery ratio

7.8.2.4 External Monitoring Reporting

The external monitoring agency will prepare external monitoring reports based on its observations and survey findings, and report independently to the city PMO, the provincial PMO and the World Bank.

(1) Interval

As required by the World Bank, external monitoring will be conducted twice a year since the beginning of resettlement from November 2011 to June 2018. A mid-year monitoring report will be submitted to the World Bank and the resettlement agencies in the middle of each year, and an annual monitoring report will be submitted to the World Bank and the project owner at each year end.

(2) Scope

1) Baseline survey of displaced persons;

2) Progress of land acquisition, property demolition and resettlement;

3) Production resettlement and restoration;

4) Property demolition and reconstruction;

5) Restoration progress of special facilities;

6) Standard of living of displaced persons;

7) Availability and utilization of resettlement funds;

8) Evaluation of the efficiency of the resettlement implementing agencies;

9) Support for vulnerable groups;

10) Functions of the resettlement implementing agencies;

11) Existing issues and suggestions

7.8.2.5 Post-evaluation

After project implementation, the resettlement activities will be subject to post-evaluation using the theory and methodology for post-evaluation on the basis of M&E. Successful experience and lessons of land acquisition will be evaluated to provide experience that can be drawn on for future resettlement. Post-evaluation will be conducted by an external

independent M&E agency appointed by the city project management office. The post-evaluation agency will prepare terms of reference for post-evaluation to establish a system of evaluation indicators, conduct socioeconomic analysis and survey, and prepare the Resettlement Post-evaluation Report of the project for submission to the provincial project management office, Dongyuan County project management office, Xiantang Town project management office and the World Bank.

7.9 Budget and Funding Sources

The general budget of the Subproject includes compensation fees for permanent land acquisition, the demolition of rural residential properties, and ground attachments, and relevant taxes, etc.

The general budget of the project is 16,592,800yuan, including compensation fees for the permanent acquisition of collective land of 5,153,600yuan (31.06% of the general budget), compensation fees for the demolition of rural residential properties of 380,800yuan (22.95% of the general budget), compensation fees for ground attachments of 1,467,800yuan (8.85% of the general budget), indirect costs of 4,581,300yuan (27.69% of the general budget), and contingencies of 1,582,100yuan (9.53% of the general budget).

8 Public Participation and Information Disclosure

8.1 Purposes of Public Participation

Public participation is an important part of environmental assessment (EIA). EIA for WIADP covers a wide range of areas and involves many environmental media. Purposes of public participation are to disclose EA-related information to areas in irrigated areas and the general public who closely follow project implementation and enable them to understand baseline situation and implementation and operation features of the project as well as significant environmental issues relating to the project; to help assessment practitioners identify issues and confirm that project-triggered significant environmental issues have been analyzed and assessed in the EIA report; and to confirm that environmental protection measures are feasible and optimum measures have been implemented.

8.2 Survey Methodology and Process

In compliance with Environmental Impact Assessment Law of the People's Republic of China, Provisional Measures for Public Participation in Environmental Impact Assessment issued by MEP and operational policy requirements of the World Bank, we adopted in the process of assessment methods such as disclosing information online,fielding publicity on the local, holding discussion sessions, and issuing public questionnaires to carry out public participation activities. According to the environmental impact of the project, the object of public participation includes the periphery residents, schools, enterprises and institutions that may be affected by the project.This project involves the relocation and resettlement, so the environmental impact of public participation synchronized with the project social stability risk analysis and immigration plan

At Present, the following activities have been completed: survey on social economy and placement willingness, survey on social stability, EIA first publicity, EIA second publicity and survey on public participation (See Table 8.2-1 for details).

Table 8.2-1 Process of Public Participation

Round	Duration	Methodology	Contents of Survey	Date/Duration of Disclosure	Results
1	Jul.19-Jul.30,2014	Discussion sessions, questionnaire survey	survey on social economy and placement willingness	Jul.19,2014	100% of the migrants support the implementation of the project and are willing to remove and land acquisition.
2	Aug. 14-Aug.20, 2014	Online disclosure ,Local on-site publicity ,questionnaire survey	survey on social stability	Aug. 14,2014	100% of the individual, units and enterprises expressed support for the project
3	Aug. 14-Aug. 23, 2014	Online disclosure ,Local on-site publicity	EIA first publicity：Informing project overview and collecting public comments on the project	Aug.14,2014	No feedback received from the general public
4	Sept. 25~ Oct.3, 2014	Online disclosure ,Local on-site publicity	EIA second publicity：Disclosure of EIA report	Sept.25, 2014	No feedback received from the general public
5	Oct.2014	1st Questionnaire survey	Collecting public comments on the environmental protection of project	Oct.2014	97.7% of public support for this project，2.3% of the public think that no matter，No objection to this project,100% of the units to support this project
6	Dec.2014	2nd questionnaire survey	Collecting public opinion on environmental protection of XIEDSTP	Dec.2014	90% of the public support for this project, 10% said no matter; 100% of the units to support this project

8.3 Process and Contents of Public Participation

8.3.1 social economy and migrant placement willingness survey

8.3.1.1 Public participation and consultation have implemented in the early stage

This project began to apply for the world bank loan project in 2009, and then due to the approval of land and suspended, until the project office to restart the application as bank loan projects in 2013.In July 2014, the project that on the use of bank loans in Guangdong province to develop economic comprehensive development demonstration town were identified by the world bank expert group. In the identification of the memorandum of the group which clearly put forward the placement plan that involve the town of Sin Tong Township project involves immigration and the need to prepare immigration resettlement.At the end of identify, Xian Tang town project office immediately launched the preparatory work for the project land acquisition demolition, and according to the project proposal to determine the scope of the project construction launched a land acquisition and demolition of the mobilization and negotiation.

At present, the public participation and consultation has been completed shows in table 8.3-1

table 8.3-1 The process of public participation in the pre project implementation

Time	Place	Participant	contents	remark
Apr.2014	Xiantang Town People's government, the relevant village committee	Xiantang town PMO, the relevant committee members,villagers representatives	Notice that the influence of project and news of every village project to be implemented , initially identified influence scope, land acquisition relocation to mobilize and policy advocacy work	Preparatory work
May.2014	Xian tang Town PMO, the	Xiantang town PMO, the relevant	Investigation on the social economic for	Understand the impact of the project

Time	Place	Participant	contents	remark
	relevant village committee	committee members,affected villagers, etc.	resettlement and the influence range of the project	and the social economic situation of the affected village and the household
May.2014	Xiantang Town PMO, the relevant village committee	Xiantang town PMO, the relevant committee members,affected villagers, etc.	announce and explain the compensation and resettlement policy To the committee, the affected villagers and negotiate preliminary scheme for compensation and resettlement	Preliminary consultation on the compensation policy when preparing the resettlement plan
May.2014	Xiantang Town PMO, the relevant village committee	Xiantang town PMO, the relevant committee members,affected villagers, etc.	To further publicize the compensation and placement policies and discuss feasible placement schemes	According to the policy, further discussion of consultation and resettlement programme
Jun.2014	Xiantang Town PMO, the relevant village committee	Xiantang town PMO, the relevant committee members,affected villagers, etc.	Combined with the actual situation in the village as well as the development of the township planning, taking into account the views of the village committee and the villagers, to develop village level restoration plan	The recovery plan should be combined with the township planning.
Jun.2014	Project influence area	Xiantang town PMO, the relevant committee members,representatives of affected villagers	Review the amount of land acquisition demolition,Publicity,Signature confirmation	During the publicity, there are objections can be made to review again
Jul.2014	Xiantang Town Project Office, the	Xiantang town PMO, the relevant committee	he individual issues of the consultation and	Supplementary consultation on individual issues

Time	Place	Participant	contents	remark
	relevant village committee	members,affected villagers, etc.	placement policies and programmes are discussed	when the resettlement plan is finalized

8.3.1.2 Investment on Immigration Participation and Willingness

When Xiantang Town PMO and China Immigration Research Center of Hehai University Carrying out sample survey on immigration situation of immigrant,participation and placement willingness for the project have been surveyed at the same time.Investigators selected 17 households affected by land requisition households (which 14 households also influence but also the relocation households) to conducted a questionnaire survey by using random sample survey method, the sample size accounted for 50% of total immigrant affected by the project.

Aspect of Public Participation:According to the survey result, all immigrants known the project, the awareness rate is 100%; and 100% of the immigrant support the implementation of the project and willing to implementing demolition and requisition; 90.9% have varying degrees understanding about policy of compensation and resettlement,it means the publicity carried out by township government and the village committee is effective. 100% of the immigrants believe that the construction of the project is conducive to the development of the village, and another 36.4% of people believe the project will benefit the country, 36.4% of people think the project will benefit individuals.

Removal and placement aspects：For housing placement methods，42.9% of people think that should directly make up the money to households, 21.4% of people choose to transfer the homestead, 35.7% of people think that should be admitted to the new rural community.For the new community housing area, 78.6% of people hope that new area of the house in 100-200 square meters and only 21.4% of people agreed to less than 100 square meters.

For the location of housing placement , 78% of people think that the placement should be selected in the scope of the panel, 22% of people think it does not matter. The most

concerned housing problem is whether there is preferential policy loans (78.6%) and rural new community housing price (64.2%), while a small number of people concerned about housing planning, site selection and location (21.4%).

Resettlement mode choice:For Resettlement mode after being land acquisition,, 82% of the immigrants think the best placement is to a nearby enterprise for work, and 48.5% of the people think old-age insurance should be added to the land acquisition farmers, few people want to continue farming (15.2%). After the land expropriation, about Whether agree to balance the whole group farmland according to the farming population of the second round of land contracting,66.7% of the people think it should be average distributioned according to the population of the second round adjustment , otherwise 15.7% do not agree, 18.2% of the people think it does not matter. All people (100%) hope that the allocation of land acquisition compensation is directly to the user.

Details of the results shows in table 8.3-2.

Table8.3-2 Results of public participation on Social economy and Resettlement

Num.	Question	Answer	Analysis of survey results
1	Do you know that the project will be building?	(1)know	100%
		(2)Know a little	0
		(3)Do not know	0
2	Are you in favor of building this project?	(1)Approve	100%
		(2)Disapprove	0
		(3)Not matter	0
3	Do you think who will benefit from the construction of project(numbers options is are permitted)?	(1)Country	36.4%
		(2)Community	100%
		(3)Individual	36.4%
4	Do you Know the compensation policy for the construction of the project?	(1)Know all	27.3%
		(2))Know a little	63.6%
		(3)Do not know	9.1%
5	Are you wiling to be Demolition and land acquisition for supporting the project?	(1) Willing	100%
		(2)Unwilling	0
6	Your choice of housing	(1)Just fill the money is ok.	42.9%

	placement?	(2)Allocated homestead to build their own houses	21.4%
		(3)Settled rural new community	35.7%
7	You hope the area of new community housing is?	(1)≤100 ㎡	21.4%
		(2)100—200 ㎡	78.6%
		(3) ≥200 ㎡	0
8	You choose about the location of housing placement?	(1)The group	78.6%
		(2The village / community)	0
		(3)Not matter	21.4%
9	Question most concerned you about housing placement is?（Multiselect）	(1)Whether there is discount to buy house in city?	21.4%
		(2)Determine the allocation of Homestead as soon as possible	21.4%
		(3)Whether There is preferential loan policies for the construction of new premises?	78.6%
		(4)Housing planning programme	21.4%
		(5)Public transparent / real process selection	21.4%
		(6)The price of new rural community housing	64.2%
10	Placement method for you or your family would choose (Multiselect)	(1)To continue farming	15.2%
		(2)Participated in the landless farmers pension insurance	48.5%
		(3)To participate in the free skills training provided by the government	0
		(4)Migrant workers	0
		(5)Nearby to the enterprise workers	81.8%
11	After the expropriation of land, do you agree with balance the whole group farmland accroding to the population of two round land contract?	(1)Agree	66.7%
		(2)Disagree	15.2%
		(3)Not matter	18.2%
12	Way of distribution of land acquisition compensation you hope is?	(1)All to the landless households	100%
		(2)All the members of the household register within the group	0
		(3)Par tin the village group, the remaining total to be landless households	0
		(4)Part in the village group, the	0

		remaining points to the team members	

8.3.1.3 Response to Feedback from the General Public

China Immigration Research Center of HEhai University has carried out interviews and interviews with the members of the affected village committee and some of the representatives of the immigrants during the socio-economic Investigation on affected areas and immigration of the project ,and collected some specific suggestions and opinions for the projects and resettlement, and then feedback to the PMO.Detail information is showed in table8.3-3。

Table 8.3-3 Public participation and consultation feedback

Question	Concrete description	Solution
For the way of relocation ,the villagers hope to stay in the new rural community, and hope the government the construct resettlement area unity	Now the government has planned a resettlement area, each household allocated homestead self, the villagers themselves pay money to build, infrastructure and services need to improve	The government can combine the development of new rural community with the resettlement of the project, make unified plan and occupancy policy, and solve the problem of resettlement.
The old man can't find the right job.	There is mostly a line of work in nearby enterprise, work intensity is relatively large, only recruit the employees under the age of 45. Many of the older farmers unemployment at home, can not find a job	Provide some public service jobs of low technology,easy relatively. And consultation with the local enterprise ,farmers of the land acquisition and relocation get jobs priority
The compensation standard is not high enough	The project area of 1 acres of land expropriation price has reached about 60000, it is much higher than the land requisition compensation of this project (30496 yuan / mu)	Compensation of This project has been much higher than the land requisition policies, communicate with the local people and mobilize the initiative of village cadres, improve the price of land acquisition as far as possible
Building house is difficult for poor households	The demolition of the project involves some vulnerable	PMO will coordinate the township to solve some money from the fund to

Question	Concrete description	Solution
	groups, and the rebuilding of the house is facing the shortage of capital and labor.	solve the housing difficulties of vulnerable groups

8.3.2 Social stability survey

8.3.2.1 Online Publicity

Disclosed project-related information on August 14, 2014 through the website of Dongyuan County People's Government(Publicity website:http://www.gddongyuan.gov.cn/list.php?fid=100),and posted a notice in the risk point.Publicity for the seven working days, from August 14, 2014 to August 20th. During the publicity, public to the public about feedback channels including phone numbers, fax numbers, e-mail address, email delivery address, etc

8.3.2.2 questionnaire

1.Respondent

The Respondent are mainly residents, units and enterprises along the line of the project.. A total of 117 questionnaires were issued, 111 valid questionnaires were obtained, of which 100 individuals, 8 units, 3 enterprises. In the surveyed individuals, men accounted for 87%, women accounted for 13%; For age structure, 16 to 50 years old accounted for 73%, 61 years old and above accounted for 27%, the age of the investigated population mainly concentrated in 41 to 50 years, accounted for 47% of the total number.

2.Survey result

（1）Individual survey result

The Individual survey result (table 8.3-4) shows:For way of compensation for the land acquisition and resettlement, villagers tend to choose monetary compensation (86%) and land replacement (87%) two kinds of compensation methods, followed by employment placement (21%); mode of land replacement, villagers hope levy land replacement compensation ratio are 1:1, to complement the original daily production and life with the production data of land; For employment resettlement way, the villagers more hope the

government to provide skills training, allows the villagers to master a survival skills, helps the local landless villagers re employment. About employment placement, the villagers choose more for the recommendation of employment, and secondly for the independent venture.

Table8.3-4 Personal questionnaire survey

Survey Items	Classify	Num.	Percentage
Through what channels know the project	Publicity announcement	89	89.9%
	Media	0	0.0%
	Friends and family	5	5.1%
	Others	4	4.0%
	Do not know	1	1.0%
What the project concerns (Multiselect)	Legitimacy of project	73	73.0%
	Land acquisition and removal	55	55.0%
	Engineering quality	21	21.0%
	Construction safety	4	4.0%
	Environmental problem	82	82.0%
	Life employment	71	71.0%
	Traffic accident	6	6.0%
	Others	0	0.0%
Whether the land is levied or houses demolished	Yes	100	100.0%
	No	0	0.0%
	Unclear	0	0.0%
Whether understand the land requisition, relocation, compensation and resettlement policy and standards	Know	59	59.0%
	Know a little	40	40.0%
	Do not know	1	1.0%
What is your attitude towards the land or house being required for the project	agree to the demolition	59	59.6%
	Agree on the agreement of the two parties	40	40.4%
	Disagree	0	0.0%
	Others	0	0.0%
Whats ways of compensation for land acquisition and demolition you Hope ?	Monetary compensation	86	86.0%
	Land replacement	87	87.0%
	Employment placement	21	21.0%
	Remote immigrant	2	2.0%

(Multiselect)	resettlement		
If the compensation standard of the land expropriation is unreasonable ,and the mass is settled.,what is your solution?	Reluctantly accepted	0	0.0%
	Consultation adjustment	99	99.0%
	Hope government's intervention	1	1.0%
	Take other ways	0	0.0%
Masses concerns in the construction process(Multiselect)	Construction nuisance	96	96.0%
	Construction conflict of interest	7	7.0%
	Construction accident	16	16.0%
	Temporary occupancy of public facilities	86	86.0%
	Public Security	71	71.0%
	Others	0	0.0%
The environmental problems that people cared during the construction and uses(Multiselect)	Noise pollution	74	74.0%
	Water pollution	40	40.0%
	Air pollution	90	90.0%
	Soil erosion	86	86.0%
	Landscape destruction	35	35.0%
	Others	2	2.0%
Impact of the project on the income level after the completion	Much better	53	53.0%
	Slightly better	47	47.0%
	Basically unchanged	0	0.0%
	Slightly worse	0	0.0%
	Much worse	0	0.0%
Impact on the surrounding development after the completion of the project(Multiselect)	Transportation is more convenient	71	71.0%
	Land value will rise	88	88.0%
	Business more prosperous	77	77.0%
	There is no effect	0	0.0%
Attitude of the masses to the construction of the project	Very supportive	67	67.0%
	Basic support	33	33.0%
	Indifferent	0	0.0%
	Unsupported	0	0.0%

（2）Survey results of unit

Eight unit Grass-roots Organization questionnaire includes Xiantang Ministry of Land

Resources, Xiantang Planning Institute, Xiantang Forestry workstation, Xiantang Fairy Pond Local Police Station, Xiantang Town Comprehensive Management Letters Stability Maintenance Center, XianTang Town Economic Development Office and XudOng Village committees and Hongguang Village Committee.

The result of questionnaire shows the focus problem reflected by he basic unit organization is the land expropriation,impact on ecological environment , quality safety and social security.Judging from the overall situation reflected in investigation , the construction of the project has been won support from most of the grass-roots organizations,they are generally believed that the construction of this project will promote local transport facilities, land appreciation, industrial and commercial prosperity and development.

Table8.3-5 Questionnaire survey of unit primary organization

Investigation items	Classify	Num.	Percentage（%）
Can the project drive the local economic development	Can	8	100.00%
	NO	0	0.00%
	Unsure	0	0.00%
Whether it will destroy the local natural environment	Yes	0	0.00%
	NO	8	100.00%
	Unsure	0	0.00%
Main environmental problems	Noise	0	0.00%
	Water pollutant	2	25.00%
	Air pollutant	4	50.00%
	Soil erosion	2	25.00%
	Landscape destruction	1	12.50%
Whether there is a need to levy land or housing	Yes	5	62.50%
	No	3	37.50%
Whether the masses of the land expropriation satisfying the compensation standards	Very satisfied	3	37.50%
	satisfied	4	50.00%
	Basic satisfaction	0	0.00%
	Dissatisfied	0	0.00%
	Not satisfied	0	0.00%
What influence did the project have on the local area after the the completion of the project	Transportation is more convenient	7	87.50%
	Land value will rise	6	75.00%
	Business more prosperous	7	87.50%

	There is no effect	0	0.00%
The concerns during construction	Construction nuisance	4	50.00%
	Construction conflict of interest	0	0.00%
	Construction accident	1	12.50%
	Temporary occupancy of public facilities	5	62.50%
	Public Security	3	37.50%
	Others	0	0.00%
Attitude towards project construction	Very supportive	7	87.50%
	Basic support	1	12.50%
	Indifferent	0	0.00%
	Unsupported	0	0.00%
	Very unsupported	0	0.00%
The main social stability risk exists side Noodles	Policy planning and approval procedures	2	25.00%
	Land expropriation	3	37.50%
	Technical and economic programme	1	12.50%
	Ecological environment influence	3	37.50%
	Project construction management	1	12.50%
	Local economic and social impact	0	0.00%
	Quality safety and social security	3	37.50%
	Media opinion orientation	1	12.50%

（3）Enterprise survey results

Questionnaire in this enterprise mainly for the sensitive point of the enterprise, contains three units. Of Heyuan Rotary Cement Co., Ltd., Asia Create (Heyuan) Wood Industry Co., Ltd., Lisheng tree lights (Heyuan) Co., Ltd.

Survey results (table 8.3-6) shows,:temporary occupation of public facilities, security are focused issue reflected by this enterprises , the surveyed enterprise generally believe that the project will enhance the surrounding business environment, promote the reduction of transportation cost and drive to improve the turnover of the enterprises. In addition, the surrounding enterprises will consider accepting the project landless peasants into the enterprise employment, or after training, where appropriate, to accept employment.

According to the overall situation of the survey reflected , the surrounding enterprises has a very supportive attitude for the construction of the project

Table8.3-6 Enterprise questionnaire survey

Enterprise Name		Heyuan Rotary Cement Co., Ltd	Asia Create (Heyuan) Wood Industry Co., Ltd	Lisheng tree lights (Heyuan) Co., Ltd.
Belong industry		Cement production	Wood processing	Christmas tree, lights string, plastic products and other products
Enterprise property		Private	Private	Private
Staff number		100-300	300-1000	1000 以上
Staff informed of the project	Most don't know			√
	Most people listened	√		
	Most people are cleared		√	
Whether it will drive economic development	Can	√	√	√
	Can't			
	Uncertain			
Whether the environmental impact and the main environmental issues will be generated	Noise			
	Water			
	Air			√
	Soil and water			
	Scenery			
	Can't	√	√	
Impact on business operations		Much better	Much better	Slightly better
	Business environment becomes good		√	
	Transportation cost reduction	√	√	√
	Turnover promotion			
	Little influence			√
what route will to be taken to solve the social contradictions During the construction				

Enterprises in the construction process of concern (Multiselect)	Construction nuisance			
	Construction conflict of interest			
	Construction accident			
	Temporary occupancy of public facilities			√
	Public Security		√	√
	Others	Accelerate the construction progress		
Whether considering to accepted the landless peasants of the project of into the factory to employment			√	√
		√		
The attitude of the enterprise to this project	Very supportive	√	√	√
	Basic support			
	Indifferent			
	Unsupported			

8.3.3 The First Publicity of EIA

According to the “Temporary participation measures of EIA", EIA Unit publicly the related information on on 14 August 2014 through the website of Dongyuan County People's Government after accepting a commission in the seven working days, also carried out field publicity in the main sensitive points on both sides of the roads at the same time.

Publicity clearly informed the characteristics of the project, announced the procedures and contents of EIA, views of publican tends to seek ,main way of public participation and effective time. During the publicity time of 2014 08，14 ~2014 08, 23, during the period, did not receive the objection to the project, nor received any feedback information on the negative environmental impact of the negative.

The first online publicity screenshot photo sees figure8.3-1, photos of site posted

announcement see figure 8.3-2.

Table8.3-1 Screenshot of first online publicity

<table>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Xudong Village</td><td>Hongguang Village</td></tr>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Xiantang Village</td><td>The Second primary School of Dongyuan</td></tr>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Senior School of Dongyuan</td><td>Primary School of Xudong</td></tr>
<tr><td> 
</td><td></td></tr>
<tr><td>Dongyuan County TCM Hospital</td><td></td></tr>
</table>

Figure8.3-2 Photo of first Field publicity

8.3.4 The Second Publicity of EIA

After finishing the draft and the simplified version of EIA,EIA units publicized the abbreviated version information of project on 25 September 2014 through the website of Dongyuan County People's Government(http://www.gddongyuan.gov.cn/),and carried out field publicity in the main sensitive points on both sides of the roads at the same time.

The content of second publicity sees Annex 2, and the screenshot of Online publicity sees photo 8.3-3, the site posted announcement photos see figure 8.3-4. During the publicity timeof 2014, 09,25 ~2014,10,03,EIA unit did not receive any objection to the project, nor received any feedback information on the negative environmental impact.

Table8.3-3 Screenshot of second online publicity

Xudong Village

Hongguang Village

Xiantang Village

The Second primary School of Dongyuan

Senior School of Dongyuan

Primary School of Xudong

Dongyuan County TCM Hospital

Figure8.3-4 Photo of second Field publicity

8.3.5 First Questionnaire Survey

After the completion of the second publicly of EIA , EIA units carried out questionnaire. on residents of Xudong Village, Hongguang Village, Xiantang Village, The Second primary School of Dongyuan County, Senior School of Dongyuan County of which within the scope of the evaluation . During the survey time ,members of EIA group introduced the basic information of the project to local residents carefully, and asked them to fill in the questionnaire.Through the issuance of "public participation form (Group)" consult the local village and the views of the school, the issuance of "Opinion Questionnaire (personal)" survey the public opinion of nearby public, the individual questionnaire divided into ordinary residents and demolition class, residents demolished by the project completing the demolition questionnaire . The investigation time was 09 months in 2014, the contents of then questionnaire of the unit shows in Appendix 3. The contents of the public opinion questionnaire shows in Appendix 4.

8.3.5.1 Respondent

Respondent includes residents and unit in the scope of evaluation.90 individual questionnaire were issued,and recover the effective questionnaire of 88 (involving 8 copies of the demolition of the questionnaire),recovery rate was 97.8%; 5 unit questionnaire totally issued and recover 5, 100% recovery rate.

In the surveyed population,of which90.9% are male, , women accounted for 9.1%; age mainly concentrated in the older age groups (30 ~ 50 years old), accounting for 65.91%; cultural degree mainly has a wide distribution, junior high school, high school, technical secondary school, junior college, bachelor degree is more, types of job of investigators are mainly farmers and teachers.

（1）Analysis of Personal Survey Results

The result of Personal Survey shows inTable8.3-7。

Table8.3-7 List of statistical results for public participation in personal opinion surveys

Num	Items	Content	Number (person)	Percentage（%）
1	Are you satisfied with the present environment?	Satisfied	45	51.2
		Comparatively satisfied	42	47.7
		Dissatisfied	1	1.1
2	Are you satisfied with the traffic situation in your locality?	Quite satisfied	42	47.7
		Comparatively satisfied	43	48.9
		Dissatisfied	3	3.4
		Quite dissatisfied	0	0
3	Do you understand / know the project?	Do not know	6	6.8
		A little	47	53.4
		Clearly	35	39.8
4	Do you think the construction of the project has affected your normal life?	Serious impact	1	1.1
		A little influence	47	53.4
		No influence	40	45.5
		Unclear	0	0
5	Under the project line cannot avoided, so related to land acquisition and demolition, the construction unit in accordance with the relevant state compensation policies and resettlement,what is your attitude about demolition?	Agree to the demolition	8	100
		Do not agree to the demolition	0	0
6	According to your master, what is the main impact of the project during construction do you think? (Multiselect):	Traffic noise	33	37.5
		Soil erosion	49	55.7
		Traffic barrier	24	27.3
		Construction dust	37	42.0
		Solid waste	7	8.0
7	According to your master, what is the main impact of the project in the operation (Multiselect)	Traffic noise	52	59.1
		Automobile tail gas	62	70.5
		Traffic barrier	14	15.9
		Dust	21	23.9
		Traffic accident	5	5.7
8	According to your expectations, what kind of environment pollution mitigation measures of is appropriate? (for the operating period):	Sound barrier	12	13.6
		Greening	56	63.6
		Sound insulation window	8	9.1
		Management measures	17	19.3
		Others	4	4.5
9	What is your opinion on on the project? (if you are opposed to the project,please reasons for your objection)	Support	86	97.7
		Indifferent	2	2.3
		Objection	0	0.0

Question 1：Are you satisfied with the present environment?

