China：Chongqing New Urbanization Pilot And Demonstration Project Nan'an District Component

ENVIRONMENTAL AND SOCIAL ASSESSMENT

Chongqing Municipal PMO

CCTEG Chongqing Engineering

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Content

1 General

1.1 Project background and origin

The State Council and the Central Committee of the Communist Party of China issued the "State New Urbanization Plan (2014-2020)" on 16 March 2014 which has been the blueprint for China future urbanization and economic development. The new urbanization in Chongqing has a new path of "people first, spatial layout improvement, urban-rural interaction, city and industry integration, ecological civilization, and cultural inheritance". It is to finally fulfill such four tasks as improvement of urban layout and morphology, improvement of cities' ability of sustainable development, promotion of the number of formebbbbbr rural residents granted urban residency, and promotion of the integrated development of urban and rural areas.

As a main urban district of Chongqing, Nan'an District is located on the south bank of the Yangtze River in Chongqing, with its west and north areas bordering on the Yangtze River, its east and south areas on Banan District, and Jiulongpo District, Yuzhong District, Jiangbei District, and Yubei District separated by river. The entire district covers a total area of 265km^2. As of 2016, it has jurisdiction over eight sub-districts and nine villages and towns, with a total permanent population of 873,900.00.

See Figure 1.1-1 for the geographic location of Nan'an District.

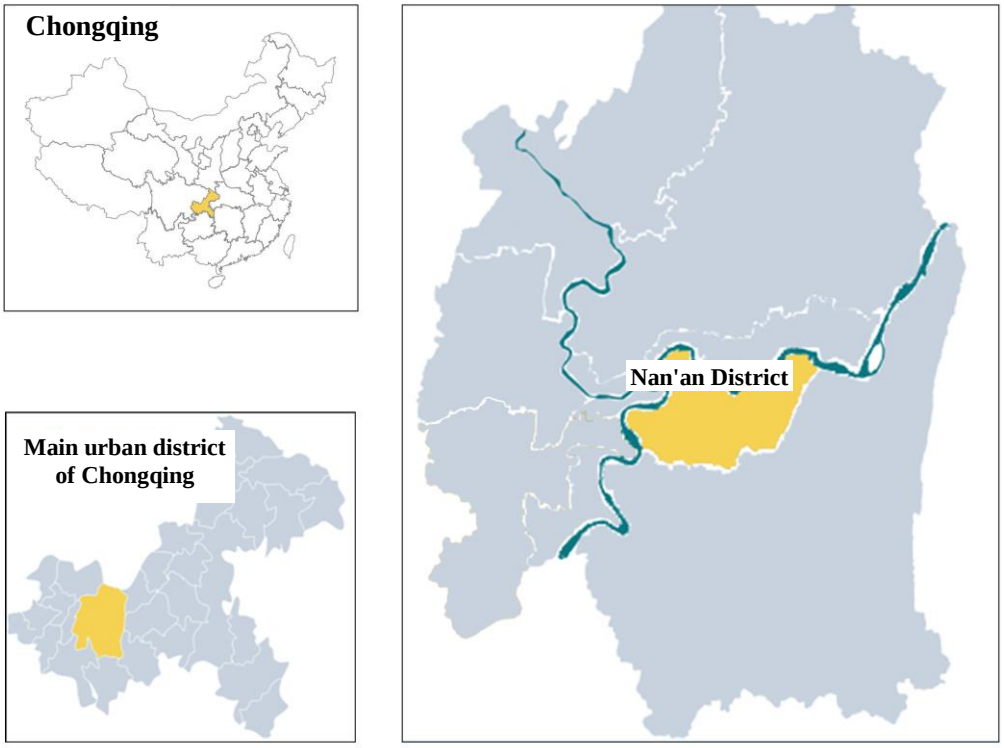


Figure 1.1-1 The geographic location of Nan'an District

1.2 Project objective

The **project development objective** is to improve use of public space and increase pedestrian mobility in select districts of Chongqing's *Central City.*

The project interventions under this project development objective consist of **four overall activities** and components in the proposal should clearly fall in one of the four categories:

(1) urban regeneration technical assistance
(2) neighborhood public space

(3) parks and green public space
(4) pedestrian walkway
(5) institutional strengthening and capacity building

1.3 Project brief

The project will support the urban regeneration activities in Nan'an and Jiulongpo Districts of Chongqing City Center, and provide technical assistance for urban regeneration planning and implementation at district level, as well as institutional development and capacity building. Details of each project component and scope are described below:

Component 1 - Technical Support to Urban Regeneration Planning and Implementation at District Level (IBRD Loan US$ 2.80 million). Provision of technical assistance to (a) Nan'an and Jiulongpo Districts to (i) conduct urban regeneration demand survey and assessment, (ii) prepare Urban Regeneration Plan and Implementation Guidelines, and (iii) assess and enhance the institutional capacity in the Districts for planning and implementing urban regenerations; (b) Nan'an and Jiulongpo Districts to carry out "Nan'an and Jiulongpo Districts' Visioning 2035"; (c) Nan'an and Jiulongpo Districts to conduct "Green Buildings Study" which provides rating and listing of all new and existing buildings and group of buildings based on variety of Green Building Principles; (d) Nan'an District to develop an APP in connection with the district-wide pedestrian walkway network; and (e) Nan'an District to pilot the Community-Led Bottom-Up (CLBU) Approach for Neighbourhood Regenetation.

Component 2 - Urban Regeneration Interventions in Nan'an District (US$ 147.20 million, IBRD Loan US$ 72.25 million). Support of investments in (a) regeneration of 10 neighborhoods (i.e. Dongxinglu, Jinzijie, Yangguang, Xiangshuilu, JInshanlu, Jinyan, Gulouwan, Nanhu, Huangjiaya, and Zhenwushan) of 29 Streets in connection with 16,133 households in 268 buildings of build-up area 1,208,500 m2 on 529 hectares of land in Nanping, Huayuanlu, and Nanshan Street Communities Neighborhoods; (b) improvement of District-Wide Pedestrian Walkway Networks of 29 pedestrian routines of total length and width of 88.32 km and 3m respectively, rehabilitation of Mountain Walkway Networks of 16 pedestrian routines of total length of 42.31 km; and upgrading of 3 road connections (i.e. Huanglonglu of 769 m, Huguilu of 1,403m and Tushanlu of 647 m); and (c) greening improvement of Nanhu Neighborhood, Guohuishan, Houbao, Nanping, Huigonglu and under theDafoqiaoBridge public spaces and parks totaled 32.17 hectares of land area.

Component 3 - Urban Regeneration interventions in Jiulongpo District (US$ 31.61 million, IBRD Loan US$ 27.25 million). Support of investments in (a) construction of 5.3 km pedestrian walkway of average width 3 m to complete a district-wide pedestrian loop; and (b) greening improvements of 9 parks (i.e. new construction of Kanglong, aitao, Wutaishan, Longjingwan, Shimei, Taohuaxi, Jiulong and Tiaodenghe Parks and rehabilitation of Caiyunhu Wetland Parks) totaled 138.37 hectare of land area.

Component 4 - Project Management and Capacity Building (IBRD Loan US$ 3.5 million). Provision of project management, implementation support and capacity building activities for the two project districts of Nan'an and Jiulongpo and the Chongqing PMO of municipal level, including (i) project management, procurement and contract management, accounting and financial management and project reporting; (ii) construction supervision for Nan'an district and Jiulongpo district; (iii) independent monitoring of the implementation of the EMP; (iv) training and workshops for strengthening the capacity of district government for urban regeneration; (v)Performance Evaluation & Results of Promotion; and (vi) external RAP monitoring.

This environmental impact assessment is conducted for the second construction project, Nan'an District Urban Regeneration Project.

This project is located at the urban area to the east of Nanshan Mountain in Nan'an District and the area of Nanshan Sub-district, covering a total area of 60km^2. See the following Figure 1.3-1 for specific scope.

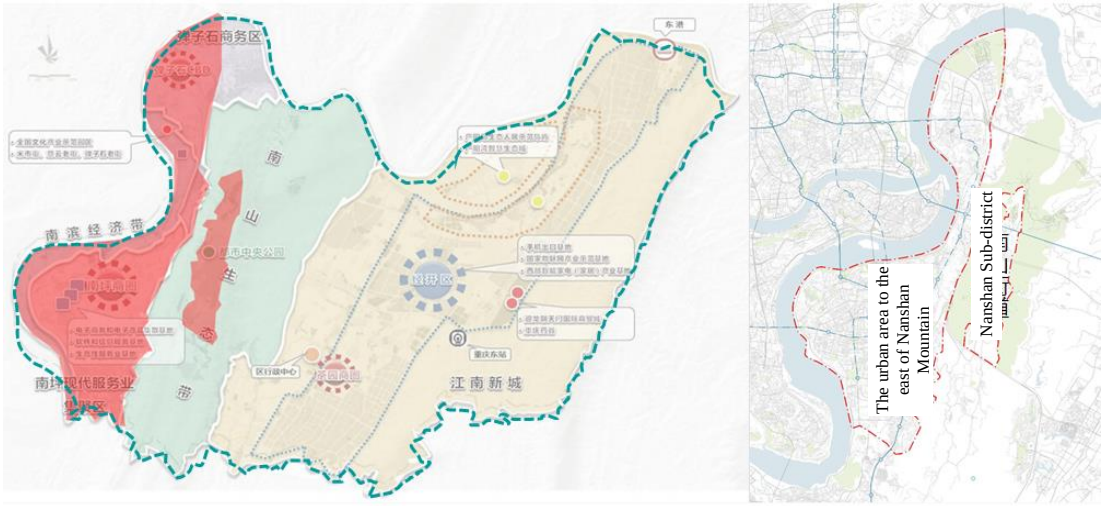


Figure 1.3-1 The construction scope of Nan'an District project

1.4 Assessment scope

The assessment scope of this project is determined based on the project scale and characteristics, and the local environment characteristics. See Table 1.4-1 for the assessment scope.

Table 1.4-1 Assessment scope of individual environmental elements

Assessment content	Assessment scope
Water environment	A total river segment of 21.5km from upstream 500m of the footpath of the Yangtze River Nanbin Road to downstream 5km of Dafosi Bridge. The assessment will focus on the construction of the riverside construction area on the water environment.
Ecological environment	For the scope of 200m around the construction area during the construction phase, the assessment will focus on the impact on Nanshan National Forest Park, Liangfengya Municipal Forest Park and Nanshan-Nanquan Municipal Scenic Area (for the areas under the administration of Nan'an District).
Ambient air	For the scope of 2.5km around the construction area, the assessment will focus on the scope of outward expanding 200m of the construction area during the construction phase, and the impact of the project construction phase on the category-I areas of Mingyue Mountain Tree Farm, Nanshan National Forest Park, Liangfengya Municipal Forest Park and Nanshan-Nanquan Municipal Scenic Area (for the areas under the administration of Nan'an District).
Acoustic environment	For the construction phase, the scope of outward expanding 200m of the construction area will be assessed, the scope of 200m respectively at two sides of the center line of the proposed main road will be assessed for the operational phase, and the emphasis will be placed on the environment sensitive targets at the front row of the two sides of the road.

1.5 Assessment phase

The environmental impact assessment phase of this project includes the construction phase and the operational phase.

1.6 Assessment rating

1.6.1 Classification method as per World Bank OP4.01

In accordance with the *Notice on Strengthening Management of the Environmental Impact Assessment for International Financial Organizations Funded Construction Projects* (HJ [1993] No. 324) of ministries and commissions like former General Administration of Environmental Protection, and the World Bank safeguards policies OP4.01 *Environmental Assessment*, this project is classified to be a Category-A project based on the pollution characteristics and the size of the pollution source strength of this project, as well as the environmental conditions of the region where the project is located.

1.6.2 Assessment rating

(1) Surface water environment

The wastewater from the construction phase of this project is mainly the construction wastewater and the sanitary sewage; that from the operational phase, the sanity sewage from the public places. The wastewater discharge during the construction phase and the operational phase will be both less than 200m^3/d, with simple water constituents, and the function of the surface water body is Category III. In accordance with the *Technical Guidelines for Environmental Impact Assessment --- Surface Water Environment* (HJ/T2.3-93), the surface water environment impact assessment work is graded to be level III.

(2) Atmospheric environment

The assessment scope of this project partly involves the Category-I ambient air quality functional zones [Mingyue Mountain Tree Farm, Nanshan National Forest Park, Liangfengya Municipal Forest Park and Nanshan-Nanquan Municipal Scenic Area (for the areas under the administration of Nan'an District)], and the rest scope is Category-II ambient air quality functional zones. This project mainly includes the renovation of streets and roads, the construction of slow-walking ways and roads, transformation and regeneration of the public space, and the recycling of waste land. The main pollutants during the construction phase mainly include automobile exhaust, asphalt fume and rising dust at construction, and those during the operational phase, the automobile exhaust, dust, and the bad smell from the public toilets and biochemical pools. The pollutants from the project are rare and scattered, which will have little impact on the atmospheric environment quality and will not change the regional environmental function. Therefore, the atmospheric environment impact assessment work is graded to be simplified level II.