All respondents answered the question, 51.2% of people satisfied the local present environmental conditions and 47.7% of people comparatively satisfied, 1.1% are not satisfied,

so we can conclude that few people concerns ahout the local present environmental conditions.

Question 1：Are you satisfied with the traffic situation in your locality?

All respondents to answer the question, 47.7% of the people are satisfied with the local present traffic conditions , 48.9% comparatively satisfied, 3.4% of the people are not satisfied with the local present traffic conditions , no people is not satisfied the present traffic situation, from here we see that few people is not satisfied with the local present traffic conditions.

Question 3：Do you understand / know the project?

For this question,only9.8% of people's answer is very clear,there is 6.8% of people's answered do not know,and 53.4% of people answered know a little.Hence, the owner unit should strengthen publicity, so that more people can understand the project, and participate in the project.

Question4：Do you think the construction of the project has affected your normal life?

For this question, 1.1% of the people said impact is serious, and 53.4% of people said there is a little influence, 45.5% people said no influence on them, no people express they were not clear.

From the survey and field visits to the situation, first of all, the local people have the need for construction projects to improve the traffic conditions in Xiantang New District ; but they also expressed concerns about impact on their daily life caused by construction activities, and remind we should give full consideration to the interests of the mass people during construction , try to shortchange the inconvenience as far as possible.

Question 5:Under the project line cannot avoided, so related to land acquisition and demolition, the construction unit in accordance with the relevant state compensation policies and resettlement,what is your attitude about demolition?

8 residents answered the question,and all of them consent to demolition under the premise of Related compensation policies and placement.

Question 6：According to your master, what is the main impact of the project during construction do you think? (Multiselect):

This question is a multiple-choice, 37.5% of the people think traffic noise is the main impact of the project during construction , 55.7% of the people think it is soil erosion and 27.3

chose blocking traffic, 42.0% of the public choose construction dust, 8.0% of the public choose solid waste. Hence we know that the environmental awareness public is high, The first impact they think during construction is soil and water loss, followed is construction dust and traffic noise, therefore, the construction unit should pay special attention to these problems, corresponding prevention and control measures should be done during construction.

Question 7：According to your master, what is the main impact of the project in the operation (Multiselect)

This question is a multiple-choice, 70.5% of the people think automobile tail gas is the main impact of the project during construction , 59.1% of the people think it is traffic noise and 23.9 chose dust , 15.9% of the public choose blocking traffic, 5.7% of the public choose traffic accident. Hence we know that the environmental awareness public is high, The first impact they think during operation is automobile tail gas, followed is traffic noise, therefore, the construction unit should pay special attention to these problems, corresponding prevention and control measures should be done during operation

Question 8：According to your expectations, what kind of environment pollution mitigation measures of is appropriate? (for the operating period):

All respondents answered the question, 63.6% of people think should strengthen the green, 19.3% of people think should strengthen management measures, 13.6% of the people think sound barrier should be equipped , there is a small number of people chose of sound insulation of windows, and others were 9.1% and 4.5%. Hence, for the project, greening, strengthing management and equipping noise barrier to ease the environmental problem is the general hope measures of public.

Question 9：What is your opinion on on the project? (if you are opposed to the project,please reasons for your objection)

All surveyed people answered the question, 97.7% of the public support the project and they think the project is favorable for the improvement of economic development and residents in the vicinity of the quality of life and 2.3% of the public think it does not matter, no people on the opposition.

Question 10：What is your suggestions and requirements for the environmental protection of this project? What do you think should be paid attention to about environmental

protection during construction, and what measures should be taken.

For suggestions and requirements on the environmental protection of this project，and environmental protection measures should be taken,some of the comments made by the respondents were mainly the following aspects:

①Doing Water and soil conservation works well;

②Strengthing publicity and education;

③Supporting Measures of support sewage and garbage prevention and control should be taken during construction;

④Preventing the impact on rural drinking water.

⑤In addition,there is one Public expressed that Related departments'attention and propaganda to the project is not enough.

Construction unit think above opinions and suggestions are reasonable, and they will strength environmental protection to reduce the impact caused by oil erosion, dust, noise and so on,pay attention to traffic barrier, strengthen traffic management and ensure the timely completion of the project, so as to not affect the people around.At the same time, enhancing environmental awareness of participants of the project, carrying out publicity work to ensure the implementation of environmental protection measures.

（2）Analysis of unit survey results

The interview survey unit is mainly sensitive points involved in the project, they are Xu dong Village, Xiantang Village, Hongguang Village, The Second Primary School OF Dongyuan County, Senior High School of Dongyuan,These units have expressed highly concern and support for the construction of this project, and have good wishes for this project, while put forward some comments for the project as follows:

①Earnestly protect the rural drinking water source, control the industrial pollution in rural areas strictly, and increase the intensity of rural life pollution control;

②The construction of the project should not polluting the environment.

The construction unit said they will actively implement the environmental protection measures according to requirements of environmental protection after known above opinions, in particular, pay attention to the erosion during construction period, to avoid affect rural water using.

8.3.5.2 Response to Feedback from the General Public

During the first questionnaire survey,Guangzhou Research Institute of environmental protection(EIA Unit) had interviewed and investigated with the affected units and public,some specific advises and opinions had been collected,and then feedback to PMO.Details showed in table 8.3-8.

Table8.3-8 Feedback of the first questionnaire survey

Question	Specific description	Solution
Carring out measures of water and soil conservation	The status environment quality in project area is good,public hopes the construction unit could implement soil erosion well , to avoid mud flow	The project has specially compiled the soil and water conservation plan for soil erosion, in the plan ,slope protection, greening and other measures have been designed for the project to avoid soil erosion.
Worried ahout pollution during construction	During the construction period, collection measures of sewage and garbage should be implemented to avoid pollutant the surrounding environment.	temporary toilets is required to set in construction area, the sewage access to municipal sewer through temporary sewage pipe networks, living garbage unified collected and then hand over to the sanitation department
Lack of publicity and education	The construction unit is lack of environmental protection attention and propaganda of the project , should intensify propaganda,should intensify publicity	PMO will carry out environmental training for the project regularly to improve environmental awareness of personnel. Regularly visit the masses, publicity environmental protection work of the project
Worried about drinking water pollution	For some residents surrounding the project,their drinking water comes from self dig wells, so ,they worried their drinking water would be polluted	The construction of the project will not destroy the water separation layer, and also will not affect the groundwater.sewage access to municipal sewage pipe, the direct discharge is strictly prohibited.

8.3.6 Second questionnaire survey

8.3.6.1 Respondent

In December 2014,Construction units and EIA unit carried out a questionnaire survey for the farmers and the electric power department in the impact of the project, focusing on the

investigation the farm families opinion on need to dismantle the breeding facilities for the construction of the project and opinion on power facilities such as power department to dismantle power facilities,focusing on the investigation of the views of farm families that need to dismantle the cultivation facilities which was influenced by the construction of the project and the views of power departments that need to dismantle the power facilities such as telegraph pole.There were 11 questionnaires and 11 questionnaires, including 10 individual questionnaires and 1 questionnaires.

The survey opinion of the farm families is showed in Appendix 5 and opinion of the power department is attached to Appendix 5

8.3.6.2 Survey results

（1）Results of Opinion of farm family

The results of the survey are shown in table 8.3-9.The table shows the support rate reached 90%, of the 10 farm families surveyed, there are 9 support for this project, the 1 said no matter.All of the individuals surveyed thought the overall effect of the project was favorable, and the project was favorable for improving the local traffic situation..

Table8.3-9 Opinion of farm families

Num.	Project	Content	Number (person)	Percentage (%)
1	Do you know the project?	No aware	0	0
		Partly aware	7	70.0
		Clearly	3	30.0
2	Are you satisfied with the present environment?	Satisfied	0	0
		Comparatively satisfied	10	100
		Dissatisfied	0	0
3	Are you satisfied with the traffic situation in your locality?	Very satisfied	1	10.0
		Comparatively satisfied	9	90.0
		Dissatisfied	0	0
		Not satisfied	0	0
4	You think the overall effect of the road construction is:	Favorable	10	100
		Equal	0	0
		unfavourable	0	0
5	You think the impact of road construction on economic benefits:	Increase	10	100
		No change	0	0
		Reduce	0	0
6	Do you think the construction of this project will help improve the traffic situation of the local state	Improve	10	100
		No improvement	0	0
		Unclear	0	0
7	According to the design, the project need to dismantle some of the facilities, under	Support	9	90.0
		Indifferent	1	10.0

Num.	Project	Content	Number (person)	Percentage (%)
	the premise that the facilities of the construction unit take the corresponding compensation to the demolition facilities,do you support the construction of this project? (if you are opposed to the reasons for your objection)	Opposition	0	0

（2）Survey results of electricity sector

The ground is attached 13 telegraph poles that belong to the town of Xian Tang and were managed by the power supply cents of Xian Tong town in area of the road of the project,there are 2 in the Industrial Avenue, 7 in the Xu hole one way, 4 in the new district all the way.As the wire rod that covers an area within the scope of the relocation needs to be relocated, in order to solicit opinions on the removal of power facilities, the construction unit has distributed the questionnaire (see the public participation in the attachment) to the power supply unit of the ownership unit,opinions include:An equivalent compensation for the demolition order to build a new alternative power facilities.Except the equivalent compensation for the proposed demolition of power facilities, all costs such as the young crops compensation, relocation compensation, land acquisition that were generated by the power line moving were borne by the construction unit.

According to the comments made by the town of Xian Tong town,the construction unit will authorize the corresponding qualification unit to evaluate the power facilities and the modified relocation of the proposed power facilities after the project plan of relocation is determined and bear all the costs of the process.After the above replies, Xian Tong town power supply agreed to dismantle the project area within the power facilities and other power facilities and supported the project construction.

8.3.6.3 Response to Feedback from the General Public

The public opinion feedback from the second public participation is summarized in table 8.3-10.

Table 8.3-10 Public feedback from second questionnaire survey

Question	Concrete description	Solution
Stay pretty green	Minimize the impact of the construction area,Greening places as far as possible	According to the soil and water conservation requirements, the road side slope of the team has taken a combination of engineering and greening slope protection way, the road is also set up green belt, as far as possible to increase green area
To speed up the construction, to avoid disturbing t in he construction period	Hope to speed up the construction phase process, Reduce the impact of the construction period, to avoid the impact of the construction period noise, vehicles and other residents	Will require the construction of civilized construction, according to the environmental protection requirements of the construction period of environmental protection, to take the construction, avoid the night construction and other ways to reduce the construction period influence
Equivalent compensation of the wire rod to be removed	Xian Tong town power supply said the construction unit needs to compensate for the cost of removal of power facilities and relocation	After the project plan of relocation is determined,the corresponding qualification units for the proposed removal of power facilities to change the assets of the assessment,the cost of the process is all borne by the construction unit.

8.4 Results of Public participation

The statistical results of public participation show that the project has been supported and approved by the units and the majority of public, although the construction and operation of the project for will bring certain influence to the life and production of the surrounding residents, most of people also believe that the construction of the project will bring certain social economic benefits to the region.

9 Environmental Management Plan

9.1 Objectives of Environmental Management

Environmental management is an important part of project management and is also an important element in achieving effective environmental protection under the project. The objectives of environmental management under XIEDSTP are to ensure smooth implementation of environmental protection measures, mitigate adverse environmental impacts of project implementation, and ensure environmental protection activities are carried out smoothly in the project areas and resettlement areas, hence achieving coordination of project implementation with eco-environmental protection and economic development.

9.2 EMP Contents

Environmental Management Plan (EMP) of XIEDSTP is prepared based on Environmental Impact Assessment (EIA),Main contents include environmental management system, environmental management training, environmental protection and soil and water conservation measures to address adverse impacts as indicated in this EIA, as well as investments in environmental protection and soil and water conservation.

9.3 Environmental Management System

Environmental management of WIADP is provided in Figure 9.3-1，and responsibilities of agencies under the system are listed in Table 9.3-1.

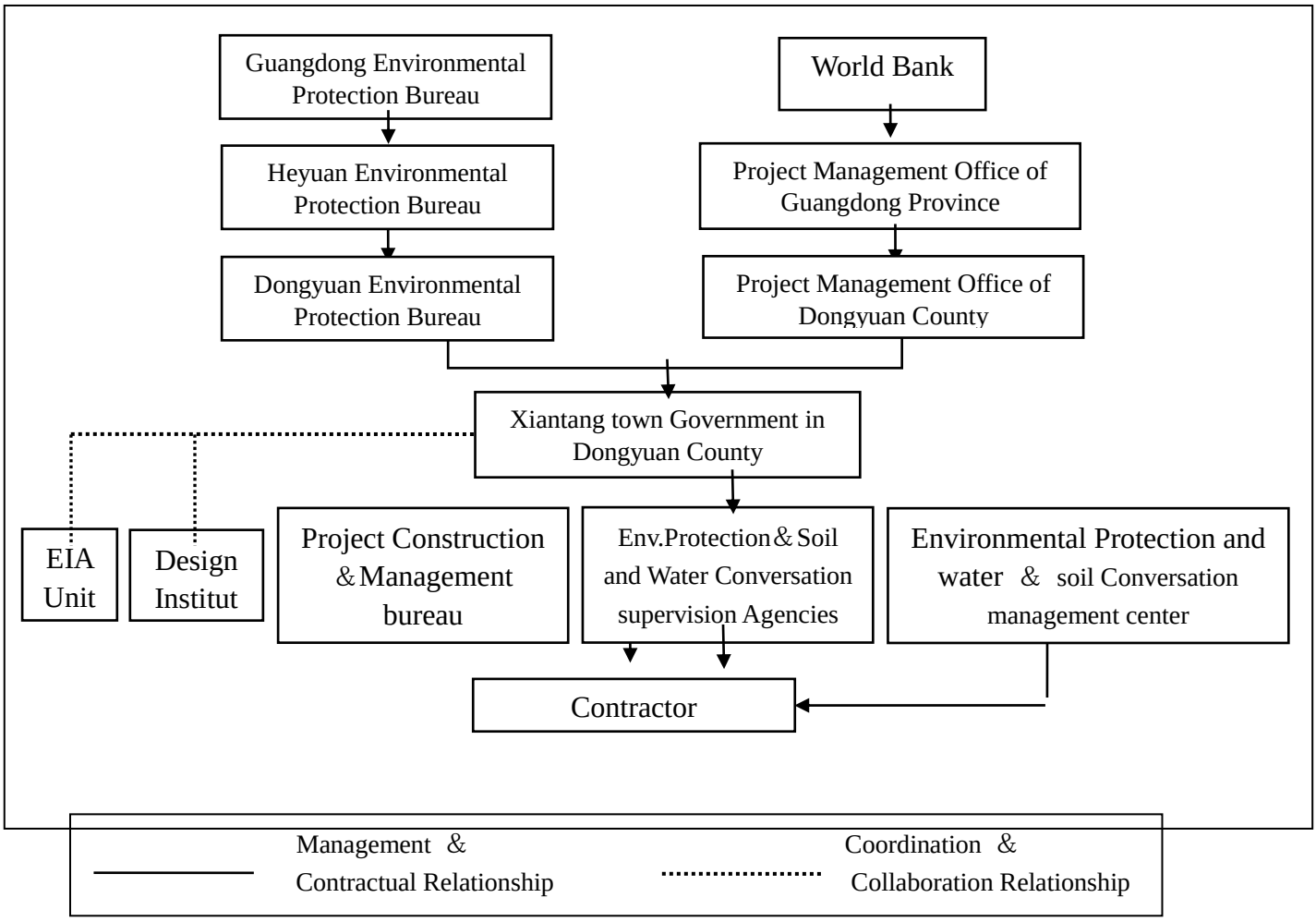


Figure 9.3-1 Environmental Management System of XIEDSTP

Table9.1-1 Agencies under Environmental Management System

Nature	Name	Role and Responsibilities
Management agency	Guangdong PMO and County(City) PMOs	Supervision and management of environmental protection activities during the entire project cycle
	Xiantang town Goverment	Project owner who is responsible for supervision and management of environmental protection activities during the entire project cycle under supervision of Guangdong PMO
	Project Construction and Management Bureau	A special institute established by the project owner to be responsible for management of environmental protection activities in the project areas from construction initiation to completion acceptance.
	Dongyuan County PMO	Environmental management during operation
	Environmental Protection and Soil and Water Conservation Management Center	A department under Project Construction and Managemant Bureau, responsible for carrying out environmental protection activities in the project areas from construction initiation to completion acceptance
Supervision	World Bank	Supervision of EMP implementation
	provincial and municipal EPBs	Government administration which is responsible for supervision and management of environmental protection activities during the entire project cycle
Impleme	Contractor	Implementing agency which is responsible

ntation		for mplementing measures for environmental protection and soil and water conservation
Consulting services	Design Institute	Entrusted by the project owner, responsible for comparing and selecting schemes during feasibility study state following requirements for environmental protection and soil and water conservation; designing schemes during project preliminary design stage following requirements for environmental protection and soil and water conservation;incorporating specific measures in the EA into technical specifications when preparing technical specifications of bidding documents.
	EIA Unit	Entrusted by the project owner, responsible for conducting environmental assessment during construction and operation based on status quo environment and proposing corresponding mitigation measures.
	Environmental protection and soil and water conservation supervision agencies	Entrusted by the project owner, responsible for supervising implementation of environmental protection and soil and water conservation measures by the contractor.

9.4 Environmental Management Agencies

Environmental management during construction will be carried out by construction unit,environmental (supervision) engineer and contractor with focus on management by construction unit and environmental engineer. Environmental management during operation will be carried out by environmental management centers and stations.

9.4.1 Implementing Agency

9.4.1.1 Management Agency

The Project Construction and Management Bureau is responsible for environmental management. The Bureau has set up an Environmental Management Center with 2-3 full-time staff and a number of part-time staff, which will be responsible for overall leadership and organization of environmental protection activities during construction.

9.4.1.2 Management Tasks

During project implementation, the construction unit will be responsible for environmental protection activities in all project areas from construction initiation to completion acceptance, including preparation of implementation plan for environmental protection measures, outsourcing and review of preliminary design, tendering design, construction organization, environmental monitoring and soil and water conservation monitoring,environmental supervision, and completion acceptance.

(1) Design and management of environmental protection and soil and water conservation

1)Preparing Implementation Plan for Environmental Protection Measures during XIEDSTP implementation based on the approved EIA, soil and water conservation schemes and relevant approvals;

2)Entrusting qualified design institute(s) to carry out design of environmental protection works according to the above implementation plan;

3)After results of preliminary design for environmental protection facilities are reviewed and approved by environmental protection administrations, tendering design and construction design would be carried out.

(2) Management of tendering for environmental protection and soil and water conservation schemes

The construction unit is responsible for preparing and reviewing environmental protection articles in the tender documents and contracts and ensuring all approved environmental protection measures are incorporated into the tender documents and contracts; carrying out in a timely manner public tendering for each scheme according to design outcomes and progress to ensure environmental protection and soil and water conservation

measures are implemented as scheduled.

(3) Environmental monitoring management

I) Preparing environmental monitoring and soil and water conservation monitoring plans following approved EIA, soil and water conservation schemes and relevant approvals;

2)Reviewing qualifications of environmental monitoring and soil and water conservation monitoring agencies, managing contracts for environmental monitoring and soil and water conservation monitoring, conducting inspections and assessment on laboratories of monitoring agencies; reviewing monitoring reports submitted by monitoring agencies, analyzing reliability of monitoring outcomes and environmental issues/problems as reflected in the reports;

3)Making use of monitoring outcomes to test implementation effectiveness of environmental protection and soil and water conservation measures and urging the contractor to develop and implement corresponding solutions to environmental impact issues/problems as reflected in the monitoring outcomes.

(4) routine management during construction

1) Developing annual environmental protection plan;

2) Reviewing and allocating annual budget for environmental protection;

3) Supervising implementation of environmental protection measures by the contractor;

4) Coordinating with environmental protection administrations and other administrations;

5) Addressing project-related pollution incidents and disputes and reporting them to higher-level authorities;

6) Preparing annual environmental protection reports and submitting monthly,quarterly and annual statements to higher-level authorities;

7) Organizing environmental education and training.

(5) Management of completion acceptance of environmental protection facilities

1) Entrusting agencies with relevant qualifications to prepare Report on Survey ofCompletion Acceptance of Environmental Protection Works under XIEDSTP;

2) Organizing acceptance of single and special works;

3) Organizing acceptance of special or comprehensive environmental protection works

while carrying out acceptance ofthe overall project;

4) Inviting local environmental protection and water administrations to direct acceptance of environmental protection works.

9.4.2 Environmental Supervision

9.4.2.1 Supervision Purpose

During project implementation, it is necessary to follow requirements in environmental protection design, conduct environmental supervision during construction, carry out all-round supervision and inspection of implementation of environmental protection measures by construction units and effectiveness of these measures, and address and resolve in a timely manner environmental pollution incidents. Outcomes of environmental supervision during construction will be used as the basis for project acceptance and will be incorporated into the acceptance report as a special chapter.

9.4.2.2 Supervision Role and Responsibilities

Contractors will be supervised to implement environmental protection-related articles in

the contracts following national and local governments' guidelines, policies, decrees, laws and regulations on environmental protection. The main roles and responsibilities are to:

(1)prepare environmental supervision plan and develop subjects and items of environmental supervision;

(2) take charge of reviewing environmental protection articles in the tender and bidding documents;

(3) conduct supervision over contractors to prevent and mitigate construction-induced environmental pollution and destructions to farmland and wild life, as well as prevent fire;

(4) carry out all-round supervIsion and inspection of implementation of environmental protection measures by construction units and effectiveness of these measures, building on survey and monitoring data; and address and resolve in a timely manner environmental pollution incidents;

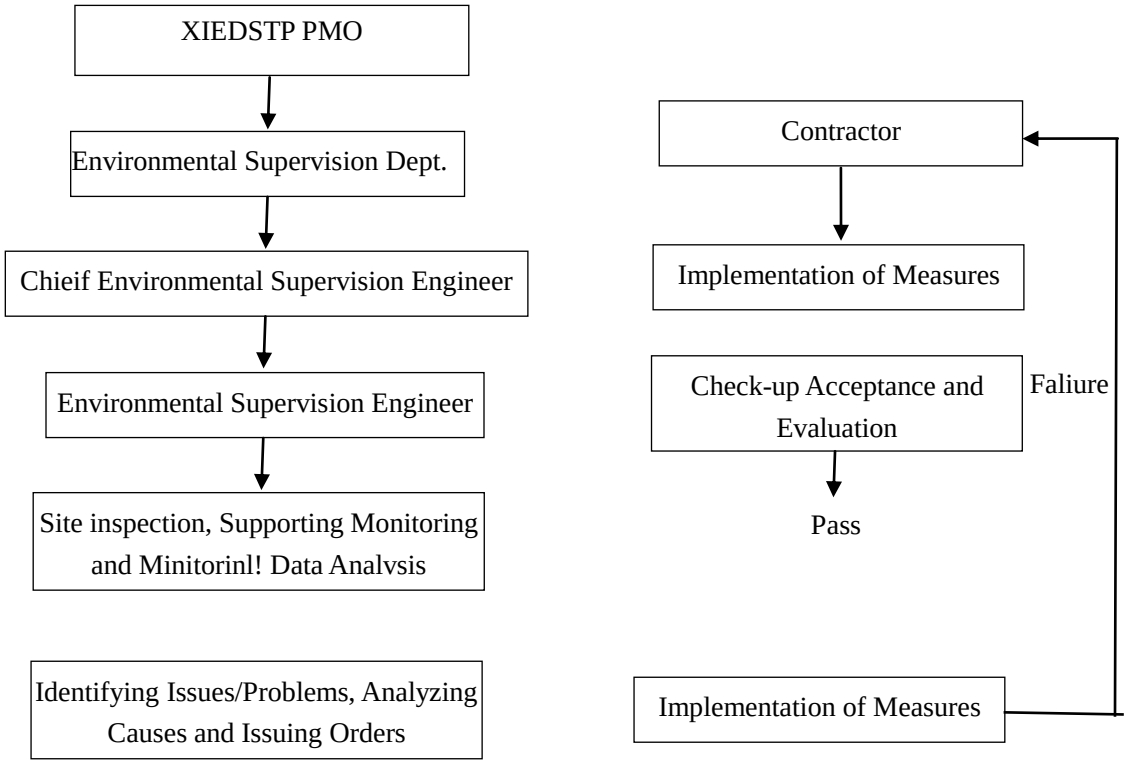
(5) conduct all-round inspection on cleaning and restoration of dump sites and construction "footprints" by construction units, including side slope stability,restoration ofconstruction footprints, afforestation and afforestation rate;

(6) be responsible for implementing environmental supervision, reviewing relevant environmental reporting, and working out requirements for canal construction management corresponding to results of air quality, ambient air and noise monitoring to minimize adverse environmental impacts ofconstruction;

(7) maintain good supervision record during daily work, prepare supervision report and participate in completion acceptance.

9.4.2.3 Management Agency and Work Procedures

Environmental supervision is an important component of environmental management and is relatively independent. Therefore, an independent and qualified environmental supervision agency shall be established. In compliance with contract articles and national environmental protection law, regulations and policies, the agency shall supervise, review and evaluate implementation of environmental protection measures by construction units,and timely identify and rectify construction activities in violation of contract articles and national environmental protection requirements. Organizational set and work procedures are given in Figure 9.4-1.



9.4.3 Environmental Management by the Contractor

9.4.3.1 Management Agency

The contractor shall set up Environmental Protection and Management Office as a key agency responsible for and implementing environmental protection during construction. When implementing environmental protection, the office shall strictly follow provisions on environmental protection and soil and water conservation as specified in the contract and tender and bidding documents.