(3) Acoustic environment

The areas of Category-I acoustic environment specified by the *Environmental Quality Standard for Noise* (GB3096-2008) in Nan'an District are mainly Chongqing Nanshan Railway Workers' Sanatorium and Chongqing Auxiliary Capital Anti-Japanese War Ruins Museum. This project involves the Museum of the Anti-Japanese War Site in Chongqing's Pedetsu City, and the rest is a Category-II area specified by GB3096-2008, which is in accordance with the Category-I, Category-II standards of the *Environmental Quality Standard for Noise* (GB3096-2008); Longhuang Highway, Hugui Road and Tushan Branch Road are secondary main roads of the city, and the scope of 30m at two sides of the roads is in accordance with the Category-4a standard. The noise during the construction phase is mainly from the construction machines and transport, which will have temporary impact on a few residents in the surrounding area. At the operational phase, with the roads open to traffic and the increase of the traffic flow, the regional noise level will increase to some extent. The sensitive target noise level increment before and after the project construction will be above 5dB(A), and the affected people will not change greatly. In accordance with the *Technical Guidelines for Environmental Impact Assessment --- Acoustic Environment* (HJ2.4-2009), the acoustic environment impact assessment work is graded to be level I.

(4) Groundwater environment

In accordance with the *Technical Guidelines for Environmental Impact Assessment --- Groundwater Environment* (HJ610-2016), this project is a Category-IV project which shall not have groundwater environment impact assessed.

(5) Ecological environment

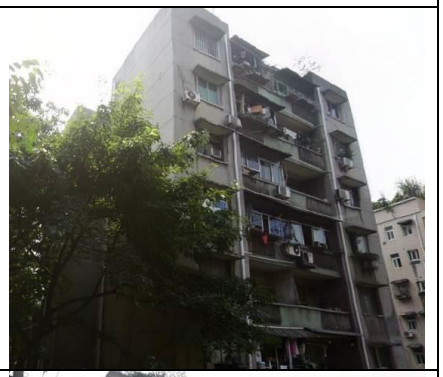
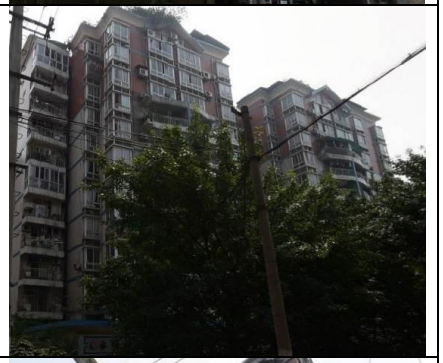
Nanshan National Forest Park, Liangfengya Municipal Forest Park and Nanshan-Nanquan Municipal Scenic Area (for the areas under the administration of Nan'an District) involved in this project are important ecological sensitive areas and the project covers an area ＜2km^2; therefore, in accordance with the *Technical Guidelines for Environmental Impact Assessment --- Ecological Impact* (HJ19-2011), the ecological environmental impact assessment for this project is graded to be level III.

1.7 Environmental protection targets

The assessment scope covers such important ecological sensitive areas as Nanshan National Forest Park, Liangfengya Municipal Forest Park and Nanshan-Nanquan Municipal Scenic Area (for the areas under the administration of Nan'an District); the atmospheric environment assessment focuses on the scope of 200m of the project area; for the construction phase, the acoustic environment assessment will involve the scope of outward expanding 200m of the construction area, and for the operational phase, the assessment will focus on the scope of 200m respectively at two sides of the center line of the proposed main road. According to the field investigation, there are residences, offices, schools and other buildings scattering near the project, and there are immovable cultural heritages in Nan'an District where the project is located.

See Table 1.7-1 ~ Table 1.7-5, and Figure 1.7-1 ~ 1.7-4 for the environmental protection targets of this project.

Table 1.7-1 Atmospheric and acoustic environmental protection targets scattering along two sides of Longhuang Highway

SN	Name of sensitive points	Stake mark	Location to the road edge/nearest distance (m)	Nearest distance to road center line (m)	Altitude difference with the road (m)	Characteristics of sensitive points	Sensitive points
1	Longmenhao Sub-district Residential buildings at Shanghao Community	K0+0.0~K0+621 both sides	7.4	16.4	0-3	Old community with 3F-11F Approx. 3,000 residents	
2	Longmen Haoyue	K0+100.0~K0+160.0 right side	23.6	31.6	0	4 12+1F/-2F residences Approx. 1,000 residents	
3	Shenghuiyuan	K0+180.0~K0+220.0 right side	33.4	41.4	0	4 7F residences Approx. 800 residents	

SN	Name of sensitive points	Stake mark	Location to the road edge/nearest distance (m)	Nearest distance to road center line (m)	Altitude difference with the road (m)	Characteristics of sensitive points	Sensitive points
4	Shuanghongyuan	K0+380.0~K0+420.0 left side	85.9	93.9	0	12F residences Approx. 450 residents	
5	Lengmen Jiayuan	K0+380.0~K0+420.0 left side	167.5	175.5	0	12F residences Approx. 450 residents	
6	Shangxin Shanshui	K0+400.0~K0+440.0 left side	51.7	59.7	0	12F residences Approx. 400 residents	

SN	Name of sensitive points	Stake mark	Location to the road edge/nearest distance (m)	Nearest distance to road center line (m)	Altitude difference with the road (m)	Characteristics of sensitive points	Sensitive points
7	Dormitory buildings of Chongqing No. 39 Secondary School	K0+420.0~K0+500.0 left side	192.1	200.1	0	2 5F buildings Approx. 500 students	

Figure 1.7-1 Environmental protection targets scattering along two sides of Longhuang Highway

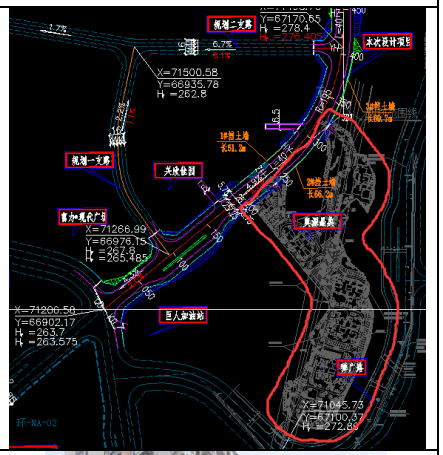
Table 1.7-2 Atmospheric and acoustic environmental protection targets scattering along two sides of Hugui Road

SN	Name of sensitive points	Stake mark	Location to the road edge/nearest distance (m)	Nearest distance to road center line (m)	Altitude difference with the road (m)	Characteristics of sensitive points	Sensitive points
1	Area D, International New City (Guoji Xincheng), Sunshine 100 (Yangguang 100)	K0+0.0~K0+680 right side	15.6	19.6	0	5 24~35F residences Approx. 4,000 residents	

Figure 1.7-2 Environmental protection targets scattering along two sides of Hugui Road

Table 1.7-3 Atmospheric and acoustic environmental protection targets scattering along two sides of Tushan Branch Road

SN	Name of sensitive points	Stake mark	Location to the road edge/nearest distance (m)	Nearest distance to road center line (m)	Altitude difference with the road (m)	Characteristics of sensitive points	Sensitive points
1	R&F Modern Plaza	K0+0.0~K0+75.0 left side	35.4	42.7	0	31F/-2F residences Approx. 1,000 residents	
2	Xingxin Jiayuan	K0+100.0~K0+200.0 left side	14.3	21.6	0	26F/-1F residences Approx. 850 residents	

SN	Name of sensitive points	Stake mark	Location to the road edge/nearest distance (m)	Nearest distance to road center line (m)	Altitude difference with the road (m)	Characteristics of sensitive points	Sensitive points
3	Planned Aoyuan Jingdian	K0+200.0~K0+230.0 right side	10.0	17.3	0	11F residences Approx. 350 residents	
4	R&F Modern Plaza 12#	K0+240.0~K0+275.0 right side	17.6	24.9	0	31F/-1F residences Approx. 1,000 residents	

SN	Name of sensitive points	Stake mark	Location to the road edge/nearest distance (m)	Nearest distance to road center line (m)	Altitude difference with the road (m)	Characteristics of sensitive points	Sensitive points
5	Teching buildings of Tushan Primary School	K0+220.0~K0+380.0 left side	11.9	19.2	0	School with 1,400 teachers and students.	
6	Dormitory buildings of No. 11 Secondary School	K0+450~ K0+620 Left side	2.0	9.25	0	2 5F dormitory buildings Approx. 500 students	

Figure 1.7-3 Environmental protection targets scattering along two sides of Tushan Branch Road

Table 1.7-4 Nan'an District urban regeneration project environmental impact sensitive targets statistical table

Sensitive targets Target category		Name	Location	Sensitivity factor(s)	Main factor(s)	Main impact phase(s)
Ecological environment	Forest Park	Nanshan National Forest Park	The footpaths and hiking footpaths of the overall space of Nan'an District are located within Nanshan National Forest Park.	National Forest Park	Construction, transport and land occupation	Construction phase Operational phase
		Liangfengya Municipal Forest Park	One footpath and one hiking footpath of the overall space of Nan'an District are located within Liangfengya Municipal Forest Park.	Provincial Level Forest Park		
	Scenic Area	Nanshan-Nanquan Municipal Scenic Area	The regeneration projects of Huangjueya Community and Zhenwushan Community in Nanshan Sub-district are located in the scenic area; part of the urban slow-walking ways	Municipal Scenic Area		
Water environment	River	Yangtze River	Nan'an District Section	In accordance with the standard of Category-III water area	Construction impact	Construction phase

2 Environment policies, regulatory and legal framework, and bases for report preparation

2.1 Regulatory and legal framework of environmental protection

2.1.1 Regulatory and legal framework

(1) *Environmental Protection Law of the People's Republic of China* (1 January 2015);

(2) *Law of the People's Republic of China on Environmental Impact Assessment* (September 2016);

(3) *Regulations on the Administration of Construction Project Environmental Protection* (October 2017);

(4) *Law of the People's Republic of China on Prevention and Control of Water Pollution* (June 2008);

(5) *Law of the People's Republic of China on Prevention and Control of Atmospheric Pollution* (January 2016);

(6) *Law of the People's Republic of China on Prevention and Control of Pollution from Environmental Noise* (March 1997);

(7) *Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste* (Amended in November 2016);

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

(9) *Forest Law of the People's Republic of China* (July 1998);

(10) *Regulations on Prevention and Control of Geological Disasters* (Decree of the State Council No. 394 in 2003);

(11) *Land Administration Law of the People's Republic of China* (August 2004);

(12) *Decision of NPC Standing Committee on Amendment to Twelve Laws like "Law of the People's Republic of China on the Protection of Cultural Relics"* (Presidential Decree No. 5, the People's Republic of China, adopted and released on 29 June 2013 at the Third Session of the Twelfth NPC Standing Committee, and coming into effect as of the day of release).