9.4.3.2 Management Roles and Responsibilities

The contractor shall be responsible for managing its own environmental protection activities and those during production and construction. Specifically, the contractor shall:

(1) provide at least one full • time staff to be responsible for environmental work, who shall receive environmental training so that he/she is qualified for the job;

(2) prepare annual environmental protection plan;

(3) inspect progress in construction of environmental protection facilities and quality,operation and testing of these facilities, address issues/problems during implementation;

(4) communicate and consult during construction with the general public in the project areas, set up a bulletin board in each construction site, keep the general public informed of specific construction activities and construction time, and provide them with contact person(s) and telephone number(s) so that they can complain about and provide suggestions on construction activities;

(5) maintain accounting on use of annual environmental protection budget;

(6) report on implementation of environmental protection articles in the contract. The contractor is urged to monitor its environmental activities and provide a daily or weekly report on environmental performance. The PMO and Construction Supervision Group would supervise these activities and review the report.

(7) The contractor shall keep a deposit out of its contract value in an amount equivalent to about 3% of its annual budget to ensure that it satisfactorily carries out environmental management.

9.5 Environmental Management Training

9.5.1 Objectives of Training

Objectives of environmental management training are to ensure smooth and effective implementation of environmental management activities, enable relevant staff to familiarize themselves with contents and procedures of environmental management,enhance capacity of environmental management staff, and ensure effective implementation of environmental protection measures. Environmental capacity building is mainly targeted at environmental managers and environmental supervisors and training for them is part of project's technical support. During project implementation, training is also provided tocontractors and construction workers. Before construction is initiated, all construction units,operation units and construction supervisors are required to participate in compulsory training on environment, health and safety.

9.5.2 Training Participants

The participants are all staff from provincial, municipal and county PMOs, all environmental supervision staff, representatives from environmental monitoring agency,

and representatives from key contractors.

9.5.3 Training Contents

(1) World Bank environmental safeguard policy, domestic environmentalprotection laws and regulations, and knowledge about and application ofenvironmental standards;

(2) Environmental management models and environmental articles in the Loan Agreement for XIEDSTP;

(3) EIA and EMP for the project;

(4) Environmental management regulations for the project (with focus on regulations during construction);

(5) Roles and responsibilities of and relationships among environmental management staff, environmental supervision staff and contractors;

(6) Preparation of environmental management report, environmental supervision report, environmental monitoring report and contractor's monthly report.

9.5.4 Training Program

(1) All staff from environmental management offices, all environmental supervision staff and representatives from PMOs at provincial, municipal and county levels Centralized training is to be organized by Provincial Environmental Management Office before project implementation and conducted by environmental specialists. The training is to last for 3 days, covering the following:

1) World Bank safeguard policy and detailed environmental protection rules developed for implementing agency;

2) Project's environmental impacts and environmental monitoring items;

3) Operational processes at training venue, including organization, communication, roles and responsibilities, decision-making process and review procedures for reports and standards;

4) World Bank's environmental information filing, disclosure, communication and reporting mechanisms;

5) World Bank health and safety supervision and reporting processes.

(2) Representatives from key contractors

Centralized training is to be organized by Mianyang PMO before project implementation and conducted by environmental and health specialists. The training is to last for one day, covering the following:

1) Overview of factors leading to environmental impacts and environmental protection measures;

2) Clarification of environmentally sensitive spots within construction areas and overview of issues/problems;

3) Overview of roles and responsibilities of environmental management and environmental supervision staff and key points in environmental reports;

4) Commonsense knowledge on health and safety;

5) Penalties for breaching laws, regulations and rules.

9.6 Environmental Impact Mitigation Measures

The construction of the XIEDSTP will effectively promote the perfection of the basic

facilities in new zone of Xiantang, promote the local economic development and improve the urban ecological environment, play a very important role in Regional stable coordinated development and Local living standards.Although some Environment impaction will be Inevitably happened during construction and operation,but it can be controlled effectively after implementing the environmental protection measures.

This report summarized the particular Mitigation Measures of XIEDSTP during design, construction, and operating period,See table 9.6-1~9.6-3.In the same time,general environmental impact mitigation measures in ECOP for road project should be strictly implemented,strive to minimize the negative impact of XIEDSTP on the environment.

Table9.6-1 Summary of particular mitigation measures for XIEDSTP during design period

Stages	Main activities	Main negative environmental impact	Mitigation Measures	enforcer	Supervisor
Pre design and preparation stage	The design of road and choice of construction material and construction method	Iimpact on natural and social environment	（1）Optimize the route selection , reduce demolition, and avoid Large area demolition in *Xingfu village* ,try to occupy less cultivated land； （2）The environmental protection measures should be Implemented to the design of the construction drawings.Such as design reasonable section in order to ease the impact of noise and automobile tail gas;Setting deceleration warning sign for *industry road* and *Xinquyi road* After the Xudong river Section to avoid the impact on water environment; through optimizing design to Mitigate the impact of the project on the natural and social environment，such as use cement mixing pile to handle soft foundation.	Qualified design unit	County PMO, Owner unit
	Bidding	/	The contents of EMP should be taken into bidding documents ,bids from tenderer should include the contents of environmental protection and civilized construction.The contracted signed with the successful tenderer must include the terms of the EMP that should be strictly implemented by the construction unit.	Tendering agency and construction unit	County PMO, Owner unit

Table9.6-2 Summary of particular mitigation measures for XIEDSTP during construction period

Influence factors	Main Activities	Main negative impact	Mitigation Measures	enforcer	Supervisor
Social environment	Road construction	The impact on the social environment of construction	（1）For areas where the route will pass through,Billboard should be set up to enforce Propaganda in construction sites,and publicize the relevant policy to villagers in *Xingfu village* and Meizikeng village who will be influenced by construction activity, so that the masses will more support for the project, and increasing the understanding and supportive of temporary interference caused by the construction activities.	Construction unit ,contractor	Project supervision unit ,County PMO

Influence factors	Main Activities	Main negative impact	Mitigation Measures	enforcer	Supervisor
			（2）The construction way should not after *Xingfu Village* Road to avoid bring adverse effect on the trip of surrounding residents,stutents and teachers in senior middle school of and the second primary schooll of Dongyuan. The existing sidewalk located at junction of state road 205 and Xudong road. （3）The construction work scope shoule be strictly limited, the expansion of the scope of the construction land is prohibit. （4）To reduce the impact of construction vehicles on the villagers, a reasonable transport plan and route should be formulated, it should minimize the pass from schools and concentrated residential areas.		
		Impact on Historical Relics	According to the "Law of the People's Republic of China on Heritage Protection",if heritage sites discovered during construction,Construction Unit should protect the scene and report to the local cultural relics administrative department immediately,only afer the heritage sites have been identified and the protection measures have been approved by the cultural relics administrative department,construction can be continued.	Construction unit	County PMO 、Antiquities Department
		Impact on Infrastructure	（1）Seting up the reasonable drainage channel to keep the original drainage along the road unobstructed; （2）Keeping consultation with the public security department about road traffic during consruction period,and carry out the special traffic command and guidance.Damage to the local roads in the construction should be repaired immediately, or the compensation will be handed over to the local highway administration department for repair.	Construction unit ,contractor	Project supervision 、 County PMO
		Resettlement	Measures of resettlement contains： (1) Permanent land requisition and resettlement scheme：1)The implementation of internal adjustment of land resettlement village2) Use of collective land placement3) Implementation of monetary compensation and resettlement4) Promote the adjustment of	Owner unit,Construction unit	County PMO.Local government

Influence factors	Main Activities	Main negative impact	Mitigation Measures	enforcer	Supervisor
			agricultural structure and improve the output value of Mu5) Social security placement (2) Temporary placement scheme：The occupancy of the temporary land, compensation for temporary use of land during the agricultural output value loss, the construction unit paid temporary land use fees to land owners or users (i.e., collective or individual) , temporary covers an area of yearly compensation. At the same time , the construction unit should pay the reclamation margin to the local land partially , at the end use of the temporary land ,restore the restitution, return the deposit. Or to do collateral by the local village responsible for the reclamation. Reclamation to obtain local land management department of supervision and recognition and experience to the original farming conditions after return returned to the land owners or users. (3) The compensation scheme of young trees and ground attachment： Compensation to the owners according to the number and amount of Ground attachments and young crops (4)Housing relocation and resettlement program：1) All the effect people by the project settled in the original village (Group) inside；2)Housing demolition mode choice,Self demolition, construction or rental, etc.;3) Individual households may voluntarily choose other placement methods (such as voluntary choice for the resettlement of cities). (5) Special facilities to re build planning (6）Vulnerable groups：1) Offer special consultation；2) Priority in the choice of Homestead；3) Help house and house to build houses；4) To give extra living allowances and relocation grants；5) Offer priority to other economic benefits. Environmental measures for resettlement include: (1) Farmland acquisition for resettlement should be minimized. Attentions should be given to soil and water conversation i.Flat area should be selected for house building		

Influence factors	Main Activities	Main negative impact	Mitigation Measures	enforcer	Supervisor
			whenever it is possible and uncontrolled waste earth dumping should be banned in order to prevent new soil loss. (2) Supervision should be enhanced over demolishment and building to reduce vegetation damage. Demolishment waste should be well cleaned and construction debris should be fully utilized for filling and surrounding wall to mitigate environmental impact. (3) Drainage and interception ditches will be built around the relocation houses and lined with masonry block stone or sheet stone. Protection facility should be built along filling side slope, which will be implemented by the relocated households during construction and capital cost will be included in resettlement cost. (4) Greening should be well carried out after completion of house building, and adaptable economic tree species or evergreen tree species will be selected.		
Ecological environment	Excavation earthwork and occupancy of arable land during road construction	Natural ecological environment	（1）Prior to the start of construction, the construction units should be in accordance with the project of soil and water maintain requirements of the program to develop the construction principle, using the existing dirt road as the construction pavement, and non random open construction detour; construction camp set Yaohui heap the soil inside, it is strictly prohibited to occupation of forest and grassland. （2）Carrying out Measures of Water and Soil Conservation strictly，mainly include： Main construction zone:Rain pipe network4640m,,sewage pipe network5270m,Chevron frame slope protection1.20hm^2, Roadbed slope protection 2.04hm^2,topsoil stripping 11400m^3,Overall land clearing 3.24hm^2,Drainage layout 10500m,Grift chamber 60、Block of the down side slope of filling 1000m,Felt tent cover 30000m2； Build area of construction ： ,Overall land clearing0.20hm^2,Sowing grass seed0.20hm^2,Drainage layou200m,Grift chamber1；	Construction unit	County PMO,Owner unit

Influence factors	Main Activities	Main negative impact	Mitigation Measures	enforcer	Supervisor
			Temporal dump zone:topsoil stripping700m^3, Overall land clearing 0.50hm^2,Sowing grass seed 0.50hm^2,,Drainage layout420m,Grift chamber2,Block of the down side slope of filling420m,Felt tent cover252m^2。		
		Impact on agricultural production	Topsoil of arable land occupied by road should be stripped and centralized colleced before construction,after the construction, the compacted land should be scarified , leveled first,and then use the topsoil collected before construction for Land reclamation and rehabilitation,besides, the the irrigation system should be improved at the same time. The temporary ocuppied land that is difficult to recover for the arable land should be greened or restored for other functions.		
		Impact on animals and plants	Strenthening the construction workers' awareness of protection, hunting wild animals is prohibited.Construction workers must comply with the "Law of the People's Republic of China on Wildlife Protection ",hunting wild animals is prohibited around the construction area and its surroundings.		
Ambient air	Construction dust and waste gas from construction machinery	Impact on air quality of construction area , and the production and life of the surrounding residents	（1）When construction to the starting point of Industrial Avenue and *Xinquy*i *Road,* to ensure dust will not affect residents,students and their learning life,Timely implementation of watering for dust suppression is very necessary. （2）Priority to choose commodity concrete for pavement material,field stir is not permitted. （3）Vehicles for transporting trash, sediment, sand must obtain a "transport vehicles navicert" and implement closed transport .When the vehicle away from the construction site, it must be flushed, so that it will not carry mud and Leak, spill on the road. （4）When there is a windy, dry weather , construction activities that easily lead to dust should be stopped. （5）Material easy to produce dust piled up in construction site should be classified	Construction unit	County PMO,Owner unit

Influence factors	Main Activities	Main negative impact	Mitigation Measures	enforcer	Supervisor
			concentrated stacked,enclosed by enclosure around it , and covered with a dense mesh or other shelter materials.		
Acoustic environment	Construction vehicle operation, road piling foundation, rammed pavement	Impact of noise on the surrounding inhabitants	（1）When construction to the starting point of Industrial Avenue and *Xinquyi Road*,high noise equipment could take sound insulation, isolation or muffler measures to reduce noise impact,besides,the temporary sound barrier could be set in *Xingfu Village* , and it can be located in the construction site boundary face to the environment sensitive point. （2）Arranging construction time and construction sites reasonably, try to shorten the construction period, and construction for starting point of Gongye Avenue is not allowed. （3）Arranging the transportation time of construction material reasonably.Vehicles passed through Xingfu Village should slow down, the speed should not exceed 40km / h, and is prohibition of arbitrary whistle so as to avoid construction vehicle noise impact on residents along the route. （4）Construction supervision units should do the noise supervision work during the construction period, and equipped with a certain number of simple noise measuring instruments，to monitor the noise in residential around the construction site to ensure that it will not affected by the noise.	Construction unit	County PMO,Owner unit
Water environment	Construction site setting and the discharge of sewage	Pollutants produced from Construction activity into surface water	（1）Temporary sedimentation tank should be setted in construction site,vehicle flushing waste water can be used back to watering for dust suppression in construction site after precipitation and oil removal treatment. （2）Each work area should build a camp toilets, the sewage can be poured into municipal sewage pipe network along the State Road 205 by temporary sewer network. （3）According to the requirements of soil and water conservation,some measures such as temporary drainage ditches should be implemented to avoid cross-flow of muddy water.	Construction unit	County PMO,Owner unit
Solid waste	Construction	Impact on	（1)According to the design requirements, the earthwork try to internal balance. Waste	Construction	County

Influence factors	Main Activities	Main negative impact	Mitigation Measures	enforcer	Supervisor
	solid waste,house hold waste	Ambient air and landscape ecological environment	soil cannot digested should be discharged according to the requirements of Dongyuan County waste management agency. （2）Temporary storage facilities for living garbage should be setted in construction site,so that the living garbage can be unified collected,and then processed by sanitation department in Xiantang. （3）Overloading for transport vehicle is prohibited ; the covering transportation must be carried out for the abandoned dump slag. （4）Construction waste sand, building materials, packaging materials should be personnel management and recycling, timely clean working face.	unit	PMO,Owner unit

Table9.6-3 Summary of particularmitigation measures for XIEDSTP duiring peration period

Influence factors	Main Activities	Main negative impact	Mitigation Measures	enforcer	Supervisor
Noise environment	Noise	Impact on sensitive points such as *Xingfu Villiage,High School of Dongyuan,The second primary school of Dongyuan,Meizi keng Vilage and*	（1）Carring out landscaping along the road,especially the aspect of Industrial Avenue and *Xinquyi Road* which pass through *Xingfu Village* for purpose to to reduce traffic noise effectively.In respect of tree species, aiphyllium with large crown and leaf area shall be selected. （2）Speed limit for vehicles ,especially in nighttime.enforce road operation maintenance, and repair damaged road promptly; keep road surface level and smooth in order to prevent increase of traffic noise resulted from vehicles unable to drive normally. （3）Instaling ventilation soundproof windows for the affected households, a total of 33 households, of which 32 households, in *Xingfu Vilage* and 1 households in *Meizikeng village*.	Construction unit	Project supervision uni, *Dongyuan* EPB

Influence factors	Main Activities	Main negative impact	Mitigation Measures	enforcer	Supervisor
		so on.			
Ambient air	Dust and Automobile tail gas	Impact on sensitive points around the road	（1）Enforcing landscaping on both sides of the roads. （2）Enforcement on detection and maintenance of motor vehicles,vehicles with over-proof off-gas emission is prohibited to drive on the road. （3）Reducing dust particles on road surface can effectively reduce the secondary dust comes from friction between the vehicle and the ground. （4）Strengthing management, optimizing the traffic signal indicator system, to ensure smooth road traffic, and reduce the waste gas emissions from vehicle idling driving.	Construction uni,*Dongyuan* Transportation Bureau ,*Dongyuan* Public security Bureau*y*	*Dongyuan* Development and Reform Bureau
Social environment	Vehicle driving	Impact on traffic safety impact	Increasing signal control points and road safety signs reasonably to reduce traffic accidents.	*Dongyuan* Development and Reform Bureau	County PMO
Water environment	Road surface runoff and hazardous chemicals accidental discharging	Impact on *Xudong River*,*Dongjiang River* and farmland soil and the surrounding around the road.	（1）According to the requirements of design ,rainwater pipe network matching to road shoule be constructed,so that the pavement rainwater can be precipitaed, and then discharged into nearby water. （2）Strengthing the traffic management, and developing the risk contingency plans to combat accidental discharge of toxic and hazardous chemicals caused by traffic Accidents , which will poullted the water quality of Xudong River and Dongjiang River.	Construction unit ,Owner unit	County PMO, *Dongyuan* EPB
Environmental risk	Chemicals accidental discharging caused by traffic	Impact on water quality of *Xudong River and Dongjiang River*	Waring sings should be setted up in cross sections of road ,channel and Xudong River to noitce drivers to limint their speed.Overtake and over speed are stricitly limited, to avoid water pollution accident caused by hazardous chemical spills.	Design unit,Constructi -on unit	County PMO

Influence factors	Main Activities	Main negative impact	Mitigation Measures	enforcer	Supervisor
	accidents				

9.7 Plans for Environmental Monitoring and Soil and Water Conservation Monitoring

9.7.1 Objectives of Monitoring

In order to protect regional environment, test and verify results of environmental impact projection and assessment, prevent harms of emergencies to environment, and develop detailed plans for implementing environmental protection measures, it is necessary to carry out environmental monitoring during construction and operation. Implementing environmental monitoring can also provide scientific basis for environmental pollution control, engineering environment management and regional environmental protection activities during construction and operation.

9.7.2 Monitoring Plans

Plans for environmental monitoring and soil and water conservation monitoring during construction and operation of XIEDSTP are provided in Tables 9.7-1 to 9.7-2.Sketch map of soil and water conservation monitoring points is shown in figure5.9-2.

Table9.7-1 Environmental Montoring Plan for XIEDSTP

Period	Subjects		Monitoring Points	Items	Frequency	Cost estimation (10000 Yuan)	Monitoring Agency	Responsible agency	Supervi-sion agency	Criteria and Specifications to be implemented
Construction	Water environment	Waste water from machine washing	discharge outlet of waste water	SS,pH,petroleum,waste water flow	Monitoring once a season duiring consruction period	15.0	Qualified agency engaged by the project owner through contracting	Project Owner	Local EPB	Teclmical Specifications forSurface Water and Sewage Monitoring (HJ/T91-2002)
	Ambient air		Construction area	TSP	Monitoring once in month，one day at a time，and getting daily average value following requirements in Ambient Air Quality Standards(GB3095-1996).		Qualified agency engaged by the project owner through contracting	Project Owner	Local EPB	Teclmical Specifications for Environmental Monitoring (State Environmental Protection Agency, 1986)
	Noise		Sensitive points listed in table1.10-1	Level A equivalent	Monitoring once in month，one day at a time，and getting samples at 08:00,8：00~10：00、14：00~16：00、20：00~22：00 every day，If there is complaints，Increasing the monitoring frequency		Qualified agency engaged by the project owner through contracting	Project Owner	Local EPB	Teclmical Specifications for Environmental Monitoring (State Environmental Protection Agency, 1986)
	H			Main contents of filing	Before construction workers		CDCs of		Lo	

	uman health survey	Filing and Epidemic survey		include age, sex, health status, history ofepidemic infection, home of origin. Survey items include TB, communicable hepatitis,bacillary dysentery, and communicable diseases at home of origin of consnuction workers	are stationed in construction sites,construction units shall conduct a comprehensive survey of their health status and create epidetnic files.		project county		cal Goverment	
运行期	声环境	声环境	Consistent with monitoring points of Status quo noise，9 monitoring points will set in total.	L_{eq}、L_{min}、L_{10}、L_{50}、L_{90}、L_{max}。	Monitoring for a period of 2 years, one time in a season ,and geting samles at day (06:00 to 22:00) and night (22:00 to 6:00 a.m.) when there is no construction actives surrounding ,every monitoring time should not less than 20 minutes.	4.0	Qualified agency engaged by the project owner through contracting	Project Owner	Local EPB	Teclmical Specifications for Environmental Monitoring (State Environmental Protection Agency, 1986)

Table9.7-2 Soil and Water Conversation Montoring Plan for XIEDSTP

Period	Areas	Items	Methods	Frequency and Times	Total cost (10000 Yuan)	Monitoring Agency	Responsible agency	Supervision agency	Criteria and Specifications to be implemented
Background	Project areas	Soil、Vegetation, terrain, slope, rainfall and other	Field investigation	once	26.0	Qualified agency	Project	Local Water	Technical Specificati

monitoring period		factors, soil erosion limitce values and background values, etc.	Data statistics			engaged by the project owner through contracting	Owner	Bureau	ons for Soil and Water Conservation Monitoring (SL277-2002)
Construction period	1、3、4、5# Monitoring point	Soil and water conservation engineering construction,erosion volume an erosion hazard, etc.	Method of settling basin	Not less than 2 times a month in rainy season (October ~ April), once a month in dry season (November to March)					
	2 、 6# Monitoring point	Erosion modulus,erosion volume and the effect of soil erosion control , etc	Simple slope measurement	Not less than 2 times a month in rainy season (October ~ April), once a month in dry season (November to March)					
Natural recovery period	Construction zone and temporary dump zone	The survival,preservation,closing, cover situation of vegetation.	Sampling investigation method	Two times					

9.8 Cost Estimate for Environmental Protection and Soil and Water Conservation

9.8.1 Instructions for Preparation

（1）Principles Governing Preparation

1） Environmental protection is an important part of project implementation and its cost composition, cost estimation basis and price levels shall be identical to those of the main project;

2） For environmental protection measures already developed for the project, the costs are included the overall estimate and are not estimated separately here;

3） Base unit prices for structures, including unit staff cost, prices of key materials and unit prices for structures, are identical to those of the main project;

4） Prices of materials and tree seedlings are calculated base on local market prices. Unit price for botanical measures are determined based on local prices of plantations for soil and water conservation.

（2）Basis for Preparation

1) Rules and Procedures Governing Preparation of Environmental Protection Cost Estimate for Water Resources and Hydropower Projects (SL359-2006);

2) Interim Provisions on the Collection and Administration of Compensation Fees for Water and Soil Conservation in Guangdong Province（Document 95 issued in 1995 by Guangdong Province）;

3) Provisions Governing Cost Estimate Preparation for Soil and Water Conservation Schemes under Development Projects (Document 67 issued in 2003 by Ministry of Water Resources);

4) Standard for the Mnagement of Engineering Survey and Design Fees (Document 10 issued in 2002 by the State Planning Commission,and the Ministry of Construction);

5)Circular on Administrative Regulations for Construction Supervision and Related Service Charges(Price Document 670 issued in 2007 by National Development and Reform Commission, Ministry of construction)

6)Guidance on Fees of Services for Water and Soil Conservation(Ministry of Water

Resources OCI [2005] No. 22);

7)Circular on Cancelling and Stopping Administrative Fees for 100 items Project(CZ [2008] No. 78).

（3）Fee composition

As required by relevant rules and specifications, environmental protection cost estimates for the project are consisted of fees for environmental protection measures, environmental monitoring measures, environmental protection instruments and equipment and their installation, and temporary environmental protection measures, stand-alone environmental protection costs, environmental protection contingencies, and interest of financing during construction.

（4）Base unit price

1) Unit price for staff budget

According to Circular of Guangdong Water Resources Department on Quota Adjustment of Water Resources and Hydropower Project Budget Section,unit staff budget price for the project is 8.38 yuan/work hour.

2）Unit price for material budget

Prices of key materials are the same as those of materials for the main project and prices of other supporting materials are determined in making reference to market prices.

3)Mechanical charge

Using the hourly fee/piece of construction machine in Cost Estimate Quota for Soil and Water Conservation Schemes.

4）Construction electricity, water budget prices

Refer to the main project materials budget prices and the Guangdong project cost information Released by the provincial construction cost management center recently, and comprehensive field survey received local market prices.

（5）Engineering unit price

1)Direct physical engineering fees

These include direct fees, other direct fees and on-site expenses.

(i) Direct fees

These include staff expenses and those on materials and use of machinery.

Staff expenses = fixed work amount (workday) x unit price for staff budget (yuan/workday)

Material expenses fixed amount of material use x budgeted unit price

Expenses for machinery use fixed use amount (pieces and hours)x hourly fee/piece

(ii) Other direct fees

Other direct fees =direct fees x other direct fee rates

(iii) On-site expenses

On-site expenses= direct fees x on-site expenses rates

2) Indirect fees

Indirect fees = direct engineering fees x indirect fee rates

3) Enterprise profits

Enterprise profits = (direct engineering fees + indirect fees)x enterprise profit rate

4) Taxes

Taxes = (direct engineering fees + indirect fees + enterprise profits) x tax rates

Fee rates for engineering and botanical measures are listed in Table 9.8-1

Table9.8-1 Fee Rates for Engineering and Botanical Measures

Num	Name of Fee Rate	Calculation Basis	Engineering Measures	Botanical Measures
1	Other direct fees	Direct fee	2	1
2	On-site expenses	Direct fee	5	4
3	Indirectly fee	Direct fee	5	3
4	Enterprise profit	Direct fee + indirect fee	7	5
5	Tax	Direct fee +indirect fee+enterprise profit	3.41	3.41

9.8.2 Estimated Results

Additional investments in environmental protection and soil and water conservation schemes under World Bank-financed part of XIEDTSP are 385.57 million yuan, including 215.1 yuan of investment in environmental protection schemes an170.47 million yuan in soil and water conservation schemes.

（1）Estimated environmental protection investment

Estimated environmental protection investment of XIEDTSP is 215.1 million yuan,

Table9.8-1 List of investment in environmental protection

Period	**Items**		investment（million yuan）	
			Estimate	**Total**
Construction	Noise,Ambient air,water environment,ecological pollution control measures		30	30
Operation	Noise	Sound insulation window	29.1	29.1
	Noise	Green	Included in green costs	0
	Ambient air	Green	Included in green costs	0
Others	Environmental monitoring cost during construction		5	5
	Sign		1	1
	Green Cost		150	150
Total			215.1	

（2）Estimated investments in soil and water conservation schemes

Total additional investments in soil and water conservation schemes of XIEDTSP are 170.47 million yuan, detailed in Table 9.8-2.

Table 9.8-2 Estimated Investments in Soil and Water Conservation Schemes of XIEDTSP Unit:10,000 yuan

Num	Name of project	Construction costs	Plant measure fee	Temporary construction fee	Independent fee	Total
One	**Section 1 Engineering Measures**	4.07				**4.07**
Two	**Section 2 Plant measures**		6.73			**6.73**
Three	**Section 3 Temporary measures**			97.29		**97.29**
1	Temporary protection project			97.07		97.07
2	Other temporary works			0.22		0.22
Four	**Section 4 独立费用**				48.8	**48.8**
1	Construction unit management fee				2.16	2.16
2	Construction supervision fee				3.78	3.78
3	Research survey and design fee				4.86	4.86
4	Soil and water conservation monitoring fee				26.0	26.0
5	Preparation of acceptance assessment for soil and water conservation facilities				12.0	12.0
Total of Section 1 to 4		4.07	6.73	97.29	48.8	156.89
Five	**Preparation fee**				9.41	**9.41**
	Basic preparatory fee				9.41	9.41
Six	**Water and soil conservation compensation fee**				4.17	**4.17**
Seven	Additional investment of water and soil conservation projects	4.07	6.73	97.29	62.38	170.47
	Investment of water and soil conservation listed in main project	2319.4	317.05	0.00	0.00	2636.45
	Total	**2323.47**	**323.78**	**97.29**	**62.38**	**2806.92**

9.9 Environmental Reporting

During the implementation of the project, the PMO, contractors and monitoring agencies of XIEDSTP shall record and report in a timely manner to pertinent departments project progress, EMP implementation and environment quality monitoring results. Specific tasks include:

(1) Monitoring agencies and contractors make detailed record of EMP implementation and report to the PMO in a timely manner;

(2) The PMO must complete preparation of project progress report (e.g. half yearly report) on time as required by the World Bank. The report mainly includes the following:

1) Implementation of environmental protection measures, EMP and training programs of the project;

2) Project status, e.g. project progress;

3) Whether there are public grievances; if incurred, such grievances, their solutions and degree of public satisfaction shall be recorded;

4) EMP implementation plan for the next year.

9.10 Environmental Codes of Practice

9.10.1 Purpose of ECOP

This project is classified as B according to the requirement of World Bank Environmental Safeguard Policies (OP4.01), In order to ensure the security of constructor and personnel in sensitive area, as well as preventing disturb to sensitive area and surrounding in construction period, this ECOP is prepared.

This ECOP is designed to clear the responsibilities and obligation of the related departments when carrying out environment protection in the implementation process; act as the guide of environment management of this project; instruct the constructor to design and implement measures to retard negative effects of environment in construction period; encourage the owners of project to adopt the environment protection measures specified in the contract as the finished facilities coming into service. It provides standard solutions to the potential negative environment effect in the construction period and formulates a set of environment control measure which is detailed, feasible in technical, sustainable and operable

in finance. Thereby eliminate or make up for the negative effect on environment and society as possible, or reduce it to a acceptable level. The specific objectives are as below:

（1）Clear the related responsibility in project environment management

Environment protection department (EPD), EIA agencies and design organization shall conduct scene verify, confirmation, propose effective environment retarding measures and include in the project design which shall serve as contractual obligation between construction unit and operators. The project management departments shall supervise and inspect as World Bank required.

（2）Operation guide of project environment management

The environment supervision plan, reporting procedure and document management procedure provided by ECOP contributes to the implementation of environment retarding measures. They will be offered to the construction supervision unit, environment monitoring units and other related units as an environment protection document to clear the responsibility and functions of related functional departments and management organization and provide communication channel and method between departments.

9.10.2 Principle of ECOP

（1）Principle of science, objectiveness and fairness: ECOP shall be scientific, objective and fair. The scientific basis shall be provided to decision after making comprehensive consideration of probable effect on environment elements and the composed ecosystem caused by implementation of ECOP.

（2）Integral principle: ECOP shall make integral consideration by linking the related policies, program, plan and corresponding projects.

（3）Principle of public participation: Encourage and advocate the public to participate during the process and interests and proposals of all sectors of society.

（4）Principle of consistency: Work of ECOP shall be consistent with construction level and details.

（5）Principle of operability: ECOP shall be operable and adopt simple, practical and feasible method proved by practice.

9.10.3 Management System of ECOP

9.10.3.1 Setup of Management System of ECOP

According to the requirement of related rules and project, this project proposed to appoint personnel in charge of environment management in addition to the environment protection department (EPD) of supervision function by law in order to approach demonstration effect of project. Hence establish a set of management system based on the external supervision of EPD and supplemented by internal management of the project management department.

9.10.3.2 Responsibilities of Organizations of Environment Management System and Personnel Allocation

Organizations of this project environment management system are composed of interior organizations, employed consulting service organizations and exterior organizations. However they respectively undertake different work and responsibility. The following table 3.2-1 shows responsibilities of organizations and personnel allocation

Table 9.10-1 responsibility of organization of environment management system

Name of organization	Type of organization	Personnel allocation	Responsibility of organization
①Environment protection Department (EPD)	Supervision organization	1 person	1. Perform total supervision and management of this project, including ratify the project EIA report (including sub-project), environment supervision and management during construction and operation
② Provincial project leading group and project management office (PMO)	Management organization	1 person	1. Draw up and supervise implementation of ECOP; 2. Supervise and coordinate to put the national and world bank (WB) environment management requirements into practice; 3. Submit reports to WB half yearly; 4. Inspect the environment management work of towns; 5. Coordinate with other departments and solve major environment problems; 6. Consign the employed environment experts to inspect the project;
③Town project leading group and PMO	Management organization	1 person	1. Prepare and supervise to implement the environment management rules and

			regulations of sub-projects; 2. Prepare and ratify national documents of EA; 3. Spur the project design to meet the requirements of EA; 4. Fit the environment protection measures in this environment management plan to the contract of construction; 5. Employ, supervise and coordinate project controller(qualification, responsibility and management); 6. Organize to implement environment management training plan; 7. Conduct monographic study and related investigation; 8. Complete project construction and record ,settle, and solve the complaint of public on operation; 9. Examine the environment supervision and environment consulting report; 10. Submit submit(report) to provincial project office every quarter; 11. Sign in the sit checklist given by the construction unit and supervision unit and verify sensitive problem and file. 12. Accept environment inspection (including WB project inspection)
④World bank	Supervision organization	1 person	1. World bank appoint inspection team in charge of special inspection of project implementation every year; 2. Inspect implementation of loan agreement of this project and ECOP.
⑤ Unit qualified with class A certificate of construction project on EIA	Environment assessment organization (EAO)	3 persons	1. Give on the spot investigation on all projects and EA; 2. Compose the ECOP.
⑥ Environment experts specially employed by provincial project office	Consulting service organization	1-2person	1. Coordinate the provincial project office to inspect the environment protection work of towns; 2. Make scene investigations on construction site, Contractor; draft and report to provincial project office with suggestion and opinion.
⑦ Project controller(undertake environment	Consulting service organization	1-2person	1. project supervisors specially entrusted by provincial project office or local project office;

supervision)			2. Supervise and inspect the condition of disposition living polluted water, production waste water, safeguard measures of loss of water and soil, waste gas, dust, noise control measure, disposition of production, living waste and sediment, epidemic prevention; 3. Fill the environment management checklists in the appendix of ECOP on a regular basis; 4. Provide solution to the environment protection problems arising in construction and follow the implementation, including delivering the rectification notice, checklists, and filing documents; 5. Make sure to report of construction implementation prepared and submitted to town project office;
⑧Organization unit	Implementation organization	1-2 person	1. Make environment protection measures during construction; 2. Accept supervision inspection on environment protection from project controller, WB, and all EPDs; 3. Establish a feedback mechanism to ensure rectification completed within 3 workdays upon receiving notice (10 workdays in case of need coordination of management organization); 4. Finish the construction site checklist with project supervisor (PS) and submit to town project office; 5. Construction unit shall report construction implementation to PS every week.

9.10.3.3 Environment Management Task (EMT) in Different Stages of the Project

COP assumes different work in different stages of implementation. As shown in 3.3-1.

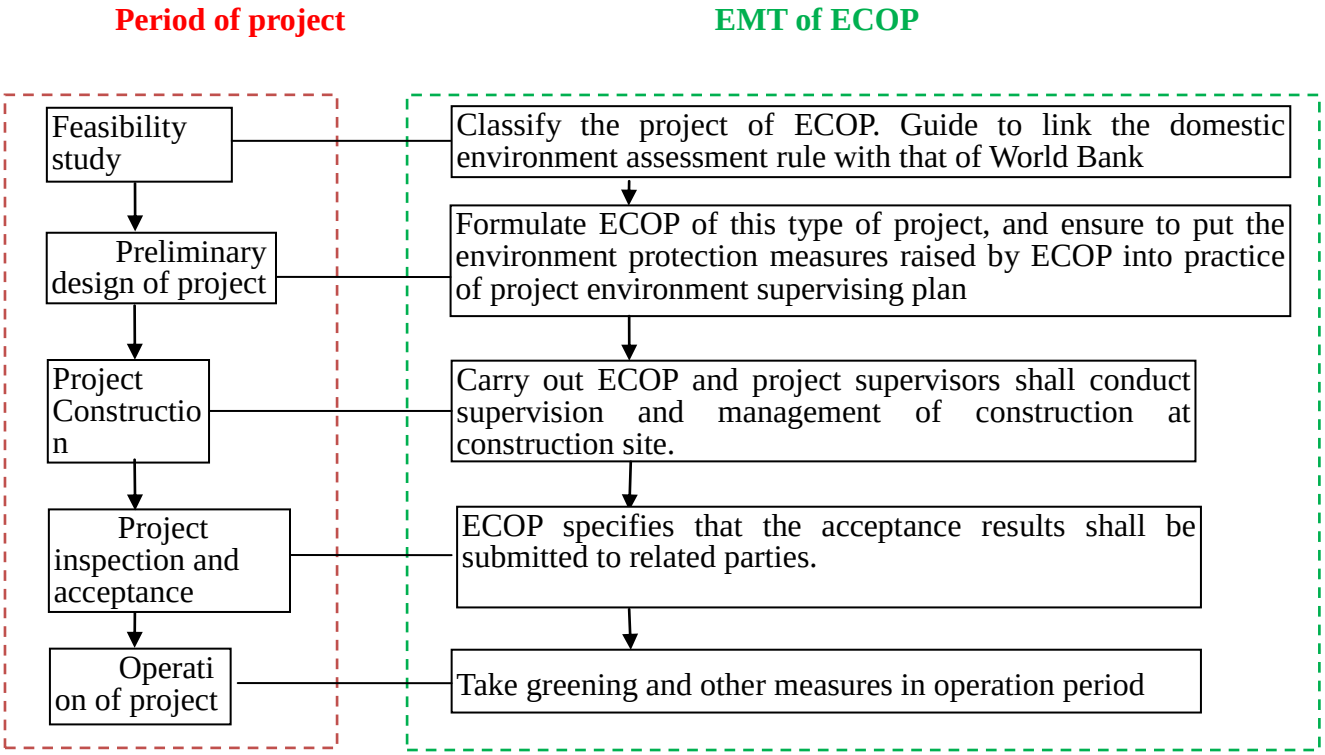


Figure 3.3-1 Work content of ECOP in different implementation stages

The foremost task of ECOP is to make sure its environment protection measures come into practice, including: ① Fit the environment protection measures of ECOP into project design and construction contract; ②Consign the environment controller to supervise the implementation of environment protection measures during construction;③Establish the inspection system, report system and file system of ECOP . The timelessness shall be proved by inspection of daily work.

9.10.3.4 Work Procedure of Organization Implementing ECOP during Construction Period

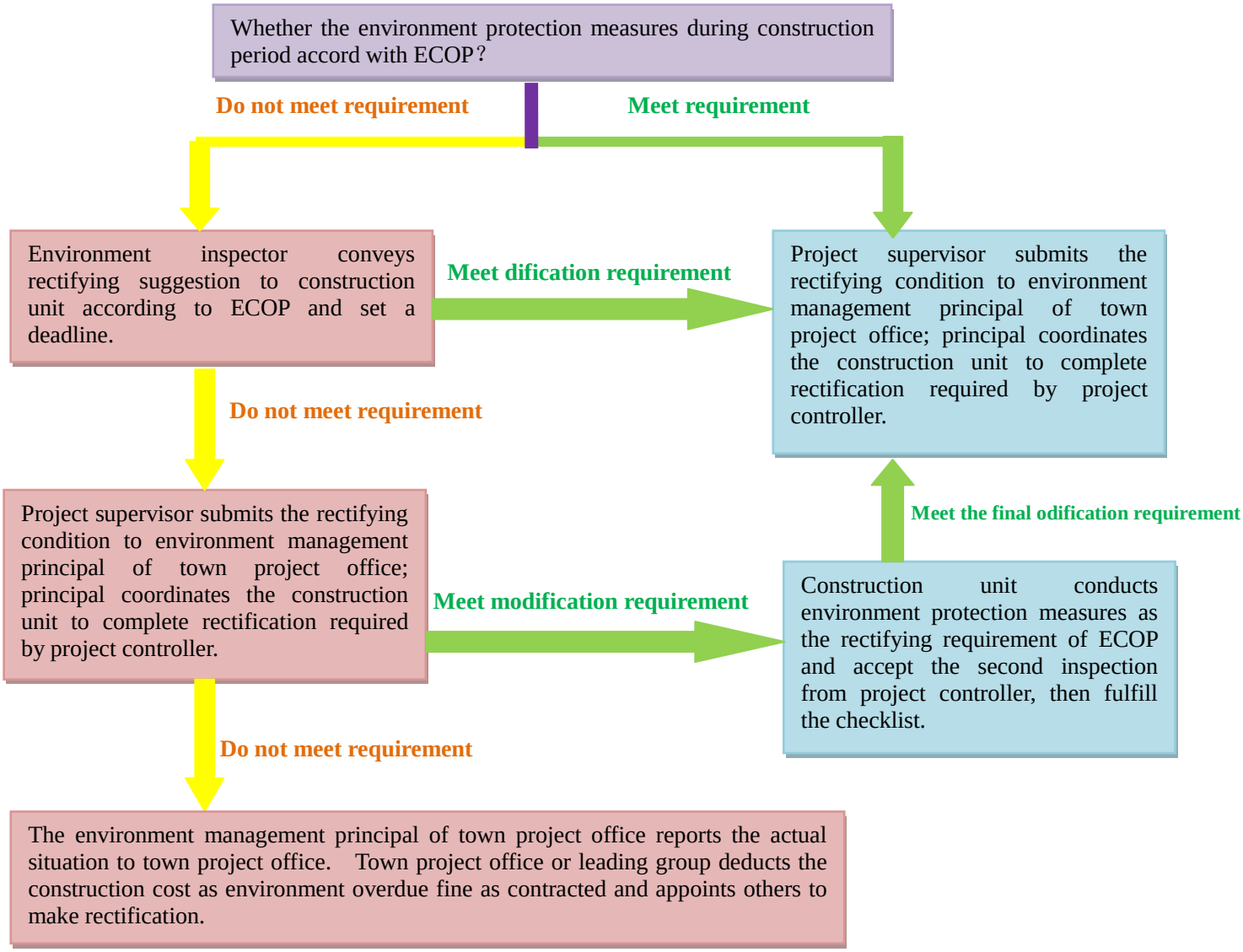


Figure 3.4-1 The workflow for agency of environmental protection implementation rules contracted and appoints others to make rectification.

9.10.3.5 Document Management of ECOP

When implementing ECOP, WB, provincial project leading group and PMO, project leading group and PMO of towns, environment assessment units, PS and construction units shall bear responsibility of relevant document management. See the table 3.5-1 for details:

Table 3.5-1 document management requirements of organizations

Name of organization	Document management
① Construction unit	1 Record construction implementation situation, file, and report to PS weekly; 2 Complete construction site checklist before construction with project controller, file and submit to town project office; 3 When in emergency, record construction implementation situation, file and submit to project controller; 4 Complete rectification within 3 workdays upon receiving rectification notice (extend to 10 workdays in case of need coordination of management organization), file the document.
② Project controller	1 Record construction implementation situation, file, and report to town project office weekly; 2 Complete construction site checklist before construction with project controller, file and submit to town project office; 3 When in emergency, record construction implementation situation, file and submit to town project office; 4 provide rectification solution to the related environment protection problems raised by construction unit in construction and put it into practice, including delivering rectification notice, checklist and file them.
③ Units qualified with certificate of construction project on EIA.	1 Compile ECOP; file the first draft, manuscript and final copy.
④ Project leading groups and PMOs of towns	1 Compile and implement environment management rules and regulations of sub-project and file them; 2 Compile domestic EA documents, apply for approval and file; 3 Compile and implement environment management training plan and file it; 4 Conduct monographic study or relates investigation, manage the and file the documents of seminar or investigation; 5 Record and settle the complaints in construction and operation period, file them; 6 Record the condition reported by project controller, file and submit statement or report to provincial project office every quarter; 7 Sign in the checklist submitted by construction unit and project controller, verify the sensitive problem and file them;

	8 Manage and file the submitted rectification notice.
⑤ Provincial project leading group and PMO	1 Formulate and supervise the implementation of ECOP, file it; 2 Record the reported content of project leading groups and management offices of towns half yearly, report to WB and file them; 3 Coordinate with other departments to solve major environment problem, record specific measures and file them;
⑥ WB	1. Record the content reported by provincial project leading group and PMO half yearly and file them;

9.10.4 General Requirements of ECOP

During construction period of this project, Contractor plays a key role in environment management, pollution control and implementing preventive measures. We here raise the general requirements which are applicable to the principal organizations during construction period in order to put ECOP into practice. This is to help the construction unit to carry out the environment measures provided by ECOP with coordination of provincial project office, town project office and project controller, by interior and exterior supervision and management.

Design of Construction Drawing and Implementation of Environment Measures in Tender Preparation

Develop purchasing activities of various projects construction according to the purchasing guidance of WB in implementation stage of this project. With the coordination, guidance and supervision of provincial project office, project office of towns shall require tender preparation institution to fit the retarding measures into technical regulation of tender and construction drawing design. These measures shall be aimed at the potential negative impacts among the environment impact assessment of sub-projects. In the bidding document, the bidders will be required to respond to following environmental management requirement that would be included into the road transport contract:

1. Contractor is required to establish supervision responsibility system and put the environment protection measures into practice. Make sure that the project construction and of subcontractor (if any) are in accordance with ECOP, besides the required environment protection measures are taken during construction period.

2. During construction period, Contractor shall communicate and consult with the local people, inform them specific construction activities and time by billboard in each construction site. Linkman and contact number shall be known by the public in order that they will provide complaints or suggestions.

3. Contractors shall comply with the related rules of local safe and civilized construction.

4. Construction unit and construction supervisors are required to accept training on environment protection and environment management. Contractor and PS shall accept training given by experts specially employed by provincial project office to recognize environment protection requirements related to this project.

5. As for serious risk accident caused by noncompliance with environment protection measures provided by ECOP, the accident PS or Contractor shall inform the town project office with 24 hours. Project offices and EPD of towns shall immediately order the construction unit to take remedial measures, and ensure the effectiveness to avoid similar risk accidents. In addition, Contractor shall record the implementation situation, and report to PS on a regular basis, which will then convey them to town project office and file them.

6. Contractor shall reserve deposit of environment management from the project contract funds according to annual budget. This deposit shall occupy 3% of budget funds. In case that construction unit takes adverse environment protection measures, provincial project office shall fine the construction unit as contracted and deduct construction cost as environment protection overdue fine, then consign others to take measures.

Construction Preparation

During the pre-construction period, contractor should make sure that the workforce is already hired as well as the construction sites which are included offices, worker camps, storage areas, asphalt plants, mixing plants, laboratories are already built. Make sure borrow pits and stockpile areas have been chosen and slopes and various design points should be setup. Make sure that seeds, native vegetation and topsoil are collected and stored for re-use during site restoration. Make sure that right-of-way is cleared by removing stumps and organic debris.

Permit of Department and Opinion of the Public

Throughout the construction, construction unit shall coordinate perfectly with local government departments and other departments to ensure its legality. They shall notify local people near construction site of the exact construction site and the estimated lasting time ahead of time. The public shall know much about it. In particular, the construction activities may threaten the public security, doing harm to public interest, sensitive area, and temporary land acquisition for construction and so on.

Construction unit shall adopt open and transparent public participating model, providing hotline for consulting and suggestion from the public, all calls about construction interfering environment shall be accepted and recorded to disclose the hot issues the caller concerning about. Meanwhile, a rapid response system is required to slove problems for public.

9.10.5 Management on Construction Sites

As the main content of this Environmental Codes of Practice（ECOP）, this chapter has put forwards environment protection measures and fundamental requirements of environment management for Contractor during road traffic engineering. This section summarizes requirements on site environmental management, including working hours, construction of nameplate, construction camp sites, access roads, construction roads, construction materials as well as prevention of accidental risks. Construction unit shall observe management regulations of the local EPD, and accept regular inspection by environment supervisor.

Construction working hours:

- Construction time is 6:00am to 22:00pm. During lunch break 12:00am-14:00pm, construction is stopped. Please note that entering and exit time of construction vehicles shall comply with the local government regulations;
- Limit night construction and notice residents around when night construction cannot be avoided. Go through relevant procedures and take measures to reduce effect on residents around.

Setup of construction name plate:

- Construction unit shall post information such as construction and project schedule, service interrupt, revised traffic route, temporary line and remove on public information platform;
- If necessary, control effect on the neighborhood caused by night construction and notice the community to take necessary measures;
- Before service interrupt (including water, electricity, gas and bus route), put up notice on project site, bus stop, effected resident houses and enterprises at least five days in advance.

Preparation of construction camps:

- Construction unit shall rent neighborhood resident houses to the greatest extent, avoid using temporary land other than road land, and reduce effect on soil and water conservation and environment caused by local construction;
- Built site office, camp, warehouse, mixing plant and workshop in areas admitted by local village and town project office;
- Workers camp and construction site cannot be built 500m within residence zone and 1000m within asphalt factory;
- Camp zone shall have effective natural drainage;
- For some sections which are difficult to operate, select barren hill, bush and inferior land. Farmland occupation is strictly forbidden;
- Arrange, store and dispose all solid waste generated from construction site appropriately;
- No natural wood shall be used as fuel for processing or preparing necessary material for project, cooking or heating;
- Kitchen waste water shall be disposed in oil separation sediment pool with enough capacity;
- To use existing quarry yard and to reduce negative impacts on environment;
- The business license should be examined and approved by national department, and qualified materials should be provided enough by quarry yard.

Access roads:

- Make the best of county roads, town roads and village roads; meanwhile reconstruct town road and village road. If new access roads are to be built, refrain from any large scale excavation and filling, meanwhile preserve soil and water and reduce water loss and soil erosion as well as ecological damage;
- Try to combine access roads with construction camp road so as the reduce number of road.

Construction road occupation management:

- In case of basic farmland, house site or government land, construction unit shall negotiate with PMO to confirm location of construction camp. Discuss with project implementation unit to select and confirm appropriate site.

Construction spare materials management:

- Earthwork and rock used for construction shall be balanced with earth and stone excavated from other construction site. If there is no such earth and stone, make best use of existing quarry yard or earth factory to avoid exploration of new quarry yard or earth factory and damage to ecological balance. Asphalt for the project shall be purchased. Asphalt mixing is not allowed in construction site;
- If soil mining yard and quarry yard is not owned by construction unit, the construction unit is in charge of purchasing earthwork and backfills. Construction unit， soil mining yard and

quarry yard owners shall sign an agreement, on which earthwork type, details of quantity and transportation duty will be specified. The copy of this agreement will be submitted to town PMO.
9.11 Prevention of accident risk: • Construction unit shall formulate accident prevention measures in advance, assign person in charge of emergency to ask relevant department for help in case of accident.

9.10.6 Erosion and Sedimentation

（1）There is a potential for erosion and sedimentation of nearby lands and waterways if the site activities are not managed. The Contractor shall implement erosion and sedimentation control measures to the satisfaction of the construction supervisor and town PMO.
（2）This project may cause: ● Destroy the surface vegetation. ● Increase soil erosion, and ● Temporarily change water flow patterns.
（3）In order to reduce environment damage caused by construction, environment management shall be strengthened and the following measures shall be taken: ● Install temporary and permanent drainage facilities to protect areas susceptible to erosion; ● Maintain sites that are not disturbed by rehabilitation activities in their existing; ● Apply native grass seeds and mulch on areas that are prone to water and soil loss; ● Before the start of the rainy season , the erosion control measures should be taken immediately after rehabilitation; ● Build surface water drains to minimize erosion and flooding; ● Install sediment control structures where needed to slow down runoff, and trap sediments until vegetation is established; ● Spray water as needed on dirt roads, cuts, fill material and stockpiled soil to reduce erosion caused by winds; ● Restrict and control traffic over stabilized areas; ● Do not allow sediments to enter cultivated fields or water drains, and ● Repair any damage to stabilized areas.

9.10.7 Prevention management on water and soil conservation

(1) Erosion possibly caused by construction project mainly occurs in roadbed area and borrow pits. The construction time in roadbed area is the longest, so the prevention emphasis should be put on slope management and drainage project assignment; the key point of prevention in borrow pits is temporary block, drainage facilities and vegetation restoration measures. The access roads in this area are the transport roads.

(2) Roadbed area:

The prevention of erosion in this area is focus on drainage on both sides of roadbed, slope prevention and temporary prevention measure in construction period. Drainage ditch and slope prevention are already included in the main part design, so we only design temporary prevention measures in the proposal.

① Requirements of construction:

- The roadbed side ditch should be in advance of roadbed filling to lessen the influence of roadbed filling on both sides;
- Prevent the side slopes timely after the roadbed is shaped up;
- Clear the sludge which located at drainage ditch and sediment deposition pool timely in rainy season, and pave the sludge on the fill slope and compact, and
- If the irrigation channel is occupied by the roadbed, change the routine or dredge it as soon as possible to avoid influencing the agricultural production.

② Design prevention measures:

A. Topsoil stripping and prevention

Topsoil stacking principle: Do not allow to stack at the gathering site of runoffs; Do not allow to stack in the susceptible area of the road and river near the project; Do not allow to stack in the area which may influence the construction or the clearness of the road; The best choice is to stock in low-lying free ground to decrease the project amount of prevention measure. The topsoil temporary stacked in the area is the stripping topsoil of paddy field and garden before roadbed filling and is used as the slope vegetation covering soil. They are stacked in the requisition land on of the both sides of roadbed temporarily. In order to avoid earthworks sliding, the temporary woven bags are used to block earthworks.

B. Shoulder block water retaining terrier and temporary chute

As the roadbed and pavement are often constructed by different construction units, so it often happens that the pavement project begins a long time after the roadbed shapes up and the roadbed earth side slope protection measures construction also lags which leads to serious scouring effect on the earth side slope in rainy season. For this reason, we are consider to set earth terrier on the shoulder and chute on slope and lead the pavement runoff into the chute to avoid the runoff scour the side slope after the roadbed filling is shaped up in the proposal.

C. Paddy filed and fishpond measures

Shenxiu Road is through the paddy field and fishpond. The higher is roadbed filling, the larger is the area of side slope. The heavy rainfall may cause serious erosion problems, which not only does harm to the construction itself but also causes dispute. Therefore, it is necessary to set woven bags to retaining wall at the slope toe in the section which is through the paddy field and fishpond.

(3) Construction production areas and workers camps :

This area mainly consists of construction encampment and mixing plants, so we are only consider about construction requirement and prevention measures of increasing construction encampment and mixing plants in this proposal.