2.1.2 Departmental rules

(1) *Administrative Measures on Prevention and Control of Geological Disasters* (Decree of Ministry of Land and Resources No. 4 in 1999);

(2) *Administrative Measures for Environmental Protection of Traffic Construction Projects* (Ministry of Transport Decree [2003] No.5);

(3) *Catalogue for Guiding Industry Restructuring (2011 Version)* (as amended in 2013) (Decree No. 21 of National Development and Reform Commission, the People's Republic of China);

(4) *National Outline for Ecological and Environmental Protection* (December 2000);

(5) *Regulations of the People's Republic of China on Scenic Areas* (the State Council Decree No. 474 on 10 September 2006);

(6) *Administrative Measures for National Forest Parks* (the State Forestry Administration Decree No. 27 on 20 May 2011);

(7) *Administrative Measures for Forest Parks* (the State Forestry Administration Decree No. 42 on 22 September 2016);

(8) *List of Wild Animals of National Priority Protection* (as amended the State Forestry

Administration Decree No. 7 in February 2003);

(9) *List of Wild Plants of National Priority Protection (first batch)* (as amended the Ministry of Agriculture and the State Forestry Administration Decree No. 53 in August 2001);

(10) *National Ecological Environment Construction Plan* (issued by the State Council in January 1999);

(11) *The 13th Five-Year Plan for Economic and Social Development of the People's Republic of China* (2016);

(12) *List of Classified Management of Environmental Impact Assessment of Construction Projects* (September 2017);

(13) *Opinions on Strengthening Environmental Protection Management of Construction Projects under the Large-scale Development of China's Western Region Program* (HF [2001] No. 4);

(14) *Notice of the State Council on Protecting Forest Resources and Stopping Disafforestation and Abuse of Forest Land* (GFMD [1998] No. 8);

(15) *Notice of the State Council on Further Implementing the Construction of National Green Channel* (GBF [2003] No. 31);

(16) *Decision of the State Council on Implementing the Scientific Outlook on Development and Strengthening Environmental Protection* (GF [2005] No. 39);

(17) *Opinions on Regulating Ecological Environmental Protection of Resource Development* (HF [2004] No. 24);

(18) *Provisional Methods on Public Participation in Environmental Effect Evaluation* (HF [2006] No. 28);

(19) *Notice on Zoning Key National Areas of Water and Soil Loss Prevention and Control* (the Ministry of Water Resources Notice [2006] No. 2);

2.2 Local laws and regulations

(1) *Regulations of Chongqing on Water Pollution Control for Yangtze River Three Gorges Reservoir Region and Valley* (Chongqing People's Congress Standing Committee Notice [2011] No. 26)

(2) *Regulations of Chongqing on Environmental Protection* (as amended) (Chongqing People's Congress Standing Committee Notice [2010] No. 22);

(3) *The 13th Five-Year Plan for Economic and Social Development of Chongqing* (YFF [2016] No. 6);

(4) *Chongqing Ecological Function Zoning (as edited and revised)* (YF [2008] No. 133);

(5) *The 13th Five-Year Plan for Ecological Civilization Construction of Chongqing* (YFF [2016] No. 34);

(6) *Regulations of Chongqing on Scenic Areas* (Chongqing People's Congress Standing Committee Notice [2008] No. 6);

(7) *Notice of Chongqing Municipal People's Government on Issuing the List of Aquatic Wild Animals of Chongqing Priority Protection* (YFF [1999] No. 65);

(8) *Notice of Chongqing Municipal People's Government on Issuing the List of Terrestrial Wild Animals of Chongqing Priority Protection* (YFF [1999] No. 94);

(9) *Administrative Measures of Chongqing on Forest Parks* (YLZF [2013] No. 14);

(10) *Regulations of Chongqing on Scenic Areas* (as amended in accordance with the *Decision on Amendment to "Regulations of Chongqing on Scenic Areas"* adopted on the 13th

Session of Chongqing Fourth People's Congress Standing Committee on 25 September 2014).

2.3 Technical specifications for environmental protection

(1) *Technical Guidelines for Environmental Impact Assessment --- General Principles* (HJ/T2.1-2016);

(2) *Technical Guidelines for Environmental Impact Assessment --- Surface Water Environment* (HJ/T2.3-93);

(3) *Technical Guidelines for Environmental Impact Assessment --- Groundwater Environment* (HJ610-2016);

(4) *Technical Guidelines for Environmental Impact Assessment --- Acoustic Environment* (HJ2.4-2009);

(5) *Technical Guidelines for Environmental Impact Assessment --- Ecological Impact* (HJ19-2011);

(6) *Technical Guidelines for Environmental Impact Assessment --- Atmospheric Environment* (HJ19-2011);

(7) *Technical Guidelines for Environmental Risk Assessment of Construction Projects* (HJ/T169-2004);

(8) *Technical Code on Soil and Water Conservation of Development and Construction Projects* (GB50433-2008)

2.4 World Bank's safeguards policies and World Bank Group's EHS guideline

2.4.1 World Bank's Safeguards Policies and their compliance analysis

World Bank has ten safeguards policies socially and environmentally. Based on the construction nature of this project, the engineering layout, and the assessment scope determined by this environment impact assessment and the field investigation, the project has been checked to determine whether it involves such ten policies, with the results shown in the following table:

Table 2.4-1 Compliance with World Bank safeguards policies

SN	Safeguard Policies	Whether applicable	Compliance
1	OP/BP4.01 *Environmental Assessment*	Yes	Category A project; Prepared full *Environmental Impact Assessment (EIA)* and *Environmental Management Plans* (EMPs); Prepared Environmental and Social Management Framework for component 1 Technical assistance activity; and Two rounds of public consultation and information disclosure were conducted as per OP4.01.
2	OP/BP4.04 *Natural Habitats*	Yes	Physical works in Nan'an district involve two forest parks and a scenic area. Thus the policy is triggered. These sensitive areas are for public recreational purpose. Proposed activities are of small scale, upgrading of existing facilities, and will not affect the ecological function or landscape of these sensitive areas. Mitigation measures have been incorporated into the EMP. The project will not cause significant conversion or degradation of natural habitats.

SN	Safeguard Policies	Whether applicable	Compliance
3	OP/BP4.36 *Forests*	No	The project will not have impacts on the health and quality of forests, or affect the rights and welfare of people and their level of dependence upon or interaction with forests. The policy is not triggered.
4	OP/BP4.09 *Pest Management*	No	The project will not involve use or procurement of pesticides directly or indirectly. The policy is not triggered.
5	OP/BP4.11 *Physical Cultural Resources*	Yes	Physical cultural resources survey was conducted through desk review, field visit and consultations. Under Nan'an district component, proposed pedestrian walkway improvements are located in the vicinity of several PCR sites. The pedestrian walkway improvements won't affect these historical sites physically. Design has taken into account the landscape and preservation of these historical sites adequately. Pre-cautionary measures have been incorporated into the EMP.
6	OP/BP4.37 *Safety of Dams*	No	Such policy does not triggered. The project doesn't involve any dams.
7	OP/BP4.10 *Indigenous Peoples*	No	No IPs affected in the project. The population of the affected areas of the project are mostly of Han ethnicity, or the ethnic majority population in China. Thus, the Indigenous Peoples OP/BP 4.10 is not triggered.
8	OP/BP4.12 *Involuntary Resettlement*	Yes	The social safeguard policy OP 4.12 is triggered as current land use of the existing proposals would cover collectively-owned land, land acquisition and physical resettlement that cannot be avoided.
9	OP/BP7.50 *Projects on International Waterways*	No	Such policy does not be triggered. The project area involves no international waterways.
10	OP/BP7.60 *Projects on Disputed Areas*	No	Such policy does not be triggered. The project area involves no place of disputes.

According to the analysis of the correlation between the project and World Bank safeguards policy documents, the policy documents relating to this project are OP/BP4.01 (Environmental Assessment), OP/BP4.04 (Natural Habitat), OP/BP4.11 (Physical Cultural Resources) and OP/BP4.12 (Involuntary Resettlement).

2.4.2 WBG EHS Guidelines and relevant provision compliance analysis

The World Bank Group *Environmental, Health and Safety Guidelines* (General Guidelines) and other guidelines apply to this project.The mitigation measures included in the *Environmental Management Plans* of the project are completely in conformity with the requirement of foregoing guidelines. Particularly, the content in such guidelines is basically in line with the laws, regulations, guidelines and construction management rules of China.

Table 2.4-2 Compliance with WBG EHS Guidelines

GeneralEHS Guidelines	**Environmental impact assessment/compliance with Environmental Management Plans (EMPs)**

If any facility or project is near a recognized ecological sensitive area (for example, a national park), the pollution level increase shall be controlled as far as practicable; in addition, appropriate mitigation measures can also include the utilization of clean fuel or technology, and the application of comprehensive pollution control measures.	The project involves the ecological sensitive area, so existing municipal facilities shall be used and local residents shall be rented as far as possible during the construction phase, and the clean fuel may be used during the operational phase to reduce the pollution level.
Dust or particulate matter is the most common pollutant among irregular emissions. Some operations (for example, transportation and open-air storage of solid materials) and bare soil surface (including unpaved roads) will emit the particulate matter.	The management shall be strengthened, with the wet method operation promoted, barriers erected along the construction site, and the material storage yard fenced and covered; throwing materials from a high place is strictly prohibited. The testing and maintenance of motor vehicles shall be strengthened during the operational phase; automobiles of exhaust exceeding standard shall be prohibited from being on roads; road conditions shall be maintained; the vegetation shall be utilized to purify air.
Environmental, Health and Safety Guidelines for Water and Sanitation	**Environmental impact assessment/compliance with Environmental Management Plans (EMPs)**
The industrial wastewater, sanitary wastewater and the wastewater from operations of public works or rain water will be discharged to the public or private wastewater treatment system, and the pretreatment and monitoring requirements of the sewage treatment system such wastewater is discharged to will be met.	During the construction phase, the washing wastewater will be reused after the treatment of the oil separation and grit chamber, without being discharged outside; the sanitary sewage will be collected and pretreated by biochemical pools and regularly sucked to the sewage treatment plant by fecal suction trucks, or directly connected to the municipal sewage pipe network; during the operational phase, the sanitary wastewater from the public space will be all discharged to the sewage treatment plant through the municipal sewage pipe network for treatment.
The rain water shall be separated from the industrial wastewater and the sanitary wastewater to reduce the volume of wastewater which can be discharged after treatment;	The diversion of rain and sewage water will be utilized, with rain water conduits and sewage conduits built separately.
At the most sensitive point, if it is predicted that the noise from the project facilities or the operation activities will exceed relevant noise level, the noise prevention and control measures shall be taken.	The low-noise machines will be used during the construction phase; the construction will be appropriately scheduled, with the night-time construction avoided; construction machines and plant will be appropriately arranged inside the site; and the fence will be erected. At the operational phase, the asphalt pavement will be adopted, and trees and grass will be planted; the speed at the road sections along densely populated residential areas and schools will be limited and the signs of no honking will be erected, with acoustic screens built, special funds for noise monitoring and treatment provided and other measures taken to prevent and control the noise.
Environmental, Health and Safety Guidelines for Toll Roads	**Environmental impact assessment/compliance with Environmental**

	Management Plans (EMPs)
When appropriate, properly selecting road and supporting facility positions, and utilizing existing traffic corridors to avoid important terrestrial and aquatic habitat (for example, old-growth forests, wetlands and fish spawning habitat);	The region where this project is located is not an important terrestrial and aquatic habitat.
During the construction phase, efforts shall be made to reduce clearing local plant species, and to replant local plant species at the affected areas	The construction activities shall be arranged within the scope of the land occupied for the construction; local plants shall be appropriately planted.
Roads shall be paved in dry weather to avoid the loss of asphalt or cement materials;	During the construction phase, pavement construction is prohibited in gale weather, and the construction site shall be appropriately determined;
The oil-water separator must be used during treatment whether there will be a great amount of grease produced;	The oily water collecting container shall be equipped for construction machines at the construction site to collect the oily water produced. The collected oily water shall be delivered to and treated at the capable unit, and any direct discharge without treatment shall be prohibited.
Replacing diesel with vegetable oil to be releasing agent and cleanser to prevent any pollution caused by cleaning asphalt equipment; the cleaning products and polluted asphalt remaining shall be prevented from escape; scraping shall be conducted before cleaning, and the cleaning activities shall be conducted at the place far away from the surface water or drainage facilities.	Contractors shall set forth requirements on "storage of fuels, oil and hazardous and noxious substances" in their specifications, and all fuels at the construction site shall be stored and fenced; the storage area shall be 110% of the fuel storage containers. The fuel storage area shall not be near any source of water (namely, up to 100m from the source of water);
Acoustic treatment shall be made to surrounding buildings (generally, change of windows); The road pavement of less and lower noise from road surface-tire friction shall be adopted, for example, the asphalt mastic crushed stone mixture.	At the operational phase, the speed at the road sections along densely populated residential areas and schools will be limited and the signs of no honking and acoustic screens will be erected, with special funds for noise monitoring and treatment reserved. All the roads of this project adopt asphalt pavement.
Environmental, Health and Safety Guidelines for Waste Management Facilities	**Environmental impact assessment/compliance with Environmental Management Plans (EMPs)**
Collection and transportation of wastes	They will be delivered to the local waste treatment plant for unified treatment
Garbage cans or garbage bags are encouraged to be used by every family or waste collecting stations around buildings; wastes shall be collected regularly and frequently to avoid waste accumulation; vehicles to collect and transport wastes shall be covered to avoid wastes blown away by wind when driving;	They shall be delivered to a fixed point, and shall be gathered and transported by the sanitation department to Nan'an District municipal solid waste treatment plant for disposal.
Regular waste collection; Developing cleaning plans for garbage collection vehicles and all the garbage collection containers of the enterprises; Advocating the use of garbage bags to avoid polluting the garbage collection equipment.	

The garbage collection routes shall be optimized to shorten the driving distance, and reduce the total fuel consumption and emission; Forwarding stations will be established for small garbage collection vehicles to gather the collected garbage to large vehicles and deliver to the garbage treatment plant;	

2.5 Relevant materials of the construction project

(1) *World Bank Funded Nan'an District Urban Regeneration Project Feasibility Study Report* (Chongqing University, November 2017);

(2) *Comprehensive Planning for Chongqing Nanshan National Forest Park* (Chongqing Municipal Forestry Planning and Design Institute, June 2006);

(3) *Comprehensive Planning for Liangfengya Municipal Forest Park* (Chongqing Municipal Forestry Planning and Design Institute, September 2002);

(4) *Comprehensive Planning for Chongqing Nanshan-Nanquan Scenic Area* (Chongqing University Urban Design Institute, December 2003);

(5) Environmental Impact Assessment Work Contract;

(6) Monitoring Report.

2.6 Assessment standards

2.6.1 Environmental quality standard

(1) Surface water environment

In accordance with the *Notice of Chongqing Municipal People's Government Endorsing the Plan of Readjusting the Surface Water Environment Functional Category of Chongqing* (YFF [2012] No. 4) and the *Notice of Chongqing Municipal People's Government Endorsing the Plan of Locally Readjusting the Surface Water Environment Functional Category of Chongqing* (YF [2016] No. 43), the water area function of the Yangtze River section in Nan'an District shall be Category-III water area and shall be in accordance with Category-III water quality standard specified in *Environmental Quality Standards for Surface Water* (GB3838-2002).

See Table 2.6-1 for relevant reference values.

Table 2.6-1 Environmental quality standards for surface water (excerpt) (Unit: mg/L)

SN	Item	Category III reference value of environmental quality standards for surface water
1	PH (Dimensionless)	6~9
2	COD	≤20
3	BOD_5	≤4
4	Ammonia nitrogen	≤1.0
5	Petroleum	≤0.05

(2) Ambient air

In accordance with the *Notice of Chongqing Municipal People's Government on Printing and Issuing Regulations on Chongqing Ambient Air Quality Function Zoning* (YFF [2016] No. 19), Mingyue Mountain Tree Farm, Nanshan National Forest Park, Liangfengya Municipal Forest Park and Nanshan-Nanquan Municipal Scenic Area (for the areas under the administration of Nan'an District) in Nan'an District shall be the Category-I areas and shall be in accordance with the level-I standard in *Ambient Air Quality Standards* (GB 3095-2012); the towns and rural areas under Nan'an District shall be Category-II areas and shall be in accordance with the level-II

standard in *Ambient Air Quality Standards* (GB 3095-2012). See Table 2.6-2 for relevant reference values.

Table 2.6-2 Ambient air quality standards (excerpt) (Unit: mg/m3)

Level / Pollutants	1-Hour average		24-Hour average (Daily mean value)	
	Category-I (GB 3095-2012)	Category-II (GB3095-1996)	Category-I (GB 3095-2012_	Category-II (GB3095-1996)
SO_2	0.15	0.50	0.05	0.15
NO_2	0.20	0.24	0.08	0.12
PM_{10}	/		0.05	0.15

(3) Acoustic environment

In accordance with *Applicable Area Classification Rules for Chongqing City Proper Environmental Noise Standard* (YFF [1998] No. 90), *Chongqing Environmental Protection Bureau Notice on Printing and Issuing Amendment to Applicable Area Classification Rules for Acoustical Environment Standard* (YHF [2007] No. 39) and *Chongqing Environmental Protection Bureau Notice on Amending Adjustment Plan of Applicable Area Classification Rules for Acoustical Environment Standard* (YHF [2007] No. 78), The status quo of the project area is mainly the Museum of Anti-Japanese War Sites, a mixed area of residence, commerce, and industry. Within 30m from both sides of the main road, the acoustic environment of the Museum of the Anti-Japanese War Site implements the "Acoustic Environment Quality Standard" (GB3096-2008) Class 1 standard (daytime 55dB, 45dB at night), residential, commercial, and industrial mixed areas perform Type 2 standards (difference between daytime 60dB and nighttime 50dB), and 4a standards are implemented within 30m on both sides of the main arterial road (70dB in daytime and 55dB in nighttime).

(4) Water and soil conservation

The soil erosion strength is subject to the *Soil Erosion Categorization and Classification Standard* (SL190-2007) and the project area belongs to the earth-rock mountain region. See Table 2.6-3 for standard values.

Table 2.6-3 Soil erosion strength classification standard table

Class	Southwestern earth-rock mountain region	
	Average erosion modulus [t/(km^2·a)]	Average loss thickness (mm/a)
Slight	<500	<0.37
Mild	500-2,500	0.37-1.9
Medium	2,500-5,000	1.9-3.7
Intense	5,000-8,000	3.7-5.9
Extremely intense	8,000-15,000	5.9-11.1
Fierce	＞15,000	＞11.1

2.6.2 Emission standards

(1) Waste water

Sewage in the park of this project enters the municipal sewage pipe network and Nan'an District urban sewage treatment plant for compliance with discharge norms. The pipe acceptance standard shall be in accordance with the standard of level III in the *Integrated Wastewater Discharge Standard* (GB8978-1996), and see Table 2.6-4 for the reference values for discharge.

Table 2.6-4 *Integrated Sewage Discharge Standard* Level III discharge standard (excerpt) (Unit: mg/L (pH dimensionless))

SN	Item	Reference value	SN	Project	Reference value
1	COD	500	4	pH	6~9
2	BOD_5	300	5	Petroleum	30
3	NH_3-N	/	6	SS	400

(2) Exhaust gas

The exhaust gas and rising dust during the construction phase are irregular emissions; and during the operational phase, main atmospheric pollutants are the exhaust gas emission on the road. The construction phase is subject to the *Integrated Discharge Standard of Atmospheric Pollutants* of Chongqing (DB 50/418－2016), and see Table 2.6-5 for the specific schedule.

Table 2.6-5 Integrated discharge standard of atmospheric pollutants (mg/m3)

Pollutant item	Concentration limiting value at irregular emissions monitoring points (mg/m3)
Other particulate matters (main urban districts)	1.0

(3) Noise

The noise during the construction phase shall be in accordance with *Emission Standard of Environment Noise for Boundary of Construction Site* (GB 12523-2011); see Table 2.6-6 for the reference value.

Table 2.6-6 Emission standard of environment noise for boundary of construction site (Unit: dB(A))

Daytime	Nighttime
70	55

2.7 Compliance analysis of relevant regionalpolicies and planning relating to the proposed project

2.7.1 Compliance analysis ofindustrialpolicies

As per *Catalogue for Guiding Industry Restructuring (2011 Version)* (as amended), "XXII, City Infrastructure": 4. City road and smart traffic system construction, 9. City water supply and drainage pipe network project, water supply source and water purification plant" belongs to encouragement type; "XXXVII, Other Service Industries: urban-rural community infrastructure service facilities and comprehensive service network construction" belongs to encouragement type.

2.7.2 Compliance analysis of laws, regulations and planning

(1) Compliance analysis of *Outline for the 13th Five-year Plan of National Economic and Social Development in Chongqing*

The *Outline* points out, "In line with the principle of 'smooth traffic inside & good reachability to the outside, being balanced and efficient', ... Improve urban road network, promote the construction of public parking lots and the walking system, ... Improve urban road network system ... Focus on the planning of construction of bridges, tunnels, and municipal roads, open up 'dead end highways' and 'blocked roads', accelerate the construction of secondary roads and branch roads ... and build a urban non-motorized transportation system. Leveraging on tourist attractions, blocks for walking, and public greenbelts, a multi-functional walking system integrating tourism, leisure, and fitness shall be created to enrich the travel modes of residents. ... Push urban construction in the light of high standards. Transformation of the old city and construction of the

new shall be coordinated, ... Optimize environmental space, improve urban quality, and promote the overall coordination of architectural style ..."

This project includes transformation of old communities, construction of slow walking footpaths, biking trails, secondary main roads, and branch ways, improvement of urban public space, environmental renovation, and land re-use to meet the requirements of the *Outline*.

(2) Compliance analysis of*Notice of Chongqing Municipal People's Government Office on Printing and Distributing Ecological Protection Red Line Delineation Scheme of Chongqing* (YFBF [2016] No. 230)

The *Notice* states that, the "General Goal" of the *Plan* is to "... protect the four major ecological protection zones, that is, Mount Daba Mount, Mount Huaying Mount, Mount Wuling Mount and Mount Dalou, as well as the three major river systems, including Yangtze River, Jialing River and Wujiang River, ... protect important ecological functional zones like nature reserves, scenic areas, forest parks, wetland parks, and drinking water source conservation areas, etc., and reserve permanent ecological space..."

This project only conducts overall improvement for the footpaths within the ecological protection red lines of Chongqing, strengthens the connection among roads, involves forest parks and scenic areas, and has slight impact on the ecological functions of sensitive areas and the environment within the ecological protection red lines.

(3) Compliance analysis of *Administrative Measures for Forest Park*

This project involves Nanshan National Forest Park and Liangfengya Municipal Forest Park. The *Measures* proposes the following requirements for the construction within the forest parks:

"The construction of facilities and scenic areas in the forest parks must be carried out in accordance with the overall planning and design. In the areas of rare scenes, important scenic areas, and core scenic areas, except necessary protection and auxillary facilities, hotels, guest houses, sanatoriums, and other engineering facilities must not be built. ... It is forbidden to conduct activities damaging the forests like deforestation, quarrying, sand extraction, and soil extraction."

The construction contents of this project do not belong to the prohibited circumstances in the *Measures*. Prior to construction, relevant procedures shall be processed in accordance with the *Measures*, and the construction company shall go through relevant procedures in line with the *Measures*. The project construction shall comply with the relevant requirements of *Administrative Measures for Forest Park*.

(4) Compliance analysis of *Administrative Measures for National Forest Park*

This project involves Nanshan National Forest Park and Liangfengya Municipal Forest Park. The *Measures* proposes the following requirements for the construction within the forest parks:

"The construction projects within national forest parks shall meet the requirements of the overall plan. Selection of site, scale, style, and color shall coordinate with the surrounding landscape and environment... The construction activities within national forest parks shall adopt measures to protect landscape and environment. After the completion of construction, sites shall be promptly cleaned. And the environment shall be beautified. The following activities are prohibited in national forest parks: (1) Cutting or digging flowers, trees, and medicinal herbs without authorization; (2) Unlawful hunting and killing wild animals; (3) Scratching and damaging trees, rocks, cultural relics, and tombs; (4) Damaging or moving the facilities in the parks without authorization; (5) Direct discharge of pollutants like domestic sewage, waste water and gas incompliant with standards, trash, and waste residues; (6) Smoking in non-smoking areas and making a fire, burning scented candlesticks, and shooting off fireworks in non-designated areas; (7) Setting up booths to sell goods without authorization; (8) Enclosing, filling, blocking, or cutting off the natural water system without authorization; and (9) Other activities prohibited by laws, regulations, and rules."

The construction contents of this project do not belong to the prohibited circumstances in the *Measures*. Prior to construction, relevant procedures shall be processed in accordance with the *Measures*, and the construction company shall go through relevant procedures in line with the *Measures*. The project construction shall comply with the relevant requirements of *Administrative Measures for National Forest Park.*

(5) Compliance analysis of *Administrative Measures for Forest Park in Chongqing*

This project involves Nanshan National Forest Park and Liangfengya Municipal Forest Park. The *Measures* proposes the following requirements for the construction within the forest parks:

"Forest parks must be developed and constructed in strict accordance with an overall plan approved by competent departments of business proprietors. ... It is forbidden to engage in hunting activities in forest parks. It is forbidden to engage in the activities damaging forest scenic areas and illegal occupation of land like deforestation, mining, quarrying, and soil extraction. Forest park management authorities must establish and improve forest fire protection institutions and deploy necessary firefighting facilities to prevent forest fire accidents. Forest parks must strengthen the protection of biodiversity and pollution control and forbid all the activities that destroy the ecological environment and natural and cultural landscapes."

The construction contents of this project do not belong to the prohibited circumstances in the *Measures*. Prior to construction, relevant procedures shall be processed in accordance with the *Measures*, and the construction company shall go through relevant procedures in line with the *Measures*. The project construction shall comply with the relevant requirements of *Administrative Measures for Forest Park in Chongqing*.

(6) Compliance analysis of *Ordinance for Scenic Spots*

This project is located in Nanshan-Nanquan Municipal Scenic Area. *Ordinance for Scenic Spots* (Decree No. 474 of the State Council) stipulates that:

"The following activities are prohibited in scenic areas: (1) Activities that destroy landscapes, vegetation, and landforms, such as cutting into a mountain for quarrying, mining, reclamation, and erection of tombs; (2) Construction of facilities to store explosive, flammable, radioactive, poisonous, and corrosive articles; (3) Scratching and smearing scenes or facilities; (4) Littering. ... It is forbidden to violate the planning of scenic areas to set up various types of development zones and construct buildings not related to the resources of scenic areas like hotels, guest houses, training centers, and sanatoriums."