① Requirements of construction:

- We should consider about renting local residential house for construction production areas and workers camps firstly;
- Construction production areas and workers camps should be located in high-lying areas to avoid water from outside;
- Other construction encampments should be cushioned with gravel instead of hardened cement, except mixing plants;
- Required dust fall and dust proof measures should be taken in mixing plants, for example, cement tank increasing dustproof device;
- In sunny day or dry weather, spray water as needed on mixing plan regularly to reduce dust; and
- Spray water as needed on sediment deposition pond timely; the sludge should not be stacked around the pond.

② Design prevention measure:

Design construction encampment prevention measures

This area is used as work shed or hardening area for most of time in construction period, so there are hardly any erosion problems. As the construction period is rather long, we plan to do the temporary vegetation work for the areas except the work shed and hardening area in the proposal. The plan is to plant grass and shrub, and the environment will become more comfortable. In the later construction period, dismantle the work shred and hardening area to carry on land consolidation and vegetation recovery. Otherwise, build brick drainage ditch to drain seeper quickly.

③ Design mixing plants prevention measures

The prevention of mixing plant should be focused on surface water in the area. As there are a lot of traffics in the area and a lot of materials to stack on the field, so we advise to harden the yard with cement. As there is much sand and stone stacked in the yard, as well as much sand contented in the rainwater and surface water, otherwise waste water in the cement tank and mixing device contains much cement which would pollute water if drained directly. So it is necessary to set a multistage sediment deposition pond at every mixing plant so that surface water could be drained in to the natural ditch nearby after sedimentation. Carry on the land consolidation in the later stage, whose main task is to dismantle the construction facilities and clean up the building materials such as stone and sand threw in the process of mixing plants.

(4) Prevention area of borrow pits:

The temporary block in the process of borrowing soil vegetation measure after borrowing both plays an important role in prevention area.

①Requirements of construction:

- Protect the vegetation in and around the borrow pits, transplant the valuable plants if necessary;
- Make some surface soil stripping protection before borrowing soil, used for earthling of land consolidation in the later period;
- As the picking-cap type borrowing is adopted, it is necessary to set temporary block and

drainage measures around the soil borrow pits;

- After soil borrowed, some measures should be taken to recover vegetation on the side slope, covering with tarpaulin in heavy rainy days.

②Design prevention measure:

Surface soil stripping:

Make a proper clean before borrowing soil, and then the surface soil should be stacked on the space in the area, using it as the cultivated soil in the later stage of second ploughing; the measures on surface soil stacking and soil borrow pits should be protected.

Measure of temporary block:

To prevent the earthworks falling to bury the road and farmland when excavating the mountain, it is necessary to pack part of the surface soil which is stripped in the early period in the bags and form a retaining wall at borrow pits. The cross section of woven retaining wall which is the same as roadbed slope toe is trapezoid.

Measures of drainage measure:

To avoid the rainwater in the yard flow into the surrounding farmland taking silt along in the process of borrowing soil, it plans to set drainage ditch around the soil borrowing pits and sediment deposition pond at the exit. By this way the rainwater in the yard is drained into the natural ditch nearby through silt deposition; set the intercepting ditch on the platform of soil borrowing pits and outboard of the soil borrowing upper side slope and connects with the drainage ditch.

Measure of vegetation:

Carpet the side slope with sward while the cutting slope of soil borrowing pits and land consolidation completed. Plant shrub on the soil borrowing platform, and then plant grass under the shrub. Native species should be chosen during this process.

Temporary coverage:

The vegetation measure on the soil borrowing side slope cannot be recovered in a short time, and need to be covered temporarily in heavy rainy days to avoid runoff scouring the slope surface.

(5) Access roads prevention area:

The access roads in this area are the transport roads.

①Requirements of construction:

The access roads should be selected from the existing roads. Consult with the local people and then contribute to broaden or harden to reach the “win-win” situation.

As for the new access roads, the big excavation and along-river plot should be avoided.

In the sunny or windy day, spray water as needed timely to control dust.

②Design prevention measures:

If there is cultivated field on both sides of access roads, it is necessary to excavate the drainage ditch on single side and connect with the drainage ditches of the soil borrow pits and roadbed in order to decrease the land occupation.

9.10.8 Earthworks, Cuts and Fill slopes

(1) Earthworks, cuts and fill slopes shall be carefully managed to minimize impacts on the environment.
(2) Poorly designed and constructed earthworks (including earth moving activities and slope cutting) may cause: • Earthworks is unsafe and bring negative impacts on human health; • Earthworks can cause damage to agricultural fields and native vegetation, and • Earthworks would contaminate surface water drainage and watercourses.
(3) In order to reduce environment damage caused by construction, environment management shall be strengthened and the following measures shall be taken: • All earthworks shall be properly managed, especially during the rainy seasons; • Maintain stable cut and fill slopes at all times and, avoid disturbance to areas outside the prescribed limits; • In order to protect cut or fill slopes from erosion, grass and other plants should be covered with them; • Provide cut off drains above high cuts to minimize runoff and slope erosion; • Dispose excavated cut or unsuitable materials in designated areas; and • Use disposed soil to fill low-lying areas.

9.10.9 Stockpiles and Borrow Pits

(1) Operation of a new borrowing area, on land, in a river, or in an existing area, shall be subject to prior approval of the town PMO and every environment protection departments, and the operation shall cease according to the construction supervisors requirements. Borrow pits shall be prohibited where possible to avoid interference with natural or designed drainages. River locations shall be prohibited where possible to avoid damage to river banks or carry too much fine material downstream.

(2) Uncovered stockpile locations, excavation sites and unprotected slope surfaces can produce erosion during adverse weather conditions. Borrow areas can result in significant environmental impacts. For example, disturbance to the existing habitats, river pollution, landscape and visual impacts. Borrow pit and stockpile locations shall be carefully considered so as to reduce the environmental impacts.

(3) In order to reduce environment damage caused by construction, environment management shall be strengthened and the following measures shall be taken:

- Identify and demarcate locations for stockpiles and borrow pits, ensuring that they are 15 meters away from critical areas such as steep slopes, erosion prone soils, and areas that drain directly into sensitive water bodies;
- Stockpiles should be kept away from sensitive areas, as well as located at downstream of sensitive areas;
- To reduce storage time in stockpiles;
- To distribute suitable areas for dust materials;
- Locate borrow pits in non-productive land to the extent possible.
- Limit extraction of material to approved and demarcated borrow pits.
- Stockpile topsoil when first opening the borrow pit. After all usable borrow has been removed, the previously stockpiled topsoil should be spread back over the borrow area and graded to a smooth, uniform surface, sloped to drain. On steep slopes, benches or terraces may have to be specified to help control erosion.
- Excess overburden should be stabilized and re-vegetated. Where appropriate, organic debris and overburden should be spread over the disturbed site to promote re-vegetation. Natural re-vegetation is preferred to the best extent practicable;
- Keep existing drainage channels in areas affected by the operation free of overburden;
- Ensure that all borrow pits used are left in a trim and tidy condition with stable side slopes, re-establishment of vegetation, restoration of natural water courses, avoidance of flooding of the excavated areas wherever possible, so no stagnant water bodies are created which could breed mosquitoes, and
- No any other materials generated/ deposited during construction shall remain on site. Reinstate all areas affected by stockpiling to the satisfaction of construction supervisors.

9.10.10Control of air pollution

(1) This project is in construction and operation stage, therefore, various operation activities will cause emission of air pollutants.

(2) Main air pollutants in this project include:

- Fugitive dust emissions due to exposure of slopes, uncovered stockpiling area, earth moving and excavation activities;
- Transportation of materials on unpaved roads;
- Gas emissions from concrete batching plants and during pavement of roads, and
- Exhaust gases from construction machinery and vehicles.

(3) In order to reduce environment damage caused by construction, environment management shall be strengthened and the following measures shall be taken:

- Spray water as needed on construction site to reduce raise dust during dry seasons;
- Cover or clean vehicles carrying powder substance before leaving construction site;
- Spray water as needed on powder materials before transportations;
- After removing all stockpiles, any leftover powder materials shall be spray by water and swiped from the road;
- The dusty road should be implemented road hardening project or wetted by sprinkle water;
- Ensure that water removal for dust control purposes does not impact surface water flows or water uses by local communities；
- Cover powder material storage sites or sprinkle water to suppress dust;
- Open cement bags in shielded place;
- Construct in regulated time to reduce air pollution. The construction time is 6:00 am to 22:00 pm. Construction works should be stopped during lunch time which is between 12:00 am to 14:00pm;
- Material loads shall be suitably covered and secured during transportation. Ensure that construction vehicles which are carrying earthworks and soil are not overload and prevent unrestrained;
- When select the location of stockpiles, wind direction shall be considered. It is necessary to avoid disposing powder materials on the upwind direction of sensitive areas;
- The piling of construction materials shall be windshield and dust controlled;
- Make sure reasonable transportation route of solid waste to reduce emission of raise dust;
- Spray water as needed on construction site for demolition works;
- Temporary wall on construction boundaries shall be built, and
- Access roads are speed restrictive, and have speed restriction mark. Construction vehicles must observe speed restriction regulations.

9.10.11 Water pollution control

(1) Waste water generated from construction work will cause negative influence on water ecological system and water quality.

(2) The following activities will cause impacts on water quality during construction and operation stages:

- Wastewater generated from construction equipment (e.g., uncontrolled release of bentonite from the drilling machine);
- Wastewater from boring and drilling locations;
- Soil erosion from uncovered stockpiling locations and uncovered excavation sites during adverse weather conditions;
- Uncontrolled surface water run-off carrying sediments directly into water bodies such as streams, fish ponds and rivers, and
- Domestic sewage from camp sites.

(3) In order to reduce environment damage caused by construction, environment management shall be strengthened and the following measures shall be taken:

- Wastewater should be drainage after treatment. The direction of drainage is to flow into drains;
- Dispose soil on drainage channels regularly and clean detritus chamber and settling tank regularly;
- Domestic wastewater should be entered into natural drains or municipal pipe network after tertiary waste treatment;
- Construction works should be involved in regulated working hour to reduce waste water pollution;
- Wastewater discharged into surface water body and sewer pipe shall comply with the Chinese legislation for environmental protection;
- Maintain waste water dispose system of the construction site regularly (such as settlement tank);
- Clean vehicles and equipment before withdraw from construction site;
- Inspect maintenance of cleaning facilities and remove sand regularly;
- Keep public road/site, entrance and temporary wall around construction site clean;
- Provide sufficient space for storing wastewater disposing system, and
- Make sure the location of waste water dispose site.

9.10.12 Noise pollution control

(1)A wide range of noise generating equipment is used during project construction works (e.g. backhoes, bulldozers, cranes, trucks, generators, earthworks, transportation, vehicular traffic, etc.).
(2) Noise can be generated from any of the following activities: Operation of construction equipment (powered mechanical equipment, bulldozers, excavators, etc), and Vehicles transporting materials within and beyond the construction site.
(3) In order to reduce environment damage caused by construction, environment management shall be strengthened and the following measures shall be taken: Comply with the relevant legislation with respect to noise during construction period; For time period that has noise restriction, construction unit shall obtain effective construction noise permit (CNP); If construction work should be done during nights, it can be worked during regulate time which is approved by related department. It is not allow to operate equipments without authorized by related department; Equipment that will generate noise(such as generator) shall be operated in a room with door closed; Adopt low noise equipment or take noise-reducing measures (sound screen, sound barrier) during construction; Contractors shall maintain construction facilities regularly and control it to be the best work mode and lowest noise level; Inactive facilities in construction site shall be closed or set to throttle and damp mode, and Put No Vehicle Horn sign on sensitive site such as school, hospital, nursing homes and office building.

9.10.13 Solid waste management

(1) Generally, solid waste includes any garbage. For example, domestic garbage from construction areas, inert construction materials and remove wastes.

(2) Solid waste can be generated from the following activities:

- Surplus excavated materials requiring disposal due to earth moving activities and slope cutting;
- Disposal of used lumber for construction works, steel material, site hoardings, packaging materials, fuel containers, lubricants and paints;
- Domestic solid waste generated by construction workers, construction campsite, kitchen, toiletries, and
- Wastes from on-site wastewater treatment facility (such as sedimentation tank).

(3) In order to reduce environment damage caused by construction, environment management shall be strengthened and the following measures shall be taken:

- Select unit that has business certificate to dispose solid waste;
- Keep construction site clean (disordered site is not allowed);
- Dispose and classify construction garbage, recyclable waste and common garbage in construction site regularly;
- During construction, if grease dirt overflows, clean the polluted soil immediately;
- Eliminate obstruction in nearby drainage ditch/sewer regularly;
- Channels shall be cleared of debris and, drains and culverts checked to ensure that natural flows are not impeded;
- Once the job is completed, all remaining debris shall be removed from the site and properly disposed of;
- Refuse shall be collected and removed from all facilities regularly. Domestic waste shall be transported to the approved refuse disposal sites in covered containers or trucks;
- The construction site shall have sufficient space for storing various solid wastes temporary;
- Prepare detailed list of solid waste treatment, and
- Keep transaction receipt of solid waste transportation.

9.10.14 Ecological environment protection

(1) Ecological environment would be impacted during construction works, so it is necessary to make suggestions on reducing negative influence on ecological system in ECOP.

(2) Ecological influence caused in construction is related to the following activities:

- Site cleaning and vegetation removal will result in ecological environment and vegetation loss;
- Earthworks remove activities will bring negative impacts on soil, and
- Occupation of ecological sensitive areas will affect vegetation beyond construction site, lack of relevant workers' training and awareness will cause illegal hunting of wild animals.

(3) In order to reduce environment damage caused by construction, environment management shall be strengthened and the following measures shall be taken:

- Under condition of ensuring quality and quantity, Contractors shall minimize temporary land occupation time, control construction time of earthwork project, maintain stable excavation and filling of side slope, and reduce effect beyond construction areas, especially in rain seasons. Optimize construction site layout properly, and reduce construction range. Construction materials shall be transported whenever needed. After completion of construction, recover vegetation or reclaim immediately;
- Protect woods that will not be developed within construction site;
- Collect and store seed, native vegetation and surface soil so that they can be reused when construction site is recovered
- Select native species for restoration on damaged plants;
- No feeding of any pet or animals during construction period;
- Exposed side slope and soil shall be recovered and replanted timely. The completed area shall be recovered to original condition to realize stability of side slope and conserve completeness of soil;
- Carry out education and training on Contractors and construction workers about wild animals and biological diversity.
- Ensure there is no natural preservation zone, ecological garden and culture conservation zone near the construction site;
- Make best use of barren hill and inferior land for construction site. Besides, construction site should be away from sensitive areas such as villages. Commonly, the construction site shall be over 200 meter away from the sensitive target in down wind direction;
- Offices, camps, warehouses, diesel oil storage areas and mixing plants can't be located within 500 meters around river course so that it would reduce damage to water quality;
- Make sure the protected area and environmental sensitive area such as farmlands, woodland, vegetable field and surface water body, and
- Make sure there are no rare wild animals and plants near construction site.

(4) Banned items:

- No cutting of plants beyond permitted construction areas without authorization, and
- Disturbance of flora and fauna outside the construction area shall be prohibited.

9.10.15 Cultural relics and historic site

(1) Cultural relics and historic site would be impacted during construction works, so it is necessary to make suggestions on reducing negative influence on cultural relics and historic site in ECOP.

(2) Cultural relics would be impacted by the following activities during construction period:

- Loss or damage to cultural sites as a result of the Project, and
- Potential damage to the structure and stability of the cultural sites during construction and operation.

(3) According to related investigation, there are not special areas for cultural relics and historic site. The following measures shall be taken when cultural relics are found during construction works:

- Stop any construction works where cultural relics are found during construction period;
- Contractor should report to PMO of towns, The PMO of town should report to the cultural relic administrative department and PMO of province immediately;
- Local cultural relic administrative department should go to the scene within 24 hours and make comments within 7 days;
- If local cultural relic administrative department identify it isn't a cultural relic, this department should inform the contractor that they should restart the construction work immediately;
- If local cultural relic administrative department identify it is a cultural relic, the scope of protection should be designated immediately. The PMO of town should assist local cultural relic administrative department to report to local government. And the local government should inform the public security to protect the site;
- Rescue measures should be chosen by local cultural relic administrative department. If conservation experts identify cultural relic should be protected as site protection, this project need to carry out reconstruction argumentation;
- If cultural relic is identified as key cultural relic, it is need to be reported to provincial or national cultural relic administrative department;
- When provincial or national cultural relic administrative department receive reports, they should decide which rescue measures should be taken. If conservation experts identify cultural relic should be protected as site protection, this project need to carry out reconstruction argumentation.

(4) Banned items:

- No disturb to any objects that have architectural and historical value.

(5) Emergency preplan flow chart:

- As appendix 5 slow below.

9.10.16 Traffic management

(1) Construction activities can disrupt traffic and damage local roads and bridges.
(2) Traffic activities during construction period will lead to the following result: ● Traffic during construction activities will lead to increased traffic in exit ramps and community roads; ● Local roads will be damaged during transportation of heavy equipments and traffic detours; ● Pedestrian safety, especially for school children, will be affected during construction, and ● Increase in traffic related accidents and third party damages.
(3) In order to reduce environment damage caused by construction, environment management shall be strengthened and the following measures shall be taken: ● Estimate the maximum traffic volume (quantity of vehicles/hour); ● Use selected routes to the project site as agreed with construction supervisor and town PMO and appropriately sized vehicles suitable to the class of roads in the area; ● Restrict loads to prevent damage to local roads and bridges used for transportation purposes; ● Maintain traffic control measures throughout the duration of the contract; ● Carefully and clearly mark pedestrian safe access routes, and ● Provision of traffic signs (including paint, easel, and signs), road markings, and guard rails to maintain pedestrian safety during construction.

9.10.17 Human health and safety management

(1) It is the Contractor's responsibility to protect workers and properties from construction accidents. The Contractor shall be responsible for complying with national and local safety standards.

(2) Some key risks associated with construction include:

- Risk of falling objectives and working on unstable working platform;
- Risk of fire;
- Risk of working on geologically unstable ground layer;
- Traffic safety in the construction site, and
- Spread of infectious diseases.

(3) In order to reduce environment damage caused by construction, environment management shall be strengthened and the following measures shall be taken:

- Traffic sign, road mark and guardrail products (including paint, frame and mark painting) and lamp need to be provided so that pedestrian is safer during construction period;
- Provide drinking water in workers' camp, office and working area;
- Provide separate and sufficient sanitary facilities for male and female workers (water closet and cleaning area);
- Conduct safety training for construction workers before the project commencement;
- Provide personal protective devices and clothing for construction workers and require workers to use;
- Make sure sufficient fire fight equipment, pipe and fire hydrant;
- In case of storm or any emergency, all work shall be stopped;
- Provide AIDS prevention and education for construction workers. For example, implementing information communication strategy, increase face to face consultant, solve systematic problems that will affect personal behavior, and encourage individuals to take preventive measures, and so on.
- Prepare first-aid case in construction camp, and assign special person in charge of this matter. Regulate official arrangement to send the wounded or suddenly ill person to the nearest hospital.

(4) prohibited matters：

- Prohibit the use of fire；
- Prohibition of the use of unauthorized toxic substances, including lead paint,asbestos, etc.;
- Workers is Prohibited to use alcohol。

9.10.18 Schedule of ECOP

Schedule 1 Construction check list before construction started

No.: Contract No. and name:

Project name: CC unit:

Current construction stage: Inspector: Date:

Inspection Items	Implemented?		N/A	Remarks/ recommendation
	YES	NO		
1. Natural habitat				
1.1 Is construction area located at or near national park (existing or planned), natural reserve, or areas with high cultural value?				
1.2 Are there vulnerable or endangered species (terrestrial or aquatic) in the area?				
1.3 Are there natural habitats in the site?				
1.4 If there are natural habitats, are they fragile, unique, and limited in size?				
1.5 Are there wetlands, areas of saturated soils (permanent or temporary)?				
1.6 Others (Please specify)				
2. Physical cultural resources				
2.1 Will this project cause permanent or temporary relocation or any other types of influences on physical cultural resources?				
2.2 Are any physical cultural resources considered especially important or sensitive particularly to local groups (e.g. gravesites)				
2.3 Are there known archaeological, historical or other cultural property (including tombs, cemeteries)?				
2.4 Others (Please specify)				
3. preparation of pre-construction				
3.1 Is workforce already hired?				

3.2 Are construction sites ready? (E.g. offices, worker camps, storage areas, asphalt plants, mixing plants, laboratories, etc.)				
3.3 Are borrow pits and stockpile areas been chosen?				
3.4 Are right-of-way been setup?				
3.5 Are slopes and various design points setup?				
3.6 Are seeds, native vegetation and topsoil collected and stored for re-use during site restoration?				
3.7 Are right-of-way been cleared by removing stumps and organic debris?				
3.8 Others (Please specify)				
4.Environment and human health				
4.1 Are these projects infringe the benefits of the surrounding farmers?				
4.2 Are construction roads bring negative impacts to surrounding farmers?				
4.3 Are these projects related with problems of temporary occupation of land?				
4.4 Are these projects related with problems compensation?				
4.5 Will these projects bring some influences on equipments?				
4.6 Will these projects bring some influences on services and accessible information?				
4.7 Are these projects bring some impacts on human life?				
4.8 Are there any pipelines under construction roads?				
4.9 Others (Please specify)				

Schedule 2 Construction management checklist

No.: Contract No. and name:

Project name: CC unit:

Current construction stage: Inspector: Date:

Inspection Items	Implemented?		N/A	Remarks/ recommendation
	YES	NO		
1. Erosion and Sedimentation				
1.1 Do temporary and permanent drainage facilities install to protect areas susceptible to erosion?				
1.2 Do sites that are not disturbed by rehabilitation activities maintain in their existing?				
1.3 Do native grass seeds and mulch on areas apply that are prone to water and soil loss?				
1.4 Before the start of the rainy season, should the erosion control measures be taken immediately after rehabilitation?				
1.5 Do surface water drains build to minimize erosion and flooding?				
1.6 Do sediment control structures where needed to slow down runoff build, and trap sediments until vegetation is established?				
1.7 Does water spray as needed on dirt roads, cuts, fill material and stockpiled soil to reduce erosion caused by winds;				

1.8 Does traffic restrict and control over stabilized areas?				
1.9 Do sediments enter into cultivated fields or water drains?				
1.10 Do any damage repair to stabilized areas?				
1.11 others (Please specify)				
2. Prevention management on water and soil conservation				
2.1 Should the roadbed side ditch be in advance of roadbed filling to lessen the influence of roadbed filling on both sides?				
2.2 Do the side slopes prevent timely after the roadbed is shaped up?				
2.3 Does the sludge which located at drainage ditch and sediment deposition pond clear timely in rainy season, and pave the sludge on the fill slope and compact?				
2.4 If the irrigation channel is occupied by the roadbed, does the routine or dredge change as soon as possible to avoid influencing the agricultural production?				
2.5 Should we consider about renting local residential house for construction production areas and workers camps firstly?				
2.6 Should Construction production areas and workers camps be located in high-lying areas to avoid water from outside?				

2.7Should other construction encampments should cushioned with gravel instead of hardened cement, except mixing plants?				
2.8 Should required dust fall and dust proof measures are taken in mixing plants, for example, cement tank increasing dustproof device?				
2.9 In sunny day or dry weather, does water spray as needed on mixing plan regularly to reduce dust?				
2.10 Does water spray as needed on sediment deposition pond timely; the sludge should not be stacked around the pond?				
2.11 Does the vegetation protect in and around the borrow pits; transplant the valuable plants if necessary?				
2.12 Should some surface soil stripping protection be done before borrowing soil, used for earthling of land consolidation in the later period?				
2.13 As the picking-cap type borrowing is adopted, is it necessary to set temporary block and drainage measures around the soil borrow pits?				
2.14 After soil borrowed, should some measures be taken to recover vegetation on the side slope, covering with tarpaulin in heavy rainy days?				

2.15 Should the access roads be selected from the existing roads?				
2.16 As for the new access roads, should the big excavation and along-river plot be avoided?				
2.17 In the sunny or windy day, does water spray as needed timely to control dust?				
2.18 others (Please specify)				
3. Earthwork, cuts and fill slopes				
3.1 Should all earthworks be properly managed especially during rainy seasons?				
3.2 Do we need to maintain stable cut and fill slopes at all times and, to avoid disturbance to areas outside the prescribed limits?				
3.3 In order to protect cut or fill slopes from erosion, should grass and other plants be covered with them?				
3.4 Do we need to provide cut off drains above high cuts to minimize runoff and slope erosion?				
3.5 Should excavated cut or unsuitable materials be disposed in designated areas?				
3.6 Should we need to use disposed soil to fill low-lying areas?				