This project does not belong to the prohibited circumstances in the *Ordinance*. Prior to construction, upon the approval by scenic area management authorities, relevant procedures shall be processed in accordance with the relevant laws and regulations. Only with the relevant approval can the construction company start construction. The project construction shall comply with the relevant requirements of *Ordinance for Scenic Spots.*

(7) Compliance analysis of *Ordinance for Scenic Spots in Chongqing*

This project is located in Nanshan-Nanquan Municipal Scenic Area. *Ordinance for Scenic Spots in Chongqing* clarifies that:

"The various construction projects in the peripheral protection zone of scenic areas shall coordinate with the landscape of the scenic areas. It is forbidden to engage in activities that destroy resources, affect landscape, pollute environment, and impede tourism in the peripheral protection zone of scenic areas. ... The following behaviors are forbidden in scenic areas: (1) Activities that destroy landscapes, vegetation, and landforms, such as cutting into a mountain for quarrying, mining, reclamation, and erection of tombs; (2) Construction of facilities to store explosive, flammable, radioactive, poisonous, and corrosive articles; (3) Damage to geological landscapes such as caverns; (4) Scratching and smearing scenes or facilities; (5) Smoking and making a fire in fire-prohibition areas; (6) Littering; (7) Other activities that damage tourist attractions and resources. ... It is forbidden to violate the planning of scenic areas to set up various

types of development zones and construct buildings not related to the resources of scenic areas like hotels, guest houses, training centers, and sanatoriums. Rivers and lakes in scenic areas shall be protected or renovated in line with the planning requirements of the scenic areas; All companies and individuals shall not, without authorization, destroy the natural water system by enclosing, filling, blocking, and or cutting off the natural water system or discharge waste water and dump trash and other pollutants incompliant with standards. ... The construction projects and man-made landscapes in the scenic areas shall coordinate with the ecological environment and surrounding landscape in layout, volume, shape, style, color, and material and cannot damage landscape, pollute environment, or hinder tourism. ... The construction companies that having construction projects in scenic areas shall carry out environmental impact assessment and geological disaster risk assessment, formulate ecological protection, pollution prevention, and water and soil conservation plans, and protect surrounding scenery, water bodies, forest, grass, and vegetation, wildlife resources, and landforms. Those engaging in the construction of ecological projects must not introduce or use exotic harmful species. The construction projects in scenic areas must comply with relevant laws, regulations, and requirements, and, upon the approval by scenic area management authorities, go through relevant approval procedures according to law."

This project will only build footpaths and regenerate the existing communities in the scenic areas and does not belong to the prohibited circumstances in the *Ordinance*. Prior to construction, upon the approval by scenic area management authorities, relevant procedures shall be processed in accordance with the relevant laws and regulations. Only with the relevant approval can the construction company start construction. The project construction shall comply with the relevant requirements of *Ordinance for Scenic Spots in Chongqing*.

3. Project description

3.1 Project construction content

This project at the district level contains the total 9 sub-projects in 3 categories. See Table 3.1-1 for the project content and see Figure 3.1-1 for each sub-project layout plan.

Table 3.1-1 Project content

SN	Sub-project name		Project content
1	Old Neighborhood Rehabilitation	Nanping Street Committee community rehabilitation	It rehabilitates 4 old Communities[1] (Dongxing Road, Jinzi Street, Yangguang and Xiangshui Road Communities), including 11 blocks, 83 residential buildings, and 4,678 households. The main project content includes rehabilitation and addition of street facilities (e.g. bench, staircase and functional artistic sketch), infrastructure improvements involving water supply and sewage pipeline.
		Huayuan Road Street Committee community rehabilitation	It rehabilitates 4 old Communities (Jinshan Road, Jinyan, Gulouwan and Nanhu Communities), including 8 blocks (communities), 158 residential buildings and 9,715 households. *The main project content same as above.*
		Nanshan Street Committee community rehabilitation	It rehabilitates 2 old Communities (Huangjueya, Zhenwushan Communities), including 10 blocks (Xiaoqu), 27 residential buildings and 1,740 households in total. *The main project content same as above.*
2	Public space improvements	Improvements to existing parks	It covers 3 green spaces including Nanhu Community Public Space, Guohuishan Public Greening Space, and Houbao Public Greenbelt Space, with the total area of 7.92ha. The improvements cover resting facilities, pavement, plant and greening space quality, etc.
		Improvements to existing squares	It covers the public recreational spaces of Nanping, the public space of Huigong Road, with the total area of approx. 4.25ha. The improvements cover pavement, resting facilities as well as artistic sketch, etc.
		Idled space utilization	It includes the vacant space utilization under Dafosi Bridge, with the total area of 20ha. It is to build a waterfront space, including footpath, pavement, greening and auxiliary facilities, etc.
3	Pedestrian walkway network improvements	Slow-walking footpath[2]	There are 29 slow-walking footpaths with total length of approx. 88.32km and a width of 3m. The improvements cover pavement, street façade, blind sidewalk, signage, resting facilities, dustbins, node greening, crossing facilities, urban furniture and sewage pipes, etc.
		Hiking footpath	There are 16 hiking footpaths in total with the length of approx. 42.31km. The improvements cover trail connection, pavement, resting facilities, power supply pipeline facilities, etc.
		Connection roads	There are 3 road connections, including i) Longhuang road widening: 769m in length, widen from 12m to approx. 2.5m each side; ii) Hugui Road 1,403m long and 12m-24m wide; including existing and new alignments; iii) Tushan Branch Road 647m long, 26m wide, including existing and new alignment.

[1] In the context of the project, Street Committee refers to 街道 (Jiedao) which is an administrative level below district; below Street Committee is Community (社区, Shequ). A Block is not an administrative unit. It refers to a residential area (小区, Xiaoqu).

[2] A slow-walking footpath is often 3m in width, wider than a hiking footpath (trail) that is 1-2 m wide.

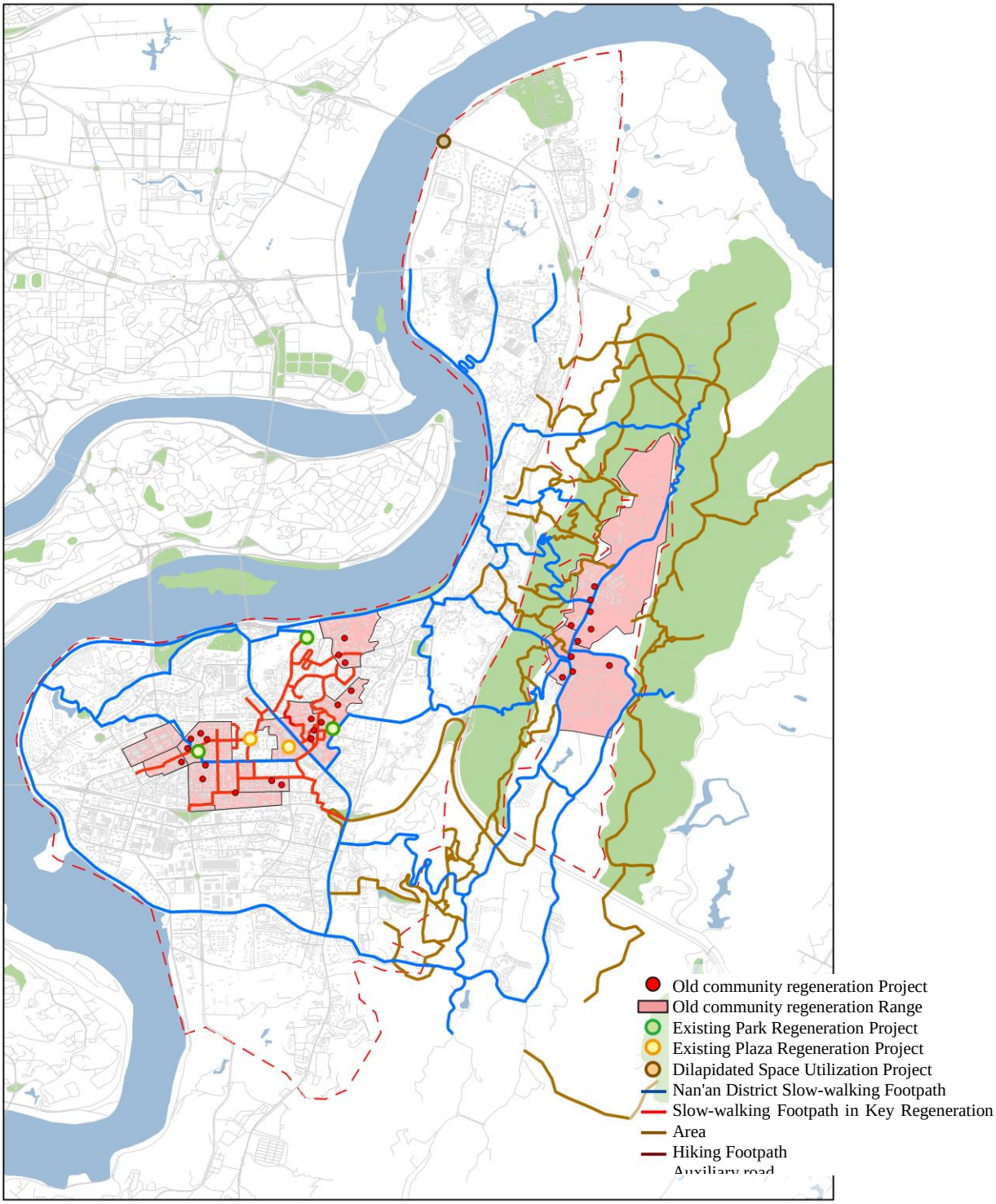


Figure 3.1-1 Nan’an District layout plan of each sub-project

3.2 Plan design

3.2.1 Community regeneration design

(1) Dongxing Road Community

There are totally 4 detail design nodes for Dongxing Road. Themes and activities planning includes East Road Lane 3---Micro 3D organic farm; Xinhua Community---Old fitness transformation demonstration area; Ningjing Community---Regeneration of activated points with community home as the core; and Changhang Community---Optimized building of "community-park" node.

In addition to regeneration of community nodes, Dongxing Road Community will perform systematic transformation and completion, mainly including infrastructure improvement, service facilities improvement, ground pavement, identification system completion, plant arrangement, regulated management of parking and barrier-free facilities completion and so on.

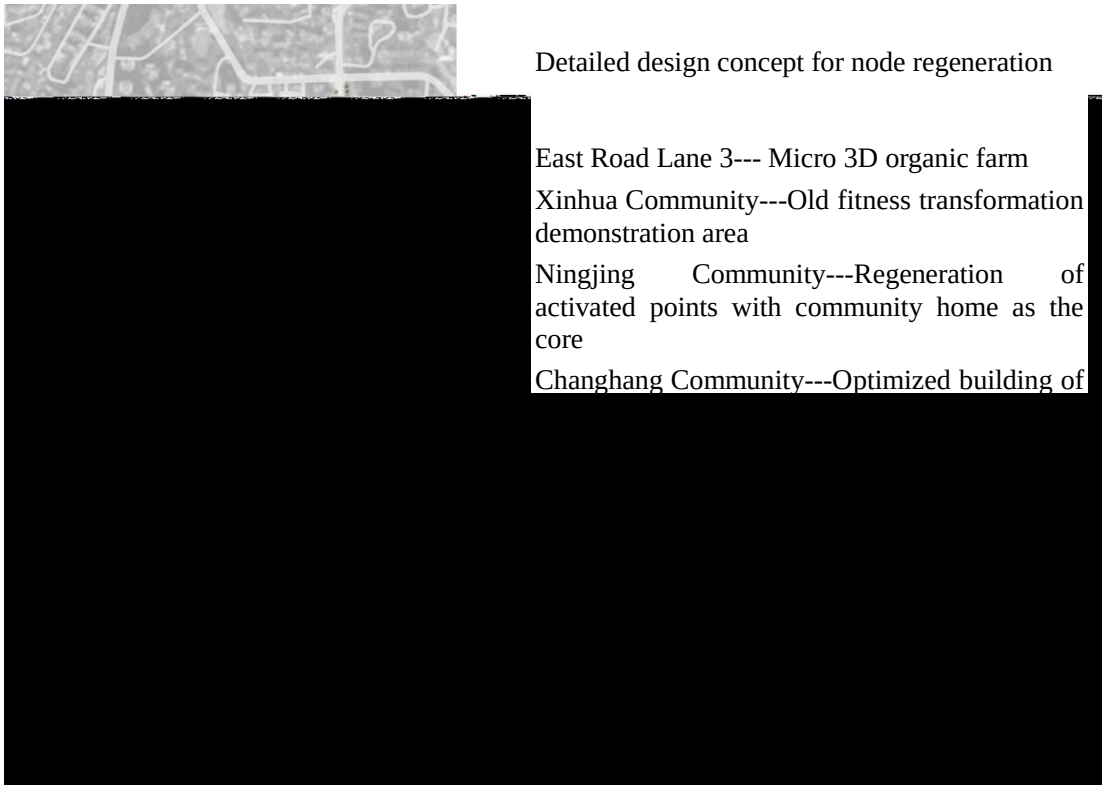


Figure 3.2-1 Regeneration project plan of Dongxing Road Community

① Node 1 - Nanping East Road Lane 3

Create a 3D micro farm. The layout of spatial facilities will lead parking integration and setting of grape frame, wall framing and other landscape accessories.

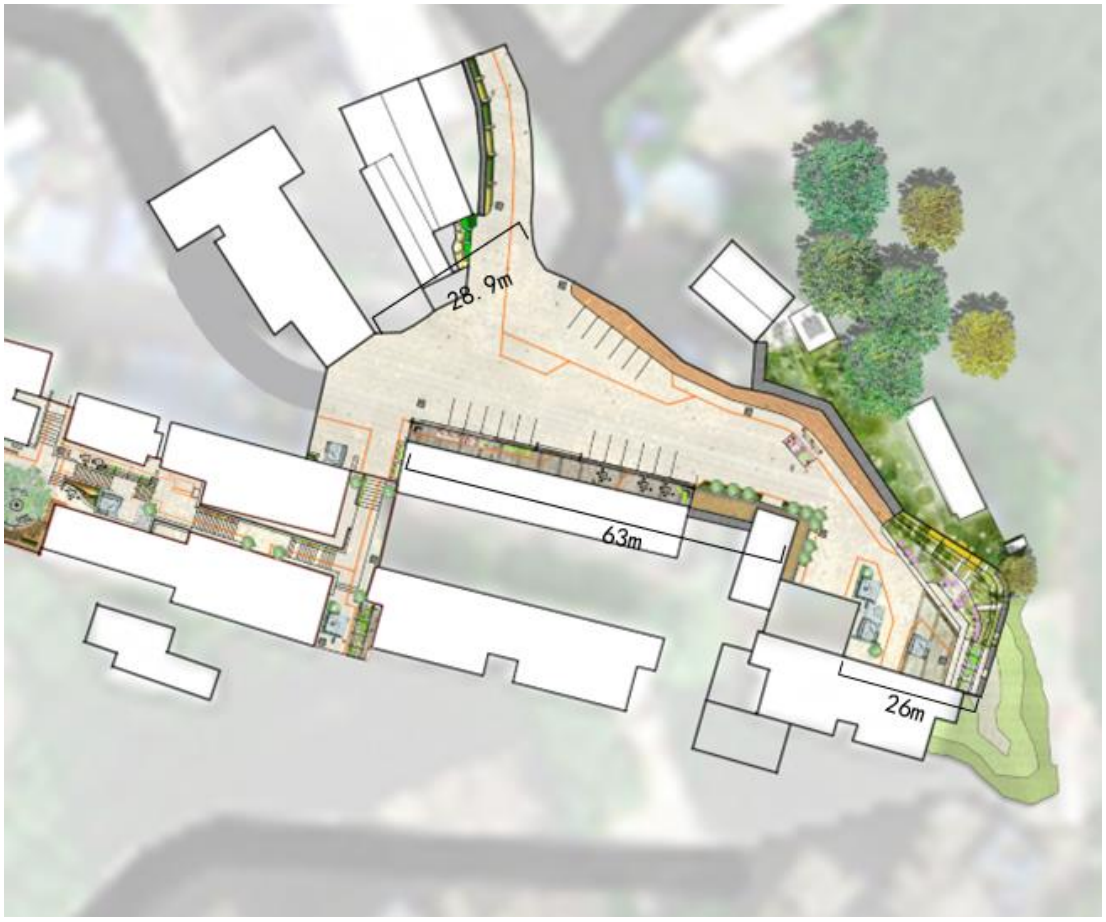


Figure 3.2-2 General layout for community regeneration design

② Node 2 - Xinhua Community

Set barrier-free facilities at entrance and inside. Reasonably arrange recreational facilities, children sand pit, etc.; and lead outdoor fitness activities of the aged and children.

Figure 3.2-3 General layout for regeneration design of Xinhua Community

③ Node 3 - Ningjing Community

Revitalize the entrance and inside. The layout of spatial facilitates will lead outdoor fitness activities of the aged and children.

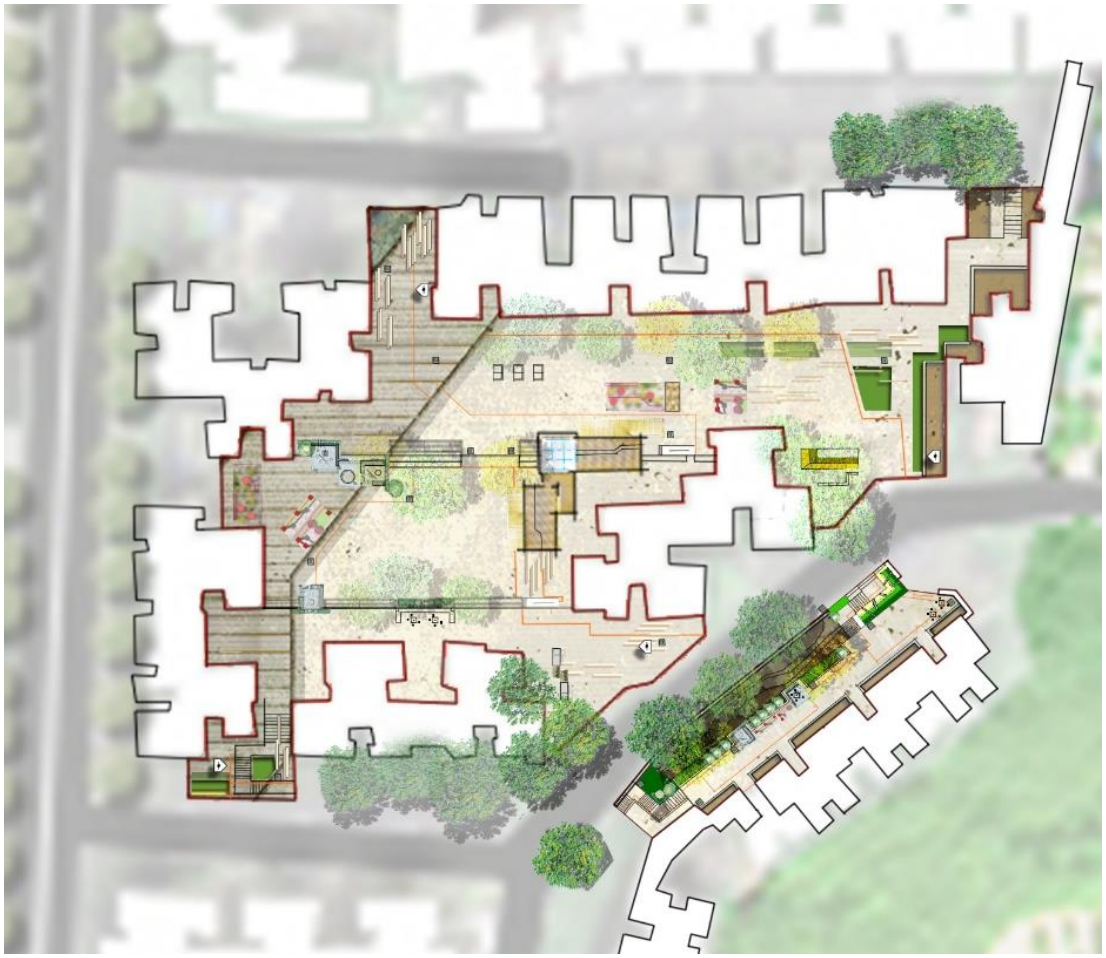


Figure 3.2-4 General layout for regeneration design of Ningjing Community

④ Node 3 - Changhang Community

Repair the retaining wall. Optimize and transform nodes at park entrance; renovate greenbeltscape and properly introduce shrub landscape.

Figure 3.2-5 General layout for regeneration design of Changhang Community

(2) Nanhu Community

Nanhu Comunity will perform detail space design and activity plan for the 4 nodes---Nanhu Park, Huayuan Village 1, Huayuan Village 2 and Huayuan Village 4, i.e.:

Nanhu Park --- Optimization and regeneration of plaza with function expansion;

Huayuan Village 1 --- Reconstruction of "5min convenient living circle";

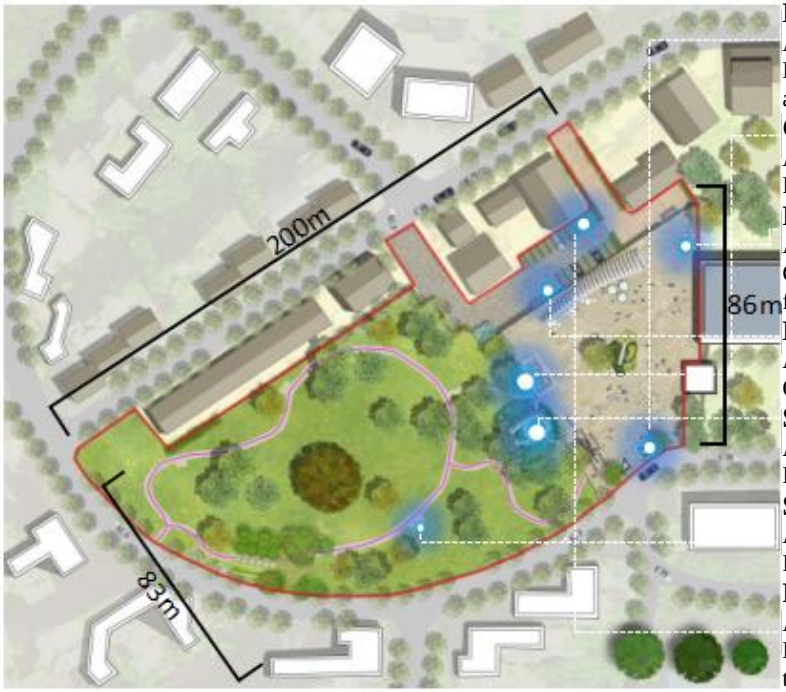
Huayuan Village 2 --- Creation of courtyard landscape media;

Huayuan Village 4 --- Creation of orderly spatial activities.

In addition to regeneration of community node, Nanhu Community will perform systematic transformation and completion, mainly including infrastructure improvement, service facilities improvement, ground pavement, identification system completion, plant arrangement, regulated management of parking and barrier-free facilities improvement and so on.

① Nahu Park zone node

Revitalize the entrance and inside. The layout of spatial facilitates will lead outdoor fitness activities of the aged and children. Set an indoor activity center below the plaza to diversify activity of plaza.



Entrance Guidance
Area: 60m^2
Building entrance landscape of quality and entrance sign

Children's Paradise
Area: 78m^2
Ramp without barrier

Fitness Facilities
Area: 40m^2
Children sand pit, recreational facilities

Barrier-free facilities
Area: 100m^2
Outdoor fitness facilities

Small Landscape Fountain
Area: 412m^2
Building landscape fountain

Setting Rest Facilities
Area: 200m^2
Rest gallery and pergola, table, chair

Parking Space Transformation
Area: 273m^2
Ecological parking space transformation

Figure 3.2-6 General layout for regeneration design of Nanhu Park

② Public space node of Huayuan Village 1

Revitalize the entrance and inside. The layout of spatial facilitates will lead outdoor fitness activities of the aged and children.

Figure 3.2-7 General layout for regeneration design of Huayuan Village 1

③ Public space node of Huayuan Village 2

Create landscape media, diversify site activity and promote contacts of residents.

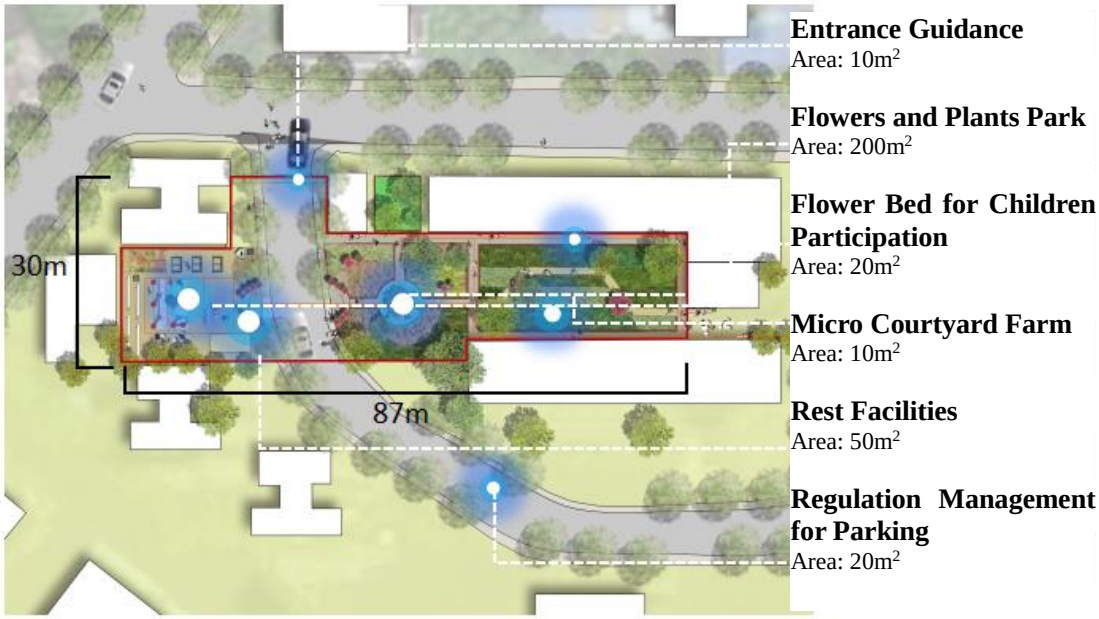


Figure 3.2-8 General layout for regeneration design of Huayuan Village 2

④ Public space node of Huayuan Village 4

Create landscape at entrance and main passages; keep safety and privacy of space nodes; and repair fixed booths for small-scale business.