3.7 Others (Please specify)				
4. Stockpiles and Borrow Pits				
4.1 Should we need to identify and demarcate locations for stockpiles and borrow pits, ensuring that they are 15 meters away from critical areas such as steep slopes, erosion prone soils, and areas that drain directly into sensitive water bodies?				
4.2 Should stockpiles be kept away from sensitive areas, as well as located at downstream of sensitive areas?				
4.3 Does storage time reduce in stockpiles?				
4.4 Should suitable areas be distributed for dust materials?				
4.5 Should we need to locate borrow pits in non-productive land to the extent possible?				
4.6 Should we need to limit extraction of material to approved and demarcated borrow pits?				
4.7 Does topsoil stock when first opening the borrow pit? After all usable borrow has been removed, should the previously stockpiled topsoil be spread back over the borrow area and graded to a smooth, uniform surface, sloped to drain? On steep				

slopes, may benches or terraces have to be specified to help control erosion?				
4.8 Should excess overburden be stabilized and re-vegetated? Where appropriate, should organic debris and overburden be spread over the disturbed site to promote re-vegetation? Is natural re-vegetation preferred to the best extent practicable?				
4.9 Do existing drainage channels keep in areas affected by the operation free of overburden?				
4.10 Should we need to ensure that all borrow pits used are left in a trim and tidy condition with stable side slopes, re-establishment of vegetation, restoration of natural water courses, avoidance of flooding of the excavated areas wherever possible, so no stagnant water bodies are created which could breed mosquitoes?				
4.11 Do any other materials generated/ deposited during construction shall remain on site?				
4.12 Others (Please specify)				
5. Control of air pollution control				
5.1 Has water been sprayed in				

construction site to reduce raise dust during dry seasons?				
5.2 Do vehicles which are carrying powder substance cover or clean before leaving construction site?				
5.3 Has powder materials sprayed before transportations?				
5.4 After removing all stockpiles, shall any leftover powder materials be spray by water and swiped from the road?				
5.5 Should the dusty road be implemented road hardening project or wetted by sprinkle water?				
5.6 Does water removal for dust control purposes bring any impacts on surface water flows or water uses by local communities?				
5.7 Do powder material storage sites cover or sprinkle water to suppress dust?				
5.8 Do cement bags open in shielded place?				
5.9 Should we need to construct in regulated time to reduce air pollution? The construction time is 6:00 am to 22:00 pm. Should construction works be stopped during lunch time which is between 12:00 am to 14:00pm?				
5.10 Shall material loads be suitably covered and secured during transportation? Whether construction vehicles which are carrying earthworks and soil has been overload and prevent unrestrained?				
5.11 When select the location of stockpiles, shall wind direction be considered? Is it necessary to avoid disposing powder				

materials on the upwind direction of sensitive areas?				
5.12 Shall the piling of construction materials be windshield and dust controlled?				
5.13 Shall we need to make sure reasonable transportation route of solid waste to reduce emission of raise dust?				
5.14 Has water been sprayed on construction site for demolition works?				
5.15 Shall temporary wall on construction boundaries be built?				
5.16 Is access roads speed restrictive? And are there any speed restriction mark?				
5.17 Do Construction vehicles observe speed restriction regulations?				
5.18 Others (Please specify)				
6. Water pollution control				
6.1 Should wastewater be drainage after treatment? Is the direction of drainage to flow into drains?				
6.2 Does soil on drainage channels dispose regularly and detritus chamber and settling tank clean regularly?				
6.3 Should domestic wastewater be entered into natural drains or municipal pipe network after tertiary waste treatment?				
6.4 Should construction works be involved in regulated working hour to reduce waste water pollution?				
6.5 Shall wastewater discharged into surface water body and sewer pipe comply with the Chinese legislation for environmental protection?				
6.6. Should waste water dispose system of the construction site maintain regularly (such as settlement tank)?				
6.7 Do vehicles and equipment clean before withdraw from construction site?				
6.8 Do cleaning facilities need to check and				

do sand need to remove regularly?				
6.9 Do public road/site, entrance and temporary wall around construction site need to keep clean?				
6.10 Is there any sufficient space provided for storing wastewater disposing system?				
6.11 Is there any location for waste water dispose site?				
6.12. Others (Please specify)				
7. Noise pollution control				
7.1 Are relevant noise regulations observed during construction period?				
7.2 For time period that has noise restriction, shall construction unit be obtained effective CNP?				
7.3. If construction work should be done during nights, can it be worked during regulate time which is approved by related department?				
7.4 Is it allowed to operate equipments without authorized by related department?				
7.5. Should equipment that will generate noise (such as generator) be operated in a room with door closed?				
7.6. Should low noise equipment or take noise-reducing measures (sound screen, sound barrier) be adopted during construction?				
7.7 Should Contractors maintain construction facilities regularly and control it to be the best work mode and lowest noise level?				
7.8 Should inactive facilities in construction site be closed or set to throttle and damp mod?				
7.9 Does No Vehicle Horn sign put on sensitive site such as school, hospital, sanatorium and office building?				
7.10 Others (Please specify)				

8. Solid waste management				
8.1Has unit that has business license been selected to dispose solid waste?				
8.2 Is construction site clean (whether there is disordered site)?				
8.3 Are construction rubbish, recycling waste, and common garbage disposed regularly?				
8.4 During construction, if grease dirt overflows, is contaminated soil cleaned immediately?				
8.5 Does obstruction eliminate in nearby drainage ditch/sewer regularly?				
8.6 Should channels be cleared of debris and, drains and culverts checked to ensure that natural flows are not impeded				
8.7 Once the job is completed, should all remaining debris be removed from the site and properly disposed of?				
8.8 Should refuse be collected and removed from all facilities regularly? Should domestic waste be transported to the approved refuse disposal sites in covered containers or trucks?				
8.9 Should the construction site have sufficient space for storing various solid wastes temporary?				
8.10 Does detailed list of solid waste treatment prepare?				
8.11 Should we keep transaction receipt of solid waste transportation?				
8.12 Others (Please specify)				
9. Ecological environment management				
9.1 Under condition of ensuring quality and quantity, should Contractors minimize temporary land occupation time, control construction time of earthwork project, maintain stable excavation and filling of side				

slope, and reduce effect beyond construction areas, especially in rain seasons?				
9.2 Should construction materials be transported whenever needed?				
9.3 After completion of construction, should we need to recover vegetation or reclaim immediately?				
9.4 Do woods which are not allowed to develop within construction site protect?				
9.5 Do seed, native vegetation and surface soil need to be collected and stored so that they can be reused when construction site is recovered?				
9.6 Do we need to select native species for restoration on damaged plants?				
9.7 Are there any pet or animals feeding during construction period?				
9.8 Should exposed side slope and soil be recovered and replanted timely?				
9.9 Should the completed area be recovered to original condition to realize stability of side slope and conserve completeness of soil?				
9.10 Should Contractors and construction workers need to have education and training lessons on about wild animals and biological diversity?				
9.11 Is there any natural preservation zone, ecological garden and culture conservation zone near the construction site?				
9.12 Should barren hill and inferior land be used for construction site? Should construction site be away from sensitive areas such as villages?				
9.13 Should the construction site be over 200 meter away from the sensitive target in down wind direction?				
9.14 Are there any offices, camps, warehouses, diesel oil storage areas and mixing plants located within 500 meters around river course?				
9.15 Should we need to make sure the protected area and environmental sensitive area such as farmlands, woodland, vegetable				

field and surface water body?				
9.16 Do rare wild animals and plants be made sure whether they are near construction site?				
9.17 Others (Please specify)				
10. Cultural relics and historic site				
10.1 Should we need to stop any construction works where cultural relics are found during construction period?				
10.2 Should Contractor report to PMO of towns and local cultural relic administrative department immediately?				
10.3 If local cultural relic administrative department identify it isn’t a cultural relic, should contractor restart the construction work immediately according to information from local cultural relic administrative department?				
10.4 Whether the contractor according to the protection scope which designated by cultural relic administrative department and requirements of the local public security authorities to protect heritage site protection?				
10.5 Others (Please specify)				
11. Traffic control				
11.1 Should maximum traffic volume (quantity of vehicles/hour) be estimated?				
11.2 Should we need to use selected routes to the project site as agreed with construction supervisor and town PMO and appropriately sized vehicles suitable to the class of roads in the area?				
11.3 Should we need to restrict loads to prevent damage to local roads and bridges used for transportation purposes?				
11.4 Should traffic control measures are				

maintained throughout the duration of the contract?				
11.5Has pedestrian safety channel been marked carefully and clearly?				
11.6 Should we need to supply traffic signs (including paint, easel, and signs), road markings, and guard rails to maintain pedestrian safety during construction?				
11.7 Others (Please specify)				
12.Human health and safety management				
12.1 Should we need to provide traffic sign, road mark and guardrail products (including paint, frame, mark painting) and lamp so that pedestrian are more safer during construction period?				
12.2 Should we need to provide drinking water in workers' camp, office and working areas?				
12.3 Should we need to provide separate and sufficient sanitary facilities for male and female workers (water closet and cleaning areas)?				
12.4 Should construction workers need to conduct safety training before the project commencement?				
12.5 Are there any sufficient fire fight equipment, pipe and fire hydrant?				
12.6 In case of storm or any emergency, should all works need to be stopped?				
12.7 Are there any training lessons on AIDS prevention and education for construction workers?				
12.8 Is there any first-aid case in construction camp, and assign special person in charge of this matter?				
12.9 Others (Please specify)				

Schedule 3 Completion of construction management checklist

No.: Contract No. and name:

Project name: CC unit:

Current construction stage: Inspector: Date:

Inspection Items	Implemented?		N/A	Remarks/ recommendation
	YES	NO		
1.Ecological restoration and compensation measures				
1.1 Did the restoration be completed after construction works?				
1.2 Did native species be chosen for restoration?				
2．Landscape restoration measures				
2.1 Should restoration, of cleared areas such as borrow pits no longer in use, disposal areas, construction roads, construction camp areas, stockpiles areas, working platforms and any areas temporarily occupied during construction of the project works be already accomplished using landscaping, adequate drainage and re-vegetation?				
2.2 Should sensitive areas such as living areas be grassed to prevent erosion on both sides of road?				
2.3 Should finished areas be reinstated in order to achieve stability of slopes and to maintain integrity of soils?				
3. Reclamation measures				
3.1 Did drainage/ditch be finished to prevent runoff erosion in rainy seasons?				
3.2 Did grasses which are fast-growing, easy-growing and better bio-protection performance be chosen for reclamation measures?				
4. Construction roads temporary occupation				
4.1 Did construction roads be considered firstly to restore?				
4.2 Did suitable seeds be chosen for farming works during land readjustment depend on real condition?				

Schedule 4 Environmental improvement notice

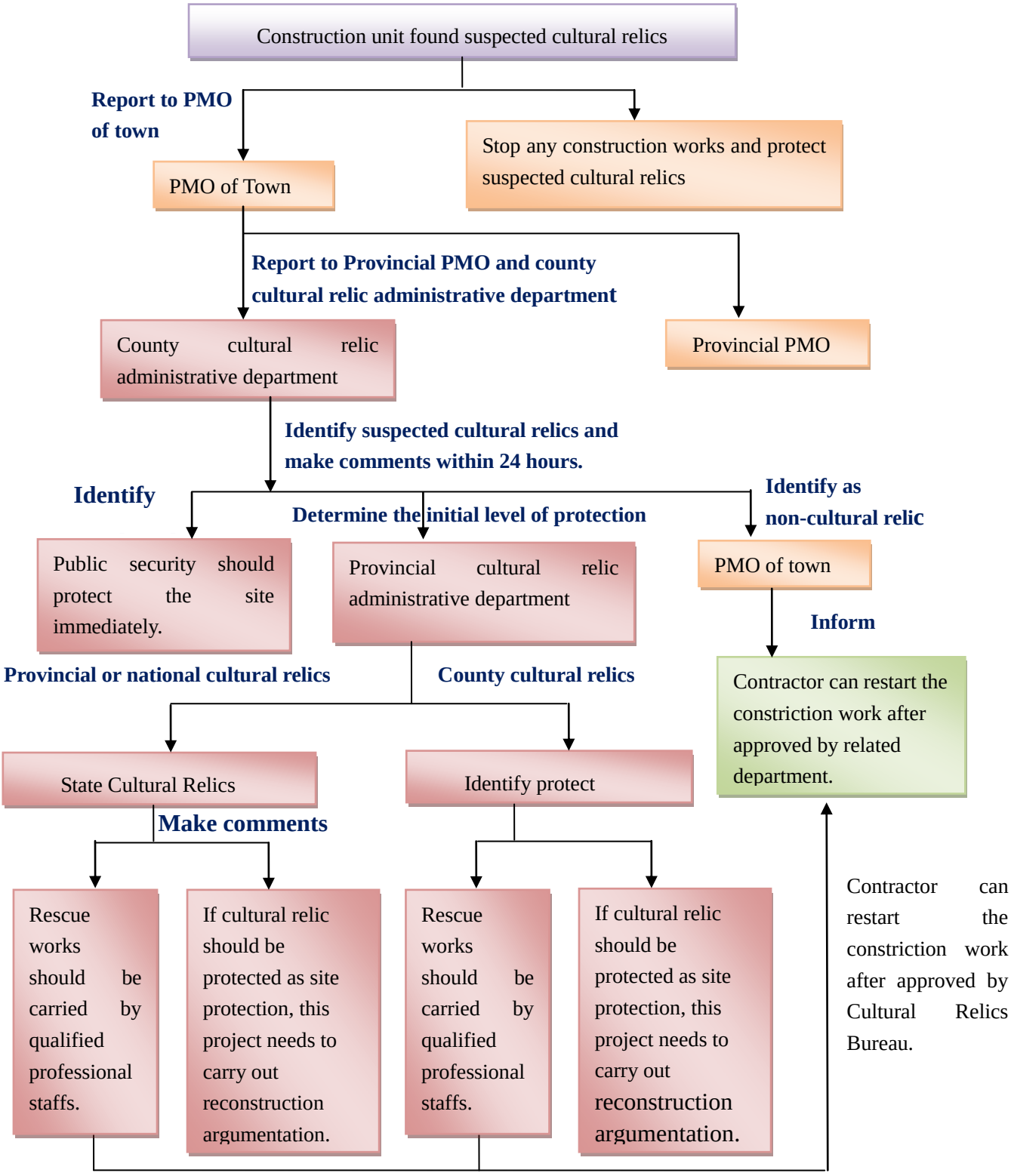
No.: Contract No. and name:

Project name: CC unit:

Current construction stage: Inspector: Date:

Existing problems in site inspection:
Reasons and improvement measures:
Rectification opinions of environmental protection department (When necessary) :
Environment inspector： Date： Rectification date： Complete within days Accepter： Date：
Review conclusion: Reviewer： Date：

Schedule 5 Cultural relics emergency preplan flow chart



10 Conclusion and suggestion

10.1 Comprehensive Assessment Conclusion

XIEDSTP is one of the six demonstration towns of Guangdong World Bank-funded Integrated Economic Development of Small Towns Project.

The planning construction content includes:3 roads of Xudongyi Road,Industry avenue,Xinquyi Road and obtained traffic works, water supply and sewerage works, lighting works and greening works. and enhancing construction of the agency and ability, improving the ability of project management and monitoring.Xudongyi Road, connecting the existing State Road205 from Xihuan Road, through Industry Avenue, Xinquyi Road and Xinquer Road in line, with overall length of 1.55km;Industry Avenue, connecting the existing Zhennan Road from Xingfu Road (Shibami Road), through Xinquer Road, Xudong Avenue, Xudongyi Road and Meizi Avenue in line, with overall length of 2.24km;Xinquyi Road, connecting Xudongyi Road from Xingfu Road (Shibami Road), through Xinquer Road and Xudong Avenue in line, with overall length of 1.48km.Both 3 roads are 4-lane dual carriageway and urban branch road, with red line width of 30m and designed speed is 40km/h.

The total project investment is about RMB 116,176.0 thousand, including the investment of infrastructure construction RMB 112,366.4 thousand.The fund source composition is: USD 8 million of World Bank loan applied (about RMB 49,540.56 thousand), RMB 5 million of county financial fund and RMB 61,630.4 thousand of town fund raising. The total World Bank loan will be used in infrastructure construction.

10.1.1 Environmental Status Assessment

The status water quality of Xudong rive r exceeded serious, and the main reason is that xudong river flows across the yantian (dongyuan) industrial transfer park. Due to the municipal sewage pipe network’s imperfect, some untreated sewage directly discharged into the xudong river, it caused the chrome of water into polluting. In addition, by the area of farmland, cultivation facilities, agricultural non-point source pollution is also a cause of excess chrome polluted water. Therefore, the project in the process of construction should be

strengthened for sludge wastewater treatment and discharge, as far as possible ,to reduce wastewater and pollutants discharging, to reduce the effect of water quality of Xudong River.

The quality of atmosphere environment and Acoustic environment is good.

In general,the environment of the assessed area meets the demand of agriculture plantation development in a sustainable and stable way and domestic livelihood. The ecological and social environment is coordinated basically.

10.1.2 Environmental Impact Assessment

This project is a road construction project. The construction and operation of the project include the favorable and unfavorable two aspects of the environment..

This project is a road construction project.The engineering constructions and operation involves both advantageous and disadvantageous impact to the environment.

10.1.2.1 Key Positive Impacts

The construction of the project can greatly improve industrial upgrading and development conditions, life and living environment, investment environment of Xiantang New District, It is conducive to the industrial upgrading and economic rapid development ,and also improve the living environment of the residents in the surrounding area , Promote the further development of local economic and social.

10.1.2.2 Key Adverse Impacts

（1）During the construction and operation of WIADP, waster water discharge in the process of engineering construction and irrigative backwater will impact to the water environment to some degree. After taking environmental friendly measures, such as water source and water quality protection, waste water treatment during construction and so on, the impact will be controlled or eliminated.

（2）During the construction phase, the main disadvantageous impact of the engineering works includes pristine vegetation breakage due to construction land occupation, residue piles, impacted people re-allocation and so on in the assessed area, added water and soil erosion and impact immediately to eco-environment in the irrigated areas. After taking the above mentioned water and soil conservation engineering measures and biological methods, the induced water and soil erosion will be controlled and alleviated effectively, and the landscape

and eco-environment in the construction area will be rehabilitated.

（3）The vehicle noise will affected the acoustic environment of surrounding residents during operation.According to the preliminary accounting,about 33 residential need for building sound insulation because noise exceed standard in night,of which 32 residential in Xingfu Village,1 in Meizikeng Village.After carrying out the corresponding preventive and controlling measures proposed in the EIA report, these adverse environmental effects can be effectively reduced.

10.1.3 Comprehensive Assessment Conclusion

The ecology and social environment of XIEDSTP are in a coordinated status in principle, The disadvantageous impacts to water environment, eco-environment and soil erosion during the construction phase are all at very light level, which will be reduced and eliminated to minimum degree after taking the environmental friendly measures.

Therefore, the integrated assessment from environmental protection perspective will consider that there's no constraint impact to environment by XIEDSTP, and the engineering construction will be feasible.

10.2 Recommendations

XIEDSTP is co-financed by WB and government investments. The EIA Statement of the Project will follow strictly not only national EIA Law, regulations and relevant guidelines, but also the safety and security policies of WB. Consequently, the PO and construction units are required to conform to EMP and Environmental Monitoring Plans, and fulfill all environmental protection measures in joint efforts.

Appendix

One：Appendix about Public

Appendix 1：Contents of the first publicly

河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇配套市政道路建设项目环境影响评价公众参与第一次公示

依据《环境影响评价公众参与暂行办法》（国家环保总局，环发[2006]28 号）、《广东省建设项目环保管理公众参与实施意见》（粤环〔2007〕99 号），对**河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇配套市政道路建设项目**环境影响评价进行公众参与信息公示。

一、建设项目的名称及概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇配套市政道路建设项目

项目概况：项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套建设工程，工程由 3 条道路组成，分别为徐洞一路、工业大道和新区一路。

徐洞一路起点接西环路，终点与现状 205 国道相交，全长 1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长 2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长 1.48km。拟建 3 条道路红线宽度均为 30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

项目地理位置示

二、建设单位名称和联系方式

单位：东源县仙塘镇人民政府

地址：河源市东源县仙塘镇镇南路 D1-99 号

邮编：517583

电话：0762-8816328

联系人：刘小姐

三、环境影响评价的工作程序和主要工作内容

评价的主要工作程序：接受委托－工程分析－确定评价等级、范围和内容-环境－现状质量调查－环境影响评价－编写报告书－环保主管单位审查，其中公众参与公众将贯穿其中。

主要的工作内容有：工程污染源分析、环境质量现状调查、环境影响预测及评价、环保措施、公众参与等。

四、评价单位名称和联系方式

单　位：广州市环境保护科学研究院

地　址：广州市天河南一路 24 号

邮　编：510620

联系人：陈工

电　话：020-87595397

邮　箱：qxchen13@163.com

五、征求公众意见的主要事项

（1）征求公众意见的范围

征求公众对本项目环境影响、污染防治措施等环境保护方面的意见和建议。

（2）征求意见的主要事项

- 目前本建设项目周围原有的环境状况如何？主要存在的环境问题是什么？
- 从环境角度考虑，是否赞同本项目的建设？
- 对本项目的环境保护工作有何建议？
- 其它建议？

六、公众提出意见的主要方式

信息公开后 10 个工作日内，可通过电话、电邮、信函等方式与建设单位或环境影响评价机构联系，提交书面意见或口头意见等。

建设单位：东源县仙塘镇人民政府

评价单位：广州市环境保护科学研究院

2014 年 08 月 14 日

Appendix 2：Contents of the second publicly

河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇配套市政道路建设项目环境影响评价公众参与第二次公告

根据《中华人民共和国环境影响评价法》和《环境影响评价公众参与暂行办法》等文件规定，广州市环境保护科学研究院在完成《河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇配套市政道路建设项目环境影响报告书》初稿后，特向社会进行第二次公示，欢迎公众积极参与并提出宝贵意见。

一、环评报告书的主要内容

1、建设项目的名称及概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇配套市政道路建设项目

项目概况：项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套完善工程，工程由 3 条道路组成，分别为徐洞一路、工业大道和新区一路。

徐洞一路起点接西环路，终点与现状 205 国道相交，全长 1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长 2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长 1.48km。拟建 3 条道路红线宽度均为 30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

项目地理位置示

2、建设项目可能产生的主要环境影响

本项目施工期会产生少量废气、废水、施工固体废物、噪声等，对项目沿线环境有一定的影响；项目建成后存在机动车噪声及尾气等影响。

经预测，本项目道路建成后，机动车尾气中的 CO、NO_2 对道路两侧环境空气的影响较小；声

环境预测结果在不考虑任何措施情况下道路两侧一定范围内有一定程度超标；道路雨水汇入徐洞河，对水环境影响较小。

3、预防或减缓不良环境影响的对策和措施

本项目在施工期间，将合理安排施工时间和施工时段，尽量避免中午休息时间和夜间施工，选用低噪音或带隔声、消声的机械设备。项目建成后，通过采取交通管制、安装隔声屏障、加装隔声窗和加强绿化等措施可有效减缓噪声影响。

4、环境影响评价结论要点

本项目建设过程中和建成通车后，不可避免会产生一定的环境污染，通过采取有效的污染防治措施后，可以减缓项目在建设过程中和通车后对沿线环境及敏感点的影响，从环境保护的角度看，本项目的建设是可行的。

二、征求公众意见的范围和主要事项

1、征求公众意见的范围：建设项目沿线居民及单位。

2、征求意见的主要事项

① 本项目所在区域目前存在的主要环境问题?

② 本项目建设和运营期间公众关注的环境影响？是否可以接受？

③ 公众对设计及环评报告书提出的环境影响防治措施是否满意？

④ 从环境保护角度考虑，是否支持本项目的建设？

⑤ 对本项目的环境保护工作有何建议和要求？

三、公众索取环评报告简本、调查表的方式

公众可通过电话或电子邮件向项目建设单位或环评单位了解项目及环评报告书情况、索取公众参与调查表，亦可前往建设单位或环评单位索取项目环境影响报告书简本。

四、公众提出意见的方式和期限

填写后的调查表及其它环保意见和要求，请于公示发出后 10 个工作日内通过直接递交、电子邮件、信函或传真方式发回建设单位或环评单位。

五、联系方式：

建设单位：东源县仙塘镇人民政府

地址：河源市东源县仙塘镇镇南路 D1-99 号

邮编：517583　　电话：0762-8816328　　联系人：刘小姐

环评单位：广州市环境保护科学研究院

地址：广州市天河南一路 24 号

邮编：510620　　联系人：陈工

电话：020-87595397　　电子邮箱：qxchen13@163.com

东源县仙塘镇人民政府

2014 年 09 月 25 日

Appendix 3：Questionnaire of public participation (unit)

公众参与意见征询调查表（单位）

单位名称： _____ **填表人：** _____

通讯地址： _____ **联系电话 ：** _____

1、建设项目概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇配套市政道路建设项目

项目概况：项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套完善工程，工程由3条道路组成，分别为徐洞一路、工业大道和新区一路。徐洞一路起点接西环路，终点与现状205国道相交，全长1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长1.48km。拟建3条道路红线宽度均为30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

2、建设项目可能产生的主要环境影响及减缓措施

本项目施工期会产生少量废气、废水、施工固体废物、噪声等，对项目沿线环境有一定的影响；项目建成后存在机动车噪声及尾气等影响。经预测，本项目道路建成后，机动车尾气中的CO、NO_2对道路两侧环境空气的影响较小；声环境预测结果在不考虑任何措施情况下道路两侧一定范围内一定程度超标；道路雨水汇入徐洞河，对水环境影响较小。

本项目在施工期间，将合理安排施工时间和施工时段，尽量避免中午休息时间和夜间施工，选用低噪音或带隔声、消声的机械设备。项目建成后，通过采取交通管制、安装隔声屏障、加装隔声窗和加强绿化等措施可有效减缓噪声影响。

3、环境影响评价结论要点

本项目建设过程中和建成通车后，不可避免会产生一定的环境污染，通过采取有效的污染防治措施后，可以减缓项目在建设过程中和通车后对沿线环境及敏感点的影响，从环境保护的角度看，本项目的建设是可行的。

单位意见：

1、从**环保角度**出发，贵单位是否支持徐洞一路、工业大道和新区一路的建设？

a. 支持　　c. 不支持

若选择“不支持”，主要理由是：_____

_____

2、贵单位对项目工程建设是否有其它建议或要求？ _____

_____

单位盖章（公章）

日期：

建设单位：东源县仙塘镇人民政府　　地址：河源市东源县仙塘镇镇南路D1-99号

邮编：517583　　电话：0762-8816328　　联系人：刘小姐

环评单位：广州市环境保护科学研究院　　地址：广州市天河南一路24号

邮编：510620　　联系人：陈工　　电话：020-87595397　　电子邮箱：qxchen13@163.com

Appendix 4：Questionnaire of public participation (personal)

公众参与意见征询调查表（个人）

<table>
<tr><td colspan="2">姓名：</td><td colspan="2">性别：</td><td colspan="2">联系电话：</td></tr>
<tr><td colspan="3">年龄：□ 20 岁以下 □ 20-30 岁 □ 30～40 岁
□ 40～50 岁 □ 50 岁以上</td><td colspan="3">家庭住址或所在单位：</td></tr>
<tr><td>文化程度：</td><td colspan="2">□本科以上 □大专 □初中
□高中、中专 □小学及其他</td><td>职业：</td><td colspan="2">□公务员 □科技人员 □农民 □学生
□教师 □公司职员 □工人 □其它</td></tr>
</table>

1、建设项目的名称及概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇配套市政道路建设项目

项目概况：项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套完善工程，工程由 3 条道路组成，分别为徐洞一路、工业大道和新区一路。

徐洞一路起点接西环路，终点与现状 205 国道相交，全长 1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长 2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长 1.48km。拟建 3 条道路红线宽度均为 30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

2、建设项目可能产生的主要环境影响

本项目施工期会产生少量废气、废水、施工固体废物、噪声等，对项目沿线环境有一定的影响；项目建成后存在机动车噪声及尾气等影响。

经预测，本项目道路建成后，机动车尾气中的 CO、NO_2 对道路两侧环境空气的影响较小；声环境预测结果在不考虑任何措施情况下道路两侧一定范围内有一定程度超标;道路雨水汇入徐洞河，对水环境影响较小。

3、预防或减缓不良环境影响的对策和措施

本项目在施工期间，将合理安排施工时间和施工时段，尽量避免中午休息时间和夜间施工，选用低噪音或带隔声、消声的机械设备。项目建成后，通过采取交通管制、安装隔声屏障、加装隔声窗和加强绿化等措施可有效减缓噪声影响。

4、环境影响评价结论要点

本项目建设过程中和建成通车后，不可避免会产生一定的环境污染，通过采取有效的污染防治措施后，可以减缓项目在建设过程中和通车后对沿线环境及敏感点的影响，从环境保护的角度看，本项目的建设是可行的。