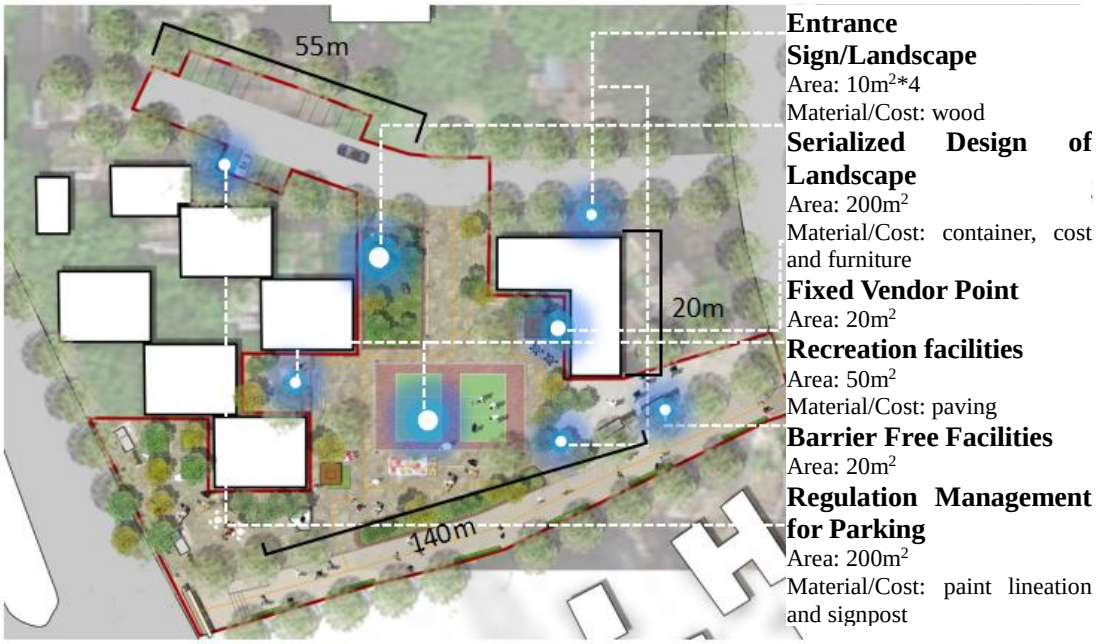


Figure 3.2-9 General layout for regeneration design of Huayuan Village 4

3.2.2 Public space regeneration design

(1) Houbao Park

The total control and planning area of Houbao Park covers 3.24 hectares and the functional orientation is a city landscape park with characteristics of mountainous land. It's expected to strengthen the publicity and connection of upper and lower platform after Rail Transit Line 10 is

open.

Its main contents include: regenerating and transforming original community plaza, adjusting and optimizing service and old fitness of the community plaza; solving connectivity from Houbao Community to Nanbin Road light rail station; positioning original regions with better vegetation conditions like large trees and palm-trees as mountainous land forest viewing area; setting Zen cultural club and adding viewing platforms at places with vast view as per current Guanyin Temple; recovering water and soil of mountainous landform and creating terraced field on the basis of original vegetable field.

Figure 3.2-10 General layout for Houbao Park

Figure 3.2-11 Zoning concept plan for Houbao Park

(2) Guohuishan Park

The total control and planning area of Guohuishan Park covers 3.37 hectares and the functional orientation is a city agricultural park with characteristics of mountain city. It's expected to strengthen the landscape connection between Guohuishan Park and Dongxing Road Community through multi-dimensional lapping of landscape corridor.

The planning design divides Guohuishan Park into three zones: entertainment life zone, social service zone and city agricultural zone. Wherein, the entertainment life zone provides basic fitness and recreational facilities for residents in Dongxing Road Community; the social service zone mainly aims at children's paradise; and the city agricultural zone is to recover water and soil of mountainous landform on the basis of original vegetable field, create an agricultural practical scientific training base and add landscape platforms.

Figure 3.2-12 Conceptual design plan of Guohuishan Park

3.2.3 Slow-walking system project

The project totally involves 29 slow-walking footpaths, 16 hiking footpaths and 3 auxiliary roads. As per the feasibility study scheme, the assessment report provides design for slow-walking footpaths: Nanping Main Street - Hongsheng Commercial Pedestrian Street, hiking footpath: Huangge Ancient Path and 3 auxiliary roads.

(1) Nanping Main Street---Hongsheng Commercial Pedestrian Street

① Nanping Main Street

The construction content of Nanping Main Street mainly includes: regenerating or supplementing partially old and damaged infrastructures and performing systematic landscape at important node spaces. Renovation mainly involves road pavement, street facilities and landscape.

② Hongsheng Commercial Pedestrian Street

The construction content of Hongsheng Commercial Pedestrian Street mainly includes: adding cultural sites, drama stages, outdoor tables and chairs on the street, light and decorations, setting non-motor vehicle parking spaces at entrance and exit in the south and north of Hongsheng Commercial Pedestrian Street, and setting rest facilities at every 50m at both sides of the street. Renovation mainly involves road pavement, street facilities and landscape.

(2) Huangge Ancient Path:

The construction content of footpath mainly includes: adding well-designed identifications, rest chairs and other small facilities; beautifying and renovating landscape vegetation at both sides of the footpath; improving design of landscape at footpath entrance and plaza space nodes; regenerating and renovating footpath tiles; regenerating and completing infrastructure like public toilet, road lamps, seats, trash cans, etc.

(3) Auxiliary roads

① Longhuang Highway

A. Basic project conditions

Project name: Nan'an District Longhuang Highway Expansion and Transformation Project

Construction nature: Reconstruction

Construction location: Chongqing Nan'an District

Construction unit: Nan'an District tunnel construction office

Total investment: CNY 227,096,000

Scale and class: Longhuang Highway has its length of 621.972m in total with the road class of urban secondary trunk road, the two-way four vehicle lanes, the standard road width of 24.0m and the design vehicle speed of 30km/h.

Traffic volume prediction: for the predicted road traffic volume in the peak hour of the characteristic year see Table 3.2-1.

Table 3.2-1 Longhuang Highway predicated two-way traffic volume in the peak hour of the predicted year (pcu/h)

Year, vehicle type / Traffic volume	The 1st year			The 7th year			The 15th year		
	Large vehicle	Mid-size vehicle	Small vehicle	Large vehicle	Mid-size vehicle	Small vehicle	Large vehicle	Mid-size vehicle	Small vehicle
Average traffic volume per hour	33	99	692	44	133	928	62	185	1,293
Day traffic volume per hour	45	134	935	60	179	1,252	83	249	1,745
Day traffic volume per peak hour	67	200	1,402	89	268	1,878	125	374	2,618
Night traffic volume per hour	10	30	208	13	40	278	18	55	388
Night traffic volume in peak hour	15	45	312	20	60	417	28	83	582

Main technical standard: as shown in Table 3.2-2.

Table 3.2-2 Main technical standard

Item		Unit	Specified value	Design value
Road class			Secondary trunk road	Secondary trunk road
Design vehicle speed		Km/h	30~50	30
Standard road width		m	-	24m
Road length		m	-	621.972m
Design life (traffic volume saturation)		Year(s)	15	15
Design life (pavement structure)		Year(s)	10	10
Plane	Stopping sight distance	m	≥30	≥30

	The minimum radius of the round curve	m	40	40
	No-ultrahigh minimum radius of the round curve	m	150	150
	Transition curve length	m	25	25
	Plane curve length	m	50	80.984
Longitudinal plane	Maximum longitudinal slope	%	10	9.9
	Minimum longitudinal slope	%	0.3	2.214
	Minimum slope length	m	100	100
	Limited minimum radius of vertical convex curve	m	250	900
	Limited minimum radius of vertical concave curve	m	250	500
	Limited minimum length of vertical curve	m	25	29
Vehicle load class		Standard axle load BZZ-100KN		
Seismic peak acceleration		0.05g		
Seismic fortification intensity		The basic intensity is 6° (for structure fortification)		

B. Road engineering

The road starts from Qianqu Road Crossing, stretches from the west to the east and ends at Tiechangwan Flyover, with the total length of 621.972m, the total 5 plane curves set, while its minimum radius of plane curve reaches 40m and the transition curve is 25m long; and in accordance with the specifications, it is required to set the ultrahigh and widen design of the whole line.

In accordance with the specifications, set the bus stop lots on both sides of the road and set the acceleration and deceleration transition sections of the parking lot for the inbound and outbound buses with the deceleration transition section 15m long and the acceleration one 20m long.

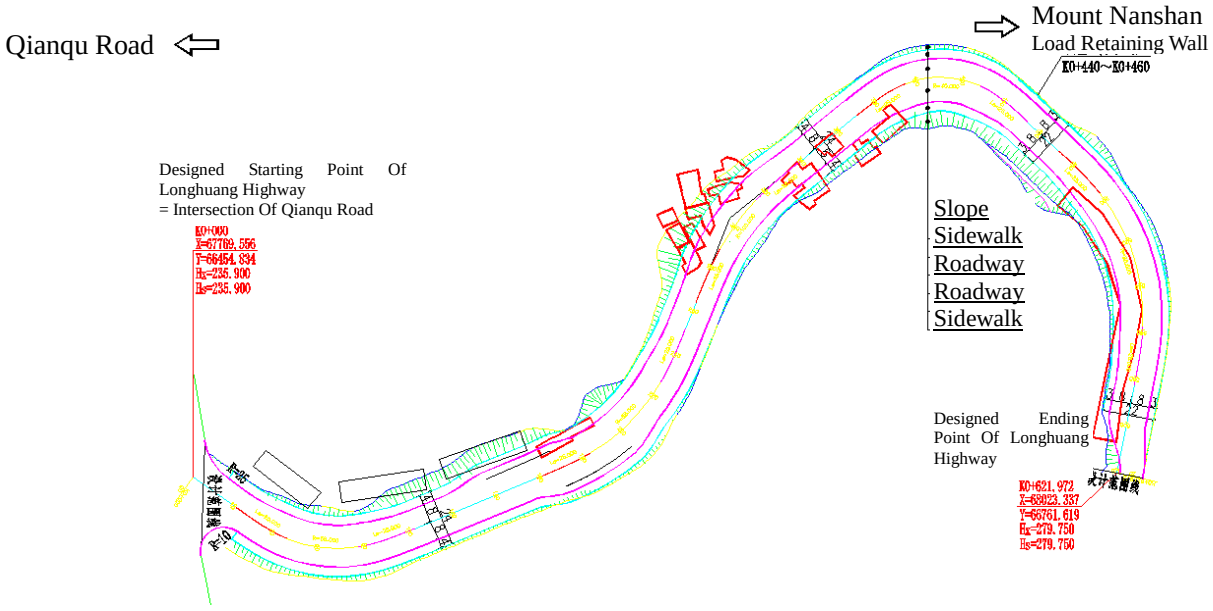


Figure 3.2-22 Layout plan

C. Roadbed design

General fill embankment: in the case of the embankment slope height H≤8.0m, the slope ratio takes 1:1.5; in the case of the slope height 8.0m<H≤20.0m, the slope ratio takes 1:1.5 within the upper 8.0m height range and 1:1.75 within the lower portion; and it is required to set a 2.0m-wide platform at the height of 8m.

Excavated embankment: in the case of the excavated slope height H≤12m, only set Class I slope.

Roadbed protection design: As for the section with the pile numbers of K0+440 to K0+460, the left fill road landform is steep at present without the slope space, so this section shall use the load retaining wall for slope protection.

D. Pavement design

This project pavement structure takes asphalt concrete with its important traffic level of heavy duty.

Longhuang Highway expansion asphalt concrete pavement has its design life of 10 years and the structure composition is as follows:

Upper surface layer: Asphalt mastic gravel SMA-13, 50mm thick

Tack coat: modified tack coat of emulsified asphalt (0.6kg/m^2)

Lower surface layer: Asphalt concrete AC-20C, 70mm thick

Slurry seal: modified slurry seal of emulsified asphalt, 7mm thick

Base: cement stabilized graded broken stone base, 200mm thick (with the cement content of 5.5%)

Sub-base: cement stabilized broken stone sub-base, 200mm thick (with the cement content of 4%)

The transverse slope of the vehicle lane pavement is 1.5% and the transverse slope at the base is similar to the surface layer.