按照有关规定，该项目环境影响评价工作需要进行公众意见调查，请您按本调查表的要求认真履行好您的权利。在选择您认为合适的选项括弧内划“√”。

1．您对现在的环境状况是否满意？

A、很满意（ ） B、较满意（ ） C、不满意（ ）

2．您对本地现在的交通状况是否满意（如不满意请注明原因）原因：

A、很满意（ ） B、较满意（ ） C、不满意（ ） D、很不满意（ ）

3．您对本项目是否了解/知道：

A、不了解（ ） B、知道一点（） C、很清楚（）

4．您认为该项目的建设影响了您的正常生活吗？

A、严重影响（ ） B 有点影响（ ） C 无影响（ ） D、说不清（ ）

5．根据您掌握的情况，认为该项目在施工期对环境/生活的影响/危害是（可多选）：

A、交通噪声（ ） B、水土流失（ ） C、交通阻隔（ ） D、施工扬尘（ ） E、固体废物（ ）

6．根据您掌握的情况，认为该项目在营运期对环境/生活的影响/危害是（可多选）：

A、交通噪声（ ） B、汽车尾气（ ） C、交通阻隔（ ） D、扬尘（ ） E、交通事故（ ）

7．根据您的期望，认为以何种方式/工程缓解环境污染较为合适（针对营运期）：

A、隔声屏障（ ） B、绿化（ ） C、隔声窗（ ） D、管理措施（ ） E、其它（ ）

8.您对本项目持何种意见？(如果反对请您写明反对原因)

A、支持（ ） B、无所谓（ ） C、反对（ ）（反对原因： ）

9．您对本项目环境保护方面有何建议和要求？

建设单位：东源县仙塘镇人民政府

地址：河源市东源县仙塘镇镇南路 D1-99 号

邮编：517583 电话：0762-8816328 联系人：刘小姐

环评单位：广州市环境保护科学研究院

地址：广州市天河南一路 24 号

邮编：510620 联系人：陈工

电话：020-87595397 电子邮箱：qxchen13@163.com

Appendix 5：Questionnaire of public participation (personal ,demolition)

公众参与意见征询调查表（个人）（拆迁）

<table>
<tr><td colspan="2">姓名：</td><td colspan="2">性别：</td><td>联系电话：</td></tr>
<tr><td colspan="3">年龄：□20 岁以下 □ 20-30 岁 □ 30～40 岁
□ 40～50 岁 □ 50 岁以上</td><td colspan="2">家庭住址或所在单位：</td></tr>
<tr><td>文化程度：</td><td>本科以上 □大专 □初中
高中、中专 □小学及其他</td><td>职业：</td><td colspan="2">□公务员 □科技人员 □农民 □学生
教师 □公司职员 □工人 □其它</td></tr>
</table>

1、建设项目的名称及概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇配套市政道路建设项目

项目概况：项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套完善工程，工程由 3 条道路组成，分别为徐洞一路、工业大道和新区一路。

徐洞一路起点接西环路，终点与现状 205 国道相交，全长 1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长 2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长 1.48km。拟建 3 条道路红线宽度均为 30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

2、建设项目可能产生的主要环境影响

本项目施工期会产生少量废气、废水、施工固体废物、噪声等，对项目沿线环境有一定的影响；项目建成后存在机动车噪声及尾气等影响。

经预测，本项目道路建成后，机动车尾气中的 CO、NO_2 对道路两侧环境空气的影响较小；声环境预测结果在不考虑任何措施情况下道路两侧一定范围内有一定程度超标;道路雨水汇入徐洞河，对水环境影响较小。

3、预防或减缓不良环境影响的对策和措施

本项目在施工期间，将合理安排施工时间和施工时段，尽量避免中午休息时间和夜间施工，选用低噪音或带隔声、消声的机械设备。项目建成后，通过采取交通管制、安装隔声屏障、加装隔声窗和加强绿化等措施可有效减缓噪声影响。

4、环境影响评价结论要点

本项目建设过程中和建成通车后，不可避免会产生一定的环境污染，通过采取有效的污染防治措施后，可以减缓项目在建设过程中和通车后对沿线环境及敏感点的影响，从环境保护的角度看，本项目的建设是可行的。

按照有关规定，该项目环境影响评价工作需要进行公众意见调查，请您按本调查表的要求认真履行好您的权利。在选择您认为合适的选项括弧内划“√”。

1．您对现在的环境状况是否满意？

A、很满意（ ） B、较满意（ ） C、不满意（ ）

2．您对本地现在的交通状况是否满意（如不满意请注明原因）原因：

A、很满意（ ） B、较满意（ ） C、不满意（ ） D、很不满意（ ）

3．您对本项目是否了解/知道：

A、不了解（ ） B、知道一点（） C、很清楚（）

4．您认为该项目的建设影响了您的正常生活吗？

A、严重影响（ ） B 有点影响（ ） C 无影响（ ） D、说不清（ ）

5．本项目在线路走向无法避让的情况下，涉及到征地拆迁，建设单位按照国家相关补偿政策及安置的情况下，您对拆迁所持的态度？

同意拆迁（ ）不同意拆迁（ ）（如不同意，请说明原因，原因是： ）

6．根据您掌握的情况，认为该项目在施工期对环境/生活的影响/危害是（可多选）：

A、交通噪声（ ） B、水土流失（ ） C、交通阻隔（ ） D、施工扬尘（ ） E、固体废物（ ）

7．根据您掌握的情况，认为该项目在营运期对环境/生活的影响/危害是（可多选）：

A、交通噪声（ ） B、汽车尾气（ ） C、交通阻隔（ ） D、扬尘（ ） E、交通事故（ ）

8．根据您的期望，认为以何种方式/工程缓解环境污染较为合适（针对营运期）：

A、隔声屏障（ ） B、绿化（ ） C、隔声窗（ ） D、管理措施（ ） E、其它（ ）

9.您对本项目持何种意见？(如果反对请您写明反对原因)

A、支持（ ） B、无所谓（ ） C、反对（ ）（反对原因： ）

10．您对本项目环境保护方面有何建议和要求？

建设单位：东源县仙塘镇人民政府

地址：河源市东源县仙塘镇镇南路 D1-99 号

邮编：517583 电话：0762-8816328 联系人：刘小姐

环评单位：广州市环境保护科学研究院

地址：广州市天河南一路 24 号

邮编：510620 联系人：陈工

电话：020-87595397 电子邮箱：qxchen13@163.com

Appendix6：Questionnaire of farm families

附件 6：养殖户意见调查表

姓名：	性别：	联系电话：
家庭住址或所在单位：		

1、建设项目的名称及概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇项目

项目概况：项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套完善工程，工程由 3 条道路组成，分别为徐洞一路、工业大道和新区一路。

徐洞一路起点接西环路，终点与现状 205 国道相交，全长 1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长 2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长 1.48km。拟建 3 条道路红线宽度均为 30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

2、建设项目可能产生的主要环境影响

本项目施工期会产生少量废气、废水、施工固体废物、噪声等，对项目沿线环境有一定的影响；项目建成后存在机动车噪声及尾气等影响。

经预测，本项目道路建成后，机动车尾气中的 CO、NO_2 对道路两侧环境空气的影响较小；声环境预测结果在不考虑任何措施情况下道路两侧一定范围内有一定程度超标；道路雨水汇入徐洞河，对水环境影响较小。

3、预防或减缓不良环境影响的对策和措施

本项目在施工期间，将合理安排施工时间和施工时段，尽量避免中午休息时间和夜间施工，选用低噪音或带隔声、消声的机械设备。项目建成后，通过采取交通管制、安装隔声屏障、加装隔声窗和加强绿化等措施可有效减缓噪声影响。

4、环境影响评价结论要点

本项目建设过程中和建成通车后，不可避免会产生一定的环境污染，通过采取有效的污染防治措施后，可以减缓项目在建设过程中和通车后对沿线环境及敏感点的影响，从环境保护的角度看，本项目的建设是可行的。

按照有关规定，该项目环境影响评价工作需要进行公众意见调查，请您按本调查表的要求认真履行好您的权利。在选择您认为合适的选项括弧内划“√”。

1．您对本项目是否了解/知道：

A、不了解（ ） B、知道一点（） C、很清楚（）

2．您对当地现在的环境状况是否满意？

A、很满意（ ） B、较满意（ ） C、不满意（ ）

3．您对本地现在的交通状况是否满意（如不满意请注明原因）原因：

A、很满意（ ） B、较满意（ ） C、不满意（ ） D、很不满意（ ）

4．您认为该道路建设的总体效应是：

A、有利（ ） B 利弊相当（ ） C 不利（ ）

5．您认为道路建设对地区经济效益的影响：

A 增加（ ） B、没改变（ ） C、减少

6．您认为本项目建设是否有利用改善当地交通状况？

A、有改善（ ） B 无改善（ ） C 不清楚（ ）

7．按照设计，项目需拆除占地范围内的部分养殖设施，在建设单位对拆除的养殖设施采取相应补偿的前提下，您是够支持本项目的建设？(如果反对请您写明反对原因)

A、支持（ ） B、无所谓（ ） C、反对（ ）（反对原因： ）

8．您对本项目环境保护方面有何建议和要求？

建设单位：东源县仙塘镇人民政府

地址：河源市东源县仙塘镇镇南路 D1-99 号

邮编：517583 电话：0762-8816328 联系人：刘小姐

环评单位：广州市环境保护科学研究院

地址：广州市天河南一路 24 号

邮编：510620 联系人：陈工

电话：020-87595397 电子邮箱：qxchen13@163.com

Appendix 7：Questionnaire of power sector

附件 7：电力部门意见调查表

单位名称： _____ **填表人：** _____
通讯地址： _____ **联系电话 ：** _____

1、建设项目概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇项目

项目概况：项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套完善工程，工程由 3 条道路组成，分别为徐洞一路、工业大道和新区一路。徐洞一路起点接西环路，终点与现状 205 国道相交，全长 1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长 2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长 1.48km。拟建 3 条道路红线宽度均为 30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

2、建设项目可能产生的主要环境影响及减缓措施

本项目施工期会产生少量废气、废水、施工固体废物、噪声等，对项目沿线环境有一定的影响；项目建成后存在机动车噪声及尾气等影响。经预测，本项目道路建成后，机动车尾气中的 CO、NO2 对道路两侧环境空气的影响较小；声环境预测结果在不考虑任何措施情况下道路两侧一定范围内一定程度超标；道路雨水汇入徐洞河，对水环境影响较小。

本项目在施工期间，将合理安排施工时间和施工时段，尽量避免中午休息时间和夜间施工，选用低噪音或带隔声、消声的机械设备。项目建成后，通过采取交通管制、安装隔声屏障、加装隔声窗和加强绿化等措施可有效减缓噪声影响。

3、环境影响评价结论要点

本项目建设过程中和建成通车后，不可避免会产生一定的环境污染，通过采取有效的污染防治措施后，可以减缓项目在建设过程中和通车后对沿线环境及敏感点的影响，从环境保护的角度看，本项目的建设是可行的。

单位意见：

1、按照设计，项目需拆除占地范围内的电线杆等电力设施，在建设单位对拆除的设施采取等价补偿的前提下，贵单位是否支持本项目的建设？

a. 支持　　c. 不支持

若选择“不支持”，主要理由是：_____

_____

2、贵单位对项目工程建设是否有其它建议或要求？ _____

_____

单位盖章（公章）

日期：

建设单位：东源县仙塘镇人民政府　　地址：河源市东源县仙塘镇镇南路 D1-99 号
邮编：517583　　电话：0762-8816328　　联系人：刘小姐
环评单位：广州市环境保护科学研究院　　地址：广州市天河南一路 24 号
邮编：510620　　联系人：陈工　　电话：020-87595397　　电子邮箱：qxchen13@163.com

Appendix 8：Public participation unit opinion

附件 8：公众参与单位意见

河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇
项目环境影响评价公众参与调查表（单位）

单位名称： 东源县第二小学　　**填表人：** 董安勇
通讯地址： 东源县仙塘镇徐洞工业园　　**联系电话：** 13553269079

1、建设项目概况

项目名称： 河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇项目

项目概况： 项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套完善工程，工程由 3 条道路组成，分别为徐洞一路、工业大道和新区一路。徐洞一路起点接西环路，终点与现状 205 国道相交，全长 1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长 2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长 1.48km。拟建 3 条道路红线宽度均为 30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

2、建设项目可能产生的主要环境影响及减缓措施

本项目施工期会产生少量废气、废水、施工固体废物、噪声等，对项目沿线环境有一定的影响；项目建成后存在机动车噪声及尾气等影响。经预测，本项目道路建成后，机动车尾气中的 CO、NO_2 对道路两侧环境空气的影响较小；声环境预测结果在不考虑任何措施情况下道路两侧一定范围内一定程度超标；道路雨水汇入徐洞河，对水环境影响较小。

本项目在施工期间，将合理安排施工时间和施工时段，尽量避免中午休息时间和夜间施工，选用低噪音或带隔声、消声的机械设备。项目建成后，通过采取交通管制、安装隔声屏障、加装隔声窗和加强绿化等措施可有效减缓噪声影响。

3、环境影响评价结论要点

本项目建设过程中和建成通车后，不可避免会产生一定的环境污染，通过采取有效的污染防治措施后，可以减缓项目在建设过程中和通车后对沿线环境及敏感点的影响，从环境保护的角度看，本项目的建设是可行的。

单位意见：

1、从环保角度出发，贵单位是否支持徐洞一路、工业大道和新区一路工程的建设？

a. 支持 ✓　　c. 不支持

若选择"不支持"，主要理由是：______

2、贵单位对项目工程建设是否有其它建议或要求？______

单位盖章（公章）

日期：

建设单位：东源县仙塘镇人民政府　　地址：河源市东源县仙塘镇镇南路 D1-99 号
邮编：517583　　电话：0762-8816328　　联系人：刘小姐
环评单位：广州市环境保护科学研究院　　地址：广州市天河南一路 24 号
邮编：510620　　联系人：陈工　　电话：020-87595397　　电子邮箱：qxchen13@163.com

河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇
项目环境影响评价公众参与调查表（单位）

单位名称：东源附城中学（原高级中学） 填表人：李卓雄

通讯地址：东源附城中学（原高级中学） 联系电话：0762-8811368

1、建设项目概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇项目

项目概况：项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套完善工程，工程由3条道路组成，分别为徐洞一路、工业大道和新区一路。徐洞一路起点接西环路，终点与现状205国道相交，全长1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长1.48km。拟建3条道路红线宽度均为30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

2、建设项目可能产生的主要环境影响及减缓措施

本项目施工期会产生少量废气、废水、施工固体废物、噪声等，对项目沿线环境有一定的影响；项目建成后存在机动车噪声及尾气等影响。经预测，本项目道路建成后，机动车尾气中的CO、NO2对道路两侧环境空气的影响较小；声环境预测结果在不考虑任何措施情况下道路两侧一定范围内一定程度超标；道路雨水汇入徐洞河，对水环境影响较小。

本项目在施工期间，将合理安排施工时间和施工时段，尽量避免中午休息时间和夜间施工，选用低噪音或带隔声、消声的机械设备。项目建成后，通过采取交通管制、安装隔声屏障、加装隔声窗和加强绿化等措施可有效减缓噪声影响。

3、环境影响评价结论要点

本项目建设过程中和建成通车后，不可避免会产生一定的环境污染，通过采取有效的污染防治措施后，可以减缓项目在建设过程中和通车后对沿线环境及敏感点的影响，从环境保护的角度看，本项目的建设是可行的。

单位意见：

1、从环保角度出发，贵单位是否支持徐洞一路、工业大道和新区一路工程的建设？

a. 支持 c. 不支持

若选择“不支持”，主要理由是：_____

_____

2、贵单位对项目工程建设是否有其它建议或要求？_____

_____

单位盖章（公章）

日期：

建设单位：东源县仙塘镇人民政府 地址：河源市东源县仙塘镇镇南路D1-99号

邮编：517583 电话：0762-8816328 联系人：刘小姐

环评单位：广州市环境保护科学研究院 地址：广州市天河南一路24号

邮编：510620 联系人：陈工 电话：020-87595397 电子邮箱：qxchen13@163.com

河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇
项目环境影响评价公众参与调查表（单位）

单位名称：红光村民委员会　　填表人：潘球光

通讯地址：仙塘镇红光村　　联系电话：15819266629

1、建设项目概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇项目

项目概况：项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套完善工程，工程由3条道路组成，分别为徐洞一路、工业大道和新区一路。徐洞一路起点接西环路，终点与现状205国道相交，全长1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长1.48km。拟建3条道路红线宽度均为30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

2、建设项目可能产生的主要环境影响及减缓措施

本项目施工期会产生少量废气、废水、施工固体废物、噪声等，对项目沿线环境有一定的影响；项目建成后存在机动车噪声及尾气等影响。经预测，本项目道路建成后，机动车尾气中的CO、NO2对道路两侧环境空气的影响较小；声环境预测结果在不考虑任何措施情况下道路两侧一定范围内一定程度超标；道路雨水汇入徐洞河，对水环境影响较小。

本项目在施工期间，将合理安排施工时间和施工时段，尽量避免中午休息时间和夜间施工，选用低噪音或带隔声、消声的机械设备。项目建成后，通过采取交通管制、安装隔声屏障、加装隔声窗和加强绿化等措施可有效减缓噪声影响。

3、环境影响评价结论要点

本项目建设过程中和建成通车后，不可避免会产生一定的环境污染，通过采取有效的污染防治措施后，可以减缓项目在建设过程中和通车后对沿线环境及敏感点的影响，从环境保护的角度看，本项目的建设是可行的。

单位意见：

1、从环保角度出发，贵单位是否支持徐洞一路、工业大道和新区一路工程的建设？

a. ✓支持　　c. 不支持

若选择"不支持"，主要理由是：_____

2、贵单位对项目工程建设是否有其它建议或要求？①切实保护好我村饮用水源地 ②严格控制农村地区工业污染 ③加大农村生活污染治理力度。

单位盖章（公章）

日期：2014年10月8日

建设单位：东源县仙塘镇人民政府　　地址：河源市东源县仙塘镇镇南路D1-99号

邮编：517583　　电话：0762-8816328　　联系人：刘小姐

环评单位：广州市环境保护科学研究院　　地址：广州市天河南一路24号

邮编：510620　　联系人：陈工　　电话：020-87595397　　电子邮箱：qxchen13@163.com

河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇
项目环境影响评价公众参与调查表（单位）

单位名称：仙塘村村民委员会　　填表人：[illegible]

通讯地址：仙塘镇仙塘村　　联系电话：13875363088

1、建设项目概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇项目

项目概况：项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套完善工程，工程由3条道路组成，分别为徐洞一路、工业大道和新区一路。徐洞一路起点接西环路，终点与现状205国道相交，全长1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长1.48km。拟建3条道路红线宽度均为30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

2、建设项目可能产生的主要环境影响及减缓措施

本项目施工期会产生少量废气、废水、施工固体废物、噪声等，对项目沿线环境有一定的影响；项目建成后存在机动车噪声及尾气等影响。经预测，本项目道路建成后，机动车尾气中的CO、NO2对道路两侧环境空气的影响较小；声环境预测结果在不考虑任何措施情况下道路两侧一定范围内一定程度超标；道路雨水汇入徐洞河，对水环境影响较小。

本项目在施工期间，将合理安排施工时间和施工时段，尽量避免中午休息时间和夜间施工，选用低噪音或带隔声、消声的机械设备。项目建成后，通过采取交通管制、安装隔声屏障、加装隔声窗和加强绿化等措施可有效减缓噪声影响。

3、环境影响评价结论要点

本项目建设过程中和建成通车后，不可避免会产生一定的环境污染，通过采取有效的污染防治措施后，可以减缓项目在建设过程中和通车后对沿线环境及敏感点的影响，从环境保护的角度看，本项目的建设是可行的。

单位意见：

1、从环保角度出发，贵单位是否支持徐洞一路、工业大道和新区一路工程的建设？

a. 支持　　c. 不支持

若选择"不支持"，主要理由是：_____

2、贵单位对项目工程建设是否有其它建议或要求？ 无

单位盖章（公章）

日期：

建设单位：东源县仙塘镇人民政府　　地址：河源市东源县仙塘镇镇南路D1-99号

邮编：517583　　电话：0762-8816328　　联系人：刘小姐

环评单位：广州市环境保护科学研究院　　地址：广州市天河南一路24号

邮编：510620　　联系人：陈工　　电话：020-87595397　　电子邮箱：qxchen13@163.com

河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇
项目环境影响评价公众参与调查表（单位）

单位名称：徐洞村委会　　填表人：刘敏源

通讯地址：　　联系电话：13509275343

1、建设项目概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇项目

项目概况：项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套完善工程，工程由3条道路组成，分别为徐洞一路、工业大道和新区一路。徐洞一路起点接西环路，终点与现状205国道相交，全长1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长1.48km。拟建3条道路红线宽度均为30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

2、建设项目可能产生的主要环境影响及减缓措施

本项目施工期会产生少量废气、废水、施工固体废物、噪声等，对项目沿线环境有一定的影响；项目建成后存在机动车噪声及尾气等影响。经预测，本项目道路建成后，机动车尾气中的CO、NO2对道路两侧环境空气的影响较小；声环境预测结果在不考虑任何措施情况下道路两侧一定范围内一定程度超标；道路雨水汇入徐洞河，对水环境影响较小。

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单位意见：

1、从环保角度出发，贵单位是否支持徐洞一路、工业大道和新区一路工程的建设？

√ a. 支持　　c. 不支持

若选择"不支持"，主要理由是：

2、贵单位对项目工程建设是否有其它建议或要求？ 支持该项目的建设，注意对环境不污染。

仙塘镇徐洞村民委员会

单位盖章（公章）

日期：2014.10.9

建设单位：东源县仙塘镇人民政府　　地址：河源市东源县仙塘镇镇南路D1-99号

邮编：517583　　电话：0762-8816328　　联系人：刘小姐

环评单位：广州市环境保护科学研究院　　地址：广州市天河南一路24号

河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇
项目环境影响评价公众参与调查表

单位名称：东源供电局仙塘供电所　　填表人：[illegible]
通讯地址：东源县仙塘[illegible]　　联系电话：8813278

1、建设项目概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇项目

项目概况：项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套完善工程，工程由3条道路组成，分别为徐洞一路、工业大道和新区一路。徐洞一路起点接西环路，终点与现状205国道相交，全长1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长1.48km。拟建3条道路红线宽度均为30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

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3、环境影响评价结论要点

本项目建设过程中和建成通车后，不可避免会产生一定的环境污染，通过采取有效的污染防治措施后，可以减缓项目在建设过程中和通车后对沿线环境及敏感点的影响，从环境保护的角度看，本项目的建设是可行的。

单位意见：

1、按照设计，项目需拆除占地范围内的电线杆等电力设施，在建设单位对拆除的设施采取等价补偿的前提下，贵单位是否支持本项目的建设？

a. 支持 ✓　　c. 不支持

若选择"不支持"，主要理由是：支持。

2、贵单位对项目工程建设是否有其它建议或要求？

单位盖章（公章）：广东电网有限责任公司河源东源供电局 仙塘供电所

日期：2014.12.

建设单位：东源县仙塘镇人民政府　　地址：河源市东源县仙塘镇镇南路D1-99号
邮编：517583　　电话：0762-8816328　　联系人：刘小姐
环评单位：广州市环境保护科学研究院　　地址：广州市天河南一路24号
邮编：510620　　联系人：陈工　　电话：020-87595397　　电子邮箱：qxchen13@163.com

Appendix 9：Public participation opinion of eviction

附件 9：公众参与拆迁户意见

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河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇
项目环境影响评价公众参与调查表（个人）

姓名：王建新	性别：男		联系电话：13553217959
年龄：□20 岁以下 □20-30 岁 □30～40 岁 √40～50 岁 □50 岁以上			家庭住址或所在单位：徐洞村防城小组
文化程度：	□本科以上 □大专 √初中 □高中、中专 □小学及其他	职业：	□公务员 □科技人员 √农民 □学生 □教师 □公司职员 □工人 □其它

1、建设项目的名称及概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇项目

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姓名：刘扬雄	性别：男		联系电话：13553760196
年龄：□20岁以下 □20-30岁 □30～40岁 ☑40～50岁 □50岁以上			家庭住址或所在单位：徐洞村民主小组
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姓名：刘招明	性别：男		联系电话：13809747492
年龄：□20 岁以下 □20-30 岁 □30～40 岁 ☑40～50 岁 □50 岁以上			家庭住址或所在单位：徐洞村民主小组
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姓名：刘新雄	性别：男		联系电话：13553285378
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2．您对本地现在的交通状况是否满意（如不满意请注明原因）原因：

A、很满意 (✓) B、较满意（ ） C、不满意（ ） D、很不满意（ ）

3．您对本项目是否了解/知道：

A、不了解（ ） B、知道一点（） C、很清楚 (✓)

4．您认为该项目的建设影响了您的正常生活吗？

A、严重影响（ ） B 有点影响 (✓) C 无影响（ ） D、说不清（ ）

5．本项目在线路走向无法避让的情况下，涉及到征地拆迁，建设单位按照国家相关补偿政策及安置的情况下，您对拆迁所持的态度？

同意拆迁 (✓) 不同意拆迁（ ）（如不同意，请说明原因，原因是： ）

6．根据您掌握的情况，认为该项目在施工期对环境/生活的影响/危害是（可多选）：

A、交通噪声 (✓) B、水土流失 (✓) C、交通阻隔（ ） D、施工扬尘（ ） E、固体废物（ ）

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8．根据您的期望，认为以何种方式/工程缓解环境污染较为合适（针对营运期）：

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9.您对本项目持何种意见？(如果反对请您写明反对原因)

A、支持 (✓) B、无所谓（ ） C、反对（ ）（反对原因： ）

10．您对本项目环境保护方面有何建议和要求？

建设单位：东源县仙塘镇人民政府

地址：河源市东源县仙塘镇镇南路 D1-99 号

邮编：517583 电话：0762-8816328 联系人：刘小姐

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地址：广州市天河南一路 24 号

邮编：510620 联系人：陈工

电话：020-87595397 电子邮箱：qxchen13@163.com

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河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇
项目环境影响评价公众参与调查表（个人）

姓名：刘永才	性别：男		联系电话：13829395731
年龄：□20岁以下 □20-30岁 □30～40岁 ☑40～50岁 □50岁以上			家庭住址或所在单位：徐洞村民主小组
文化程度：	□本科以上 □大专 ☑初中 □高中、中专 □小学及其他	职业：	□公务员 □科技人员 ☑农民 □学生 □教师 □公司职员 □工人 □其它

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徐洞一路起点接西环路，终点与现状205国道相交，全长1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长1.48km。拟建3条道路红线宽度均为30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

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项目环境影响评价公众参与调查表（个人）

姓名：潘映群	性别：男	联系电话：13827834193
年龄：□20岁以下 □20-30岁 □30～40岁 ☑40～50岁 □50岁以上		家庭住址或所在单位：徐洞村民主小组

文化程度：	□本科以上 □大专 ☑初中 □高中、中专 □小学及其他	职业：	□公务员 □科技人员 ☑农民 □学生 □教师 □公司职员 □工人 □其它

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项目环境影响评价公众参与调查表（个人）

姓名：刘振荣	性别：男		联系电话：13579105557
年龄：□20岁以下 □20-30岁 □30～40岁 ☑40～50岁 □50岁以上			家庭住址或所在单位：徐洞村民主小组
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项目环境影响评价公众参与调查表（个人）

姓名：潘贻旺	性别：男		联系电话：13825377413
年龄：□20岁以下 □20-30岁 □30～40岁 ☑40～50岁 □50岁以上		家庭住址或所在单位：仙塘镇红光村百水环小组	
文化程度：	□本科以上 □大专 □初中 ☑高中、中专 □小学及其他	职业：	□公务员 □科技人员 □农民 □学生 □教师 □公司职员 ☑工人 □其它

1、建设项目的名称及概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇项目

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3、预防或减缓不良环境影响的对策和措施

本项目在施工期间，将合理安排施工时间和施工时段，尽量避免中午休息时间和夜间施工，选用低噪音或带隔声、消声的机械设备。项目建成后，通过采取交通管制、安装隔声屏障、加装隔声窗和加强绿化等措施可有效减缓噪声影响。

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A、很满意（ ） B、较满意（✓） C、不满意（ ）

2. 您对本地现在的交通状况是否满意（如不满意请注明原因）原因：

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3. 您对本项目是否了解/知道：

A、不了解（ ） B、知道一点（✓） C、很清楚（）

4. 您认为该项目的建设影响了您的正常生活吗？

A、严重影响（ ） B 有点影响（✓） C 无影响（ ） D、说不清（ ）

5. 本项目在线路走向无法避让的情况下，涉及到征地拆迁，建设单位按照国家相关补偿政策及安置的情况下，您对拆迁所持的态度？

同意拆迁（✓）不同意拆迁（ ）（如不同意，请说明原因，原因是： ）

6. 根据您掌握的情况，认为该项目在施工期对环境/生活的影响/危害是（可多选）：

A、交通噪声（✓） B、水土流失（✓） C、交通阻隔（ ） D、施工扬尘（ ） E、固体废物（ ）

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A、支持（✓） B、无所谓（ ） C、反对（ ）（反对原因： ）

10. 您对本项目环境保护方面有何建议和要求？

相关部门重视程度不够多，宣传力度不够多.

建设单位：东源县仙塘镇人民政府

地址：河源市东源县仙塘镇镇南路 D1-99 号

邮编：517583 电话：0762-8816328 联系人：刘小姐

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电话：020-87595397 电子邮箱：qxchen13@163.com

Appendix 10：Contents of the first publicly

附件 10：Public participation opinion of typical public

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项目环境影响评价公众参与调查表（个人）

姓名：杜振康	性别：男		联系电话：13536756097
年龄：□20 岁以下 □20-30 岁 □30～40 岁 ☑40～50 岁 □50 岁以上			家庭住址或所在单位：徐洞村光明小组
文化程度：	□本科以上 □大专 ☑初中 □高中、中专 □小学及其他	职业：	□公务员 □科技人员 ☑农民 □学生 □教师 □公司职员 □工人 □其它

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姓名：潘李笑	性别：男		联系电话：13642490666
年龄：□20岁以下 □20-30岁 ☑30～40岁 □40～50岁 □50岁以上			家庭住址或所在单位：仙塘镇红光村德门小组
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项目环境影响评价公众参与调查表（个人）

姓名：李玉到	性别：男		联系电话：13435231216
年龄：□20 岁以下 □20-30 岁 □30～40 岁 □40～50 岁 ☑50 岁以上			家庭住址或所在单位：仙塘镇
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1. 您对现在的环境状况是否满意？

A、很满意（ ） B、较满意（√） C、不满意（ ）

2. 您对本地现在的交通状况是否满意（如不满意请注明原因）原因：

A、很满意（√） B、较满意（ ） C、不满意（ ） D、很不满意（ ）

3. 您对本项目是否了解/知道：

A、不了解（ ） B、知道一点（） C、很清楚（√）

4. 您认为该项目的建设影响了您的正常生活吗？

A、严重影响（ ） B 有点影响（ ） C 无影响（√） D、说不清（ ）

5. 根据您掌握的情况，认为该项目在施工期对环境/生活的影响/危害是（可多选）：

A、交通噪声（ ） B、水土流失（ ） C、交通阻隔（ ） D、施工扬尘（ ） E、固体废物（√）

6. 根据您掌握的情况，认为该项目在营运期对环境/生活的影响/危害是（可多选）：

A、交通噪声（√） B、汽车尾气（ ） C、交通阻隔（ ） D、扬尘（ ） E、交通事故（ ）

7. 根据您的期望，认为以何种方式/工程缓解环境污染较为合适（针对营运期）：

A、隔声屏障（√） B、绿化（ ） C、隔声窗（ ） D、管理措施（ ） E、其它（ ）

8.您对本项目持何种意见？(如果反对请您写明反对原因)

A、支持（√） B、无所谓（ ） C、反对（ ）（反对原因： ）

9. 您对本项目环境保护方面有何建议和要求？

无

建设单位：东源县仙塘镇人民政府

地址：河源市东源县仙塘镇镇南路 D1-99 号

邮编：517583 电话：0762-8816328 联系人：刘小姐

环评单位：广州市环境保护科学研究院

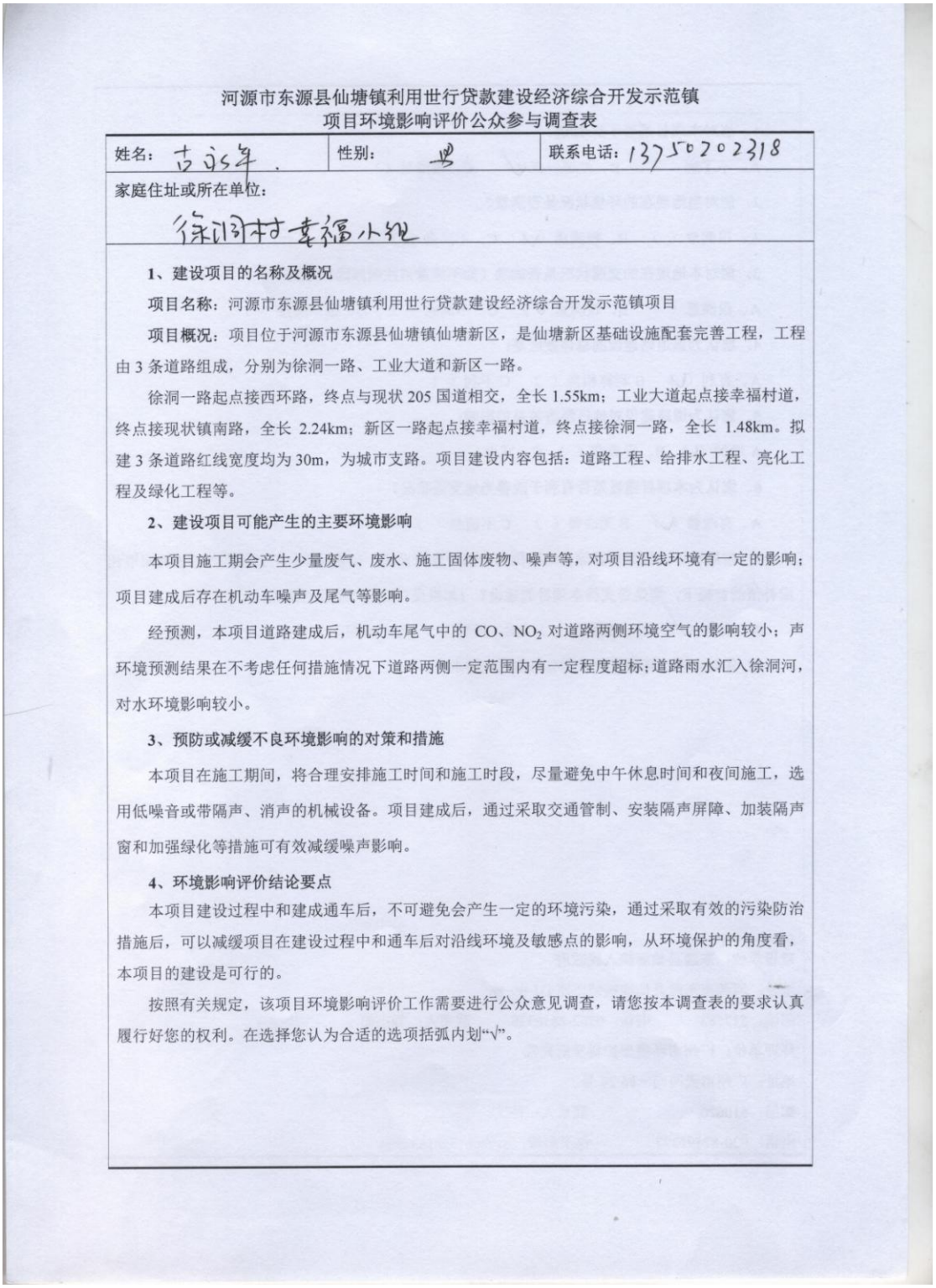
地址：广州市天河南一路 24 号

邮编：510620 联系人：陈工

电话：020-87595397 电子邮箱：qxchen13@163.com

Appendix 11：Public participation opinion of typical farm families

附件 11：公众参与典型养殖户意见



河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇
项目环境影响评价公众参与调查表

姓名：古永年	性别：男	联系电话：13750702318
家庭住址或所在单位：徐洞村幸福小组		

1、建设项目的名称及概况

项目名称：河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇项目

项目概况：项目位于河源市东源县仙塘镇仙塘新区，是仙塘新区基础设施配套完善工程，工程由 3 条道路组成，分别为徐洞一路、工业大道和新区一路。

徐洞一路起点接西环路，终点与现状 205 国道相交，全长 1.55km；工业大道起点接幸福村道，终点接现状镇南路，全长 2.24km；新区一路起点接幸福村道，终点接徐洞一路，全长 1.48km。拟建 3 条道路红线宽度均为 30m，为城市支路。项目建设内容包括：道路工程、给排水工程、亮化工程及绿化工程等。

2、建设项目可能产生的主要环境影响

本项目施工期会产生少量废气、废水、施工固体废物、噪声等，对项目沿线环境有一定的影响；项目建成后存在机动车噪声及尾气等影响。

经预测，本项目道路建成后，机动车尾气中的 CO、NO_2 对道路两侧环境空气的影响较小；声环境预测结果在不考虑任何措施情况下道路两侧一定范围内有一定程度超标；道路雨水汇入徐洞河，对水环境影响较小。

3、预防或减缓不良环境影响的对策和措施

本项目在施工期间，将合理安排施工时间和施工时段，尽量避免中午休息时间和夜间施工，选用低噪音或带隔声、消声的机械设备。项目建成后，通过采取交通管制、安装隔声屏障、加装隔声窗和加强绿化等措施可有效减缓噪声影响。

4、环境影响评价结论要点

本项目建设过程中和建成通车后，不可避免会产生一定的环境污染，通过采取有效的污染防治措施后，可以减缓项目在建设过程中和通车后对沿线环境及敏感点的影响，从环境保护的角度看，本项目的建设是可行的。

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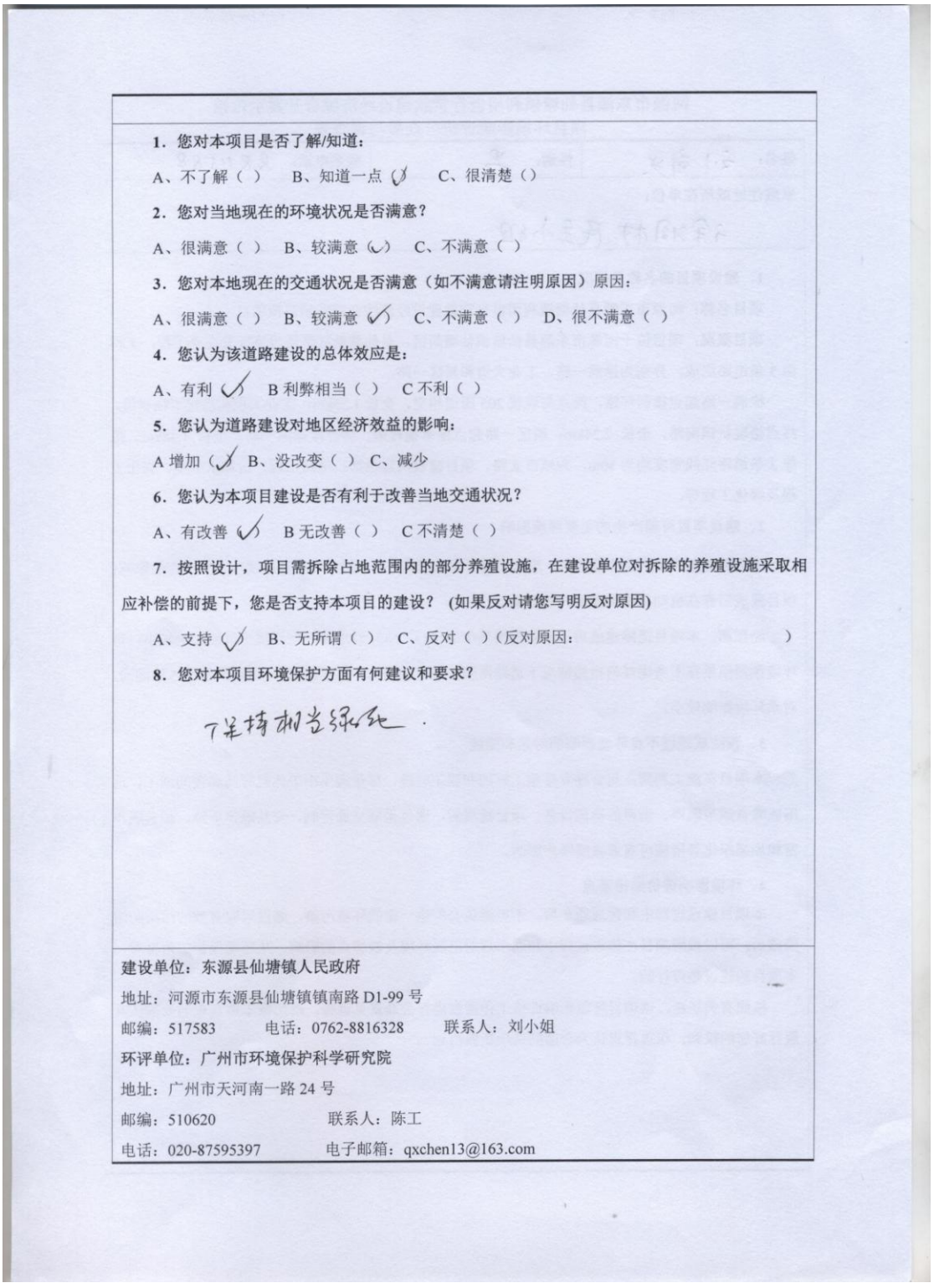

1. 您对本项目是否了解/知道：

A、不了解（ ） B、知道一点 (✓) C、很清楚（）

2. 您对当地现在的环境状况是否满意？

A、很满意（ ） B、较满意 (✓) C、不满意（ ）

3. 您对本地现在的交通状况是否满意（如不满意请注明原因）原因：

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4. 您认为该道路建设的总体效应是：

A、有利 (✓) B 利弊相当（ ） C 不利（ ）

5. 您认为道路建设对地区经济效益的影响：

A 增加 (✓) B、没改变（ ） C、减少

6. 您认为本项目建设是否有利于改善当地交通状况？

A、有改善 (✓) B 无改善（ ） C 不清楚（ ）

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A、支持 (✓) B、无所谓（ ） C、反对（ ）(反对原因：)

8. 您对本项目环境保护方面有何建议和要求？

[illegible]相当绿化.

建设单位：东源县仙塘镇人民政府

地址：河源市东源县仙塘镇镇南路 D1-99 号

邮编：517583 电话：0762-8816328 联系人：刘小姐

环评单位：广州市环境保护科学研究院

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邮编：510620 联系人：陈工

电话：020-87595397 电子邮箱：qxchen13@163.com

河源市东源县仙塘镇利用世行贷款建设经济综合开发示范镇
项目环境影响评价公众参与调查表

姓名：刘育兴	性别：男	联系电话：8811588
家庭住址或所在单位：徐洞村民主小组		

1、建设项目的名称及概况

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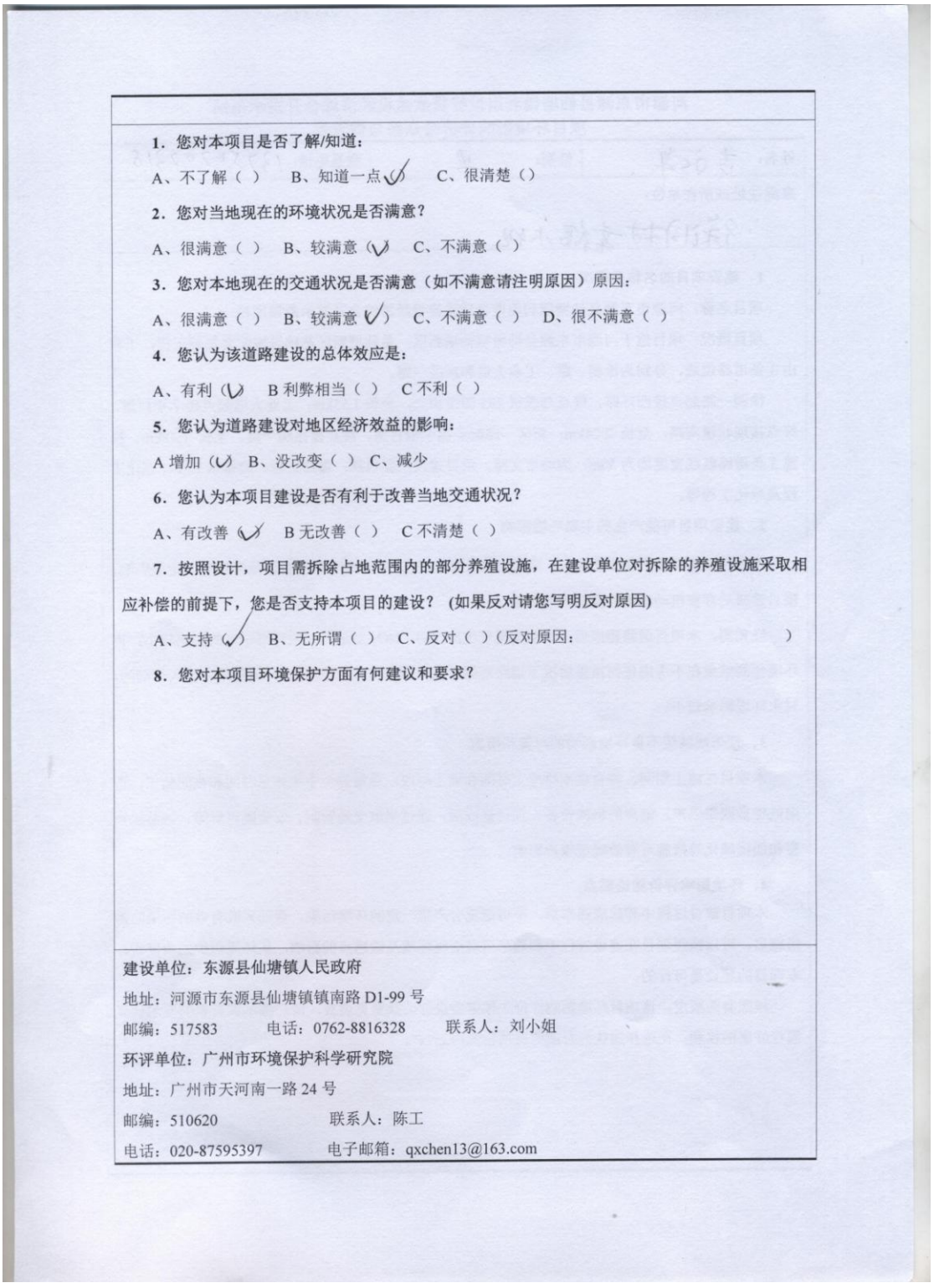

1．您对本项目是否了解/知道：

A、不了解（ ） B、知道一点(√) C、很清楚（）

2．您对当地现在的环境状况是否满意？

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A、支持（√） B、无所谓（ ） C、反对（ ）（反对原因： ）

8．您对本项目环境保护方面有何建议和要求？

建设单位：东源县仙塘镇人民政府

地址：河源市东源县仙塘镇镇南路 D1-99 号

邮编：517583 电话：0762-8816328 联系人：刘小姐

环评单位：广州市环境保护科学研究院

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电话：020-87595397 电子邮箱：qxchen13@163.com

Two：Related land file

东源县国土资源局

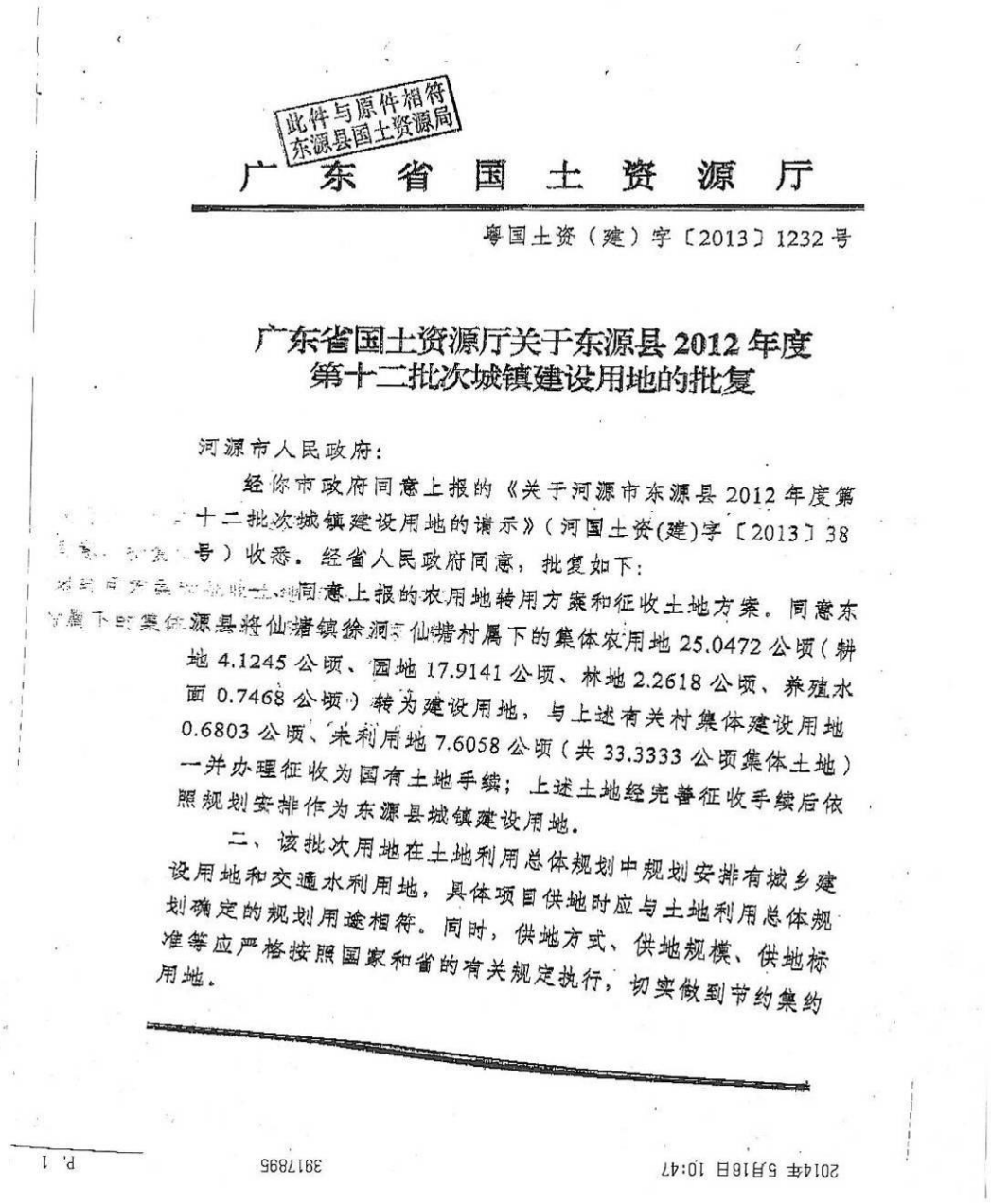
关于东源县仙塘镇新区用地情况说明

东源县仙塘镇新区项目在仙塘镇辖区西侧，规划区用地规模面积约1300亩，仙塘镇新区目前已取得广东省国土资源厅审批的用地面积429亩（粤国土资（建）字〔2013〕1232号），其余用地手续争取在今年的建设用地指标和“三旧”政策中落实。

东源县国土资源局

二〇一四年五月十一日

2014年 5月16日 10:39 3917895 P. 4



此件与原件相符
东源县国土资源局

广东省国土资源厅

粤国土资（建）字〔2013〕1232号

广东省国土资源厅关于东源县2012年度第十二批次城镇建设用地的批复

河源市人民政府：

经你市政府同意上报的《关于河源市东源县2012年度第十二批次城镇建设用地的请示》（河国土资(建)字〔2013〕38号）收悉。经省人民政府同意，批复如下：

同意上报的农用地转用方案和征收土地方案。同意东源县将仙塘镇徐洞村仙塘村属下的集体农用地25.0472公顷（耕地4.1245公顷、园地17.9141公顷、林地2.2618公顷、养殖水面0.7468公顷）转为建设用地，与上述有关村集体建设用地0.6803公顷、未利用地7.6058公顷（共33.3333公顷集体土地）一并办理征收为国有土地手续；上述土地经完善征收手续后依照规划安排作为东源县城镇建设用地。

二、该批次用地在土地利用总体规划中规划安排有城乡建设用地和交通水利用地，具体项目供地时应与土地利用总体规划确定的规划用途相符。同时，供地方式、供地规模、供地标准等应严格按照国家和省的有关规定执行，切实做到节约集约用地。

2014年5月16日 10:47　3917895　P. 1

三、同意上报的补充耕地方案，使用已有耕地储备指标（粤国土资（验）函〔2008〕80号）落实占补平衡。

四、请你市人民政府督促东源县人民政府依法组织实施征地，切实保障被征地群众生活出路；东源县人民政府应依法发布征地公告，限期办理征地补偿登记；县国土资源行政主管部门应会同有关单位根据批准的征收土地方案拟订具体的征收土地补偿安置方案并予以公告，听取群众意见后报同级人民政府批准实施。征地补偿安置不落实的，不得强行使用被征土地。

五、使用土地涉及有关税费的收缴或调整，请按有关规定办理。

六、征地批后实施情况连同经批准的征地补偿安置方案和具体项目供地情况须按规定报备。

广东省国土资源厅
用地审批专用章
2013年12月16日

公开方式：主动公开

抄送：国家土地督察广州局，财政部驻广东省财政监察专员办事处，省府办公厅、财政厅、省地税局，河源市国土资源局、财政局，东源县国土资源局、财政局。

广东省国土资源厅办公室　　2013年12月10日印发

排印：林思华　　校对：方志森　　共印22份

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2014年5月18日 10:48　　3817895　　P. 2