② Hugui Road

A. Basic project conditions

Project name: Chongqing Hugui Road Project

Construction nature: new construction

Construction location: Chongqing Nan’an District

Total investment: CNY 28,017,800

Scale and class: Hugui Road Project has the total length of 1,403m, belong to Class II urban secondary trunk road with the design vehicle speed of 20 km/h～30km/h. The section from the starting point to Taichang Road takes three switch-back curves to overcome the height difference and it takes the design speed of 20km/h, while the section applies two-way two lanes with the pavement width of 8.0m and non-motor lanes and sidewalks are not set on both sides; and the section from Taichang Road to Danzishi New Street takes the design speed of 30km/h, wherein the roadbed takes two-way four lanes with the red line width of 32m and non-motor lanes and sidewalks are set on both sides.

Traffic volume prediction: for the predicted road traffic volume in the peak hour of the characteristic year see Table 3.2-3.

Table 3.2-3 Predicted two-way traffic volume per peak hour of predicted year for Hugui Road Project (pcu/h)

Year, vehicle type / Traffic volume	The 1st year			The 7th year			The 15th year		
	Large vehicle	Mid-size vehicle	Small vehicle	Large vehicle	Mid-size vehicle	Small vehicle	Large vehicle	Mid-size vehicle	Small vehicle
Average traffic volume per hour	21	63	442	25	75	524	34	102	716
Day traffic volume per hour	28	85	597	34	101	708	46	138	966
Day traffic volume in peak hour	43	128	896	51	152	1062	69	207	1449
Night traffic volume per hour	6	19	133	7	22	157	10	31	215
Night traffic volume in peak hour	9	28	199	11	34	236	15	46	322

Main technical standards: as shown in Table 3.2-4.

Table 3.2-4 Main technical standards

Project		Unit	Design value	Specified value
Road class			Urban secondary trunk road	Urban secondary trunk road
Design vehicle speed		Km/h	20, 30	20, 30, 40
Standard road width		m	9.5, 32	
Road length		m	1,403	
Design life (traffic volume saturation)		Year(s)	20	20
Design life (pavement structure)		Year(s)	15	15
Plane	Stopping sight distance	m	≥30m	≥30m
	The minimum radius of the round curve	m	20	20
	No ultrahigh minimum radius of round curve is set	m		
	Transition curve length	m	30	20
	Plane curve length	m	103	60
Longitudinal plane	Maximum longitudinal slope	%	8	8
	Minimum longitudinal slope	%	1	0.3
	Minimum slope length	m	60	60
	Limited minimum radius of vertical convex curve	m	1,000	150
	Limited minimum radius of vertical concave curve	m	1,100	150
	Limited minimum length of vertical curve	m	50	50
Vehicle load class		BZZ-100 type standard vehicle, crowd load: 3.5KN/m^2		
Seismic peak acceleration		0.05g		
Seismic fortification intensity		Basic seismic intensity is 6° (structure fortification of 7°)		

B. Vertical section design

The line in this plan has the maximum longitudinal slope of 7.950% and the slope length of 110m, located between Taichang Road and Yuhua Road; the section from the starting point to Taichang Road has the maximum longitudinal slope of 6.95% and the slope length of 630m. The

longitudinal slopes are located at the crossings between the line and the three planned roads, respectively with the ratio of 3.50%, 3.50% or 2.81%. This plan has the maximum height difference of 75.47m in the section and the continuous uphill section (K0+000 to K1+200) highlights the average longitudinal slope of 6.29%.

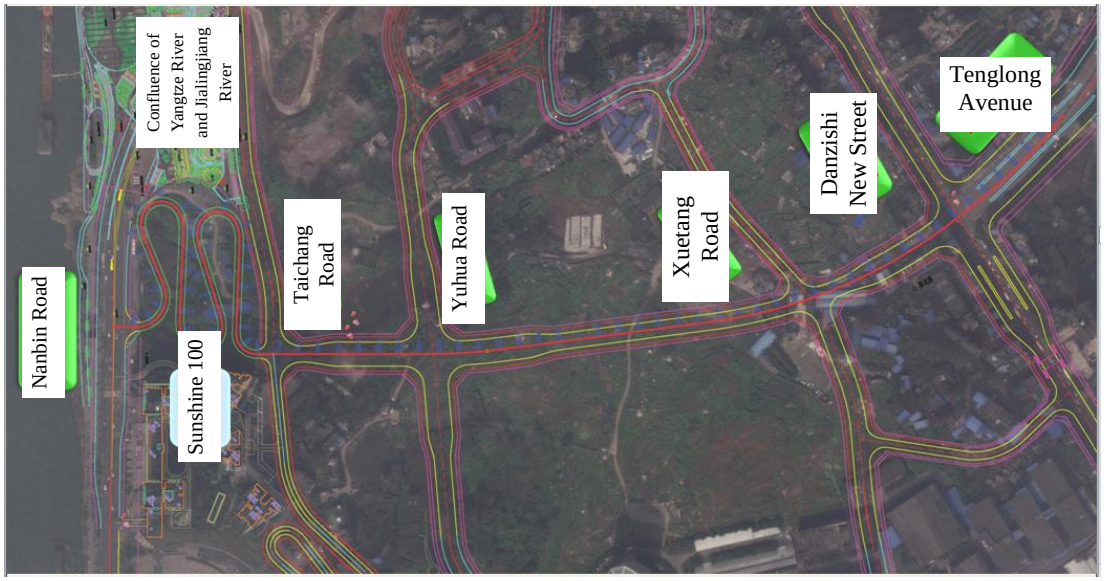


Figure 3.2-14 Hugui Road layout plan

C. Roadbed design

Fill roadbed: in the case that the fill slope of 8m or less, the slope ratio is 1:1.5. As the surface water outside the fill roadbed converges toward the roadbed, set temporary gutter at the slope toe.

Excavated roadbed: the excavation section rock slope ratio takes 0:0.75 and the soil slope ratio 1:1.5. In the case of the slope height >8m from the bottom to the top, set one platform per 8m high and reserve a 2m-wide platform between two Class II slopes.

D. Pavement design

Chaotianmen connection road pavement at the lower level uses asphalt concrete and the deck structure load is designed to BZZ-100 Type standard vehicle load. The vehicle lane structure layers are as follows:

Asphalt mastic gravel SMA-13, 4cm thick

Asphalt concrete AC-20C, 6cm thick

Slurry seal, 0.6cm thick

5.5% cement stabilized graded broken stone base 20cm

4% cement stabilized graded broken stone sub-base 25cm.

③ Tushan Branch Road

A. Basic project conditions

Project name: Tushan Branch Municipal Road Project

Construction nature: new construction

Construction location: Chongqing Nan’an District

Construction unit:

Total investment: CNY 38,427,600

Scale and class: Tushan Branch municipal road has its total length of 646.578m with its road

class of Class II urban secondary trunk road, while it is two-way four-lane highlighting the standard road width of 26.0m and the design vehicle speed of 40km/h.

Traffic volume prediction: the predicted road traffic volume in the peak hour of the specific year is shown in 3.2-5.

Table 3.2-5 Predicated two-way traffic volume in the peak hour of the predicted year (pcu/h)

Year, vehicle type / Traffic volume	The 1st year			The 7th year			The 15th year		
	Large vehicle	Mid-size vehicle	Small vehicle	Large vehicle	Mid-size vehicle	Small vehicle	Large vehicle	Mid-size vehicle	Small vehicle
Average traffic volume per hour	33	100	697	49	147	1030	73	218	1523
Day traffic volume per hour	45	134	941	66	199	1391	98	294	2056
Day traffic volume in peak hour	67	202	1411	99	298	2086	147	441	3084
Night traffic volume per hour	10	30	209	15	44	309	22	65	457
Night traffic volume in peak hour	15	45	314	22	66	464	33	98	685

Main technical standards: as shown in Table 3.2-6.

Table 3.2-6 Main technical standards

Road name		Tushan branch municipal road	
		Specified value	Design application
Design speed (km/h)		40	40
Road width (m)		/	26
Minimum plane curve radius (m)		70	195
Minimum length of transition curve (m)		35	40
Minimum radius of vertical curve (m)	Convex curve	400	1,350
	Concave curve	450	4,000
Maximum longitudinal slope (%)		7	4
Minimum longitudinal slope (%)		0.3	2
Minimum length of slope section (m)		110	140
Minimum length of vertical curve (m)		35	83.64
Stopping sight distance (m)		40	40
Design life (year)		15	15
Design life of asphalt concrete pavement (year)		10	10
Pavement design standard axle load		BZZ-100	BZZ-100
Design flood frequency			1/100
Bridge culvert and roadbed			Refer to Class I Road
Seismic fortification standard			The basic seismic intensity is 6°, and the important structures shall be protected to 7°.

B. Road engineering

The road starts from the crossing (K0+000) of Danzishi New Street and runs south-north successively connected with several transverse road systems such as the planned Branch I and the planned Branch II, and it ends to the south of Road 5 crossing (K0+646.578), with the total length

of approx. 647m.

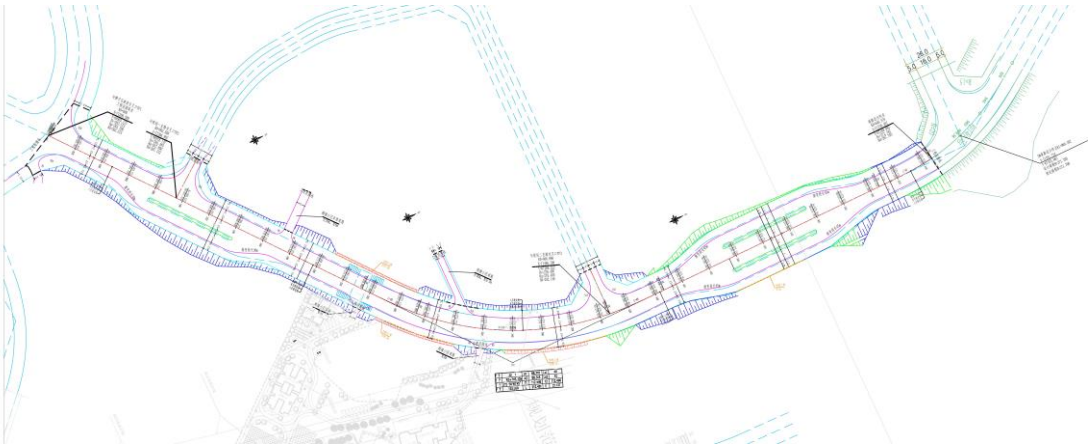


Figure 3.2-15 Tushan Branch Road plan view

C. Roadbed design

General fill embankment: in the case of the embankment slope height H≤8.0m, the slope ratio takes 1:1.5; in the case of the slope height 8.0m<H≤20.0m, the slope ratio takes 1:1.5 within the upper 8.0m height range and 1:1.75 within the lower portion; and it is required to set a 2.0m-wide platform at the height of 8m.

Excavated embankment: in the case of the excavated slope height H≤12m, only set Class I slope.

D. Pavement design

a. Driveway

Upper surface layer: 4cm	modified fine-grain asphalt concrete	SMA-13C
Lower surface layer: 6cm	medium-grain asphalt concrete	AC-20C
Slurry seal 0.6cm		
Base: 20cm	5.5% cement stabilized gravel	
Sub-based: 20cm	4.0% cement stabilized gravel	
Total thickness: 50.6cm		

b. Sidewalk

Upper surface layer: 6cm	prefabricated permeable brick
Lower surface layer: 3cm	M10 cement mortar
Base: 15cm	4% cement stabilized gravel
Cushion: 5cm	coarse sand cushion
Total thickness: 29cm	

3.3 Construction methods

3.3.1 Construction conditions

(1) Water, power and communication for construction

This project is located in the city proper, which has superior water and power conditions for construction; and the construction water is the municipal network water supply. The power in the construction area is directly supplied by the local power grid, while communication takes the mode of radio communication.

(2) Building materials

The building materials in the vicinity shall suffice for the project with bricks, tiles, rock, gravel, lime, cement etc. all purchased externally and the transportation conditions shall be good.

(3) Labor resource condition

Chongqing belongs to the western region and boasts rich human resource, so as for this project the labor resource required can be easily gotten.

(4) Construction machinery

The main construction machinery in this project contains auto truck, vibrator, hoist, bulldozer, agitator etc. provided by the construction units or leased in the vicinity.

3.3.2 Construction process

In accordance with the foregoing introduction, this sub-project includes 4 aspects in total, wherein the construction content related to civil engineering or possibly producing environmental effects covers infrastructure, pavement transformation and road construction such as water supply and sewage pipe under "old community regeneration", "public space regeneration" and "slow-walking system regeneration". It mainly includes the construction processes such as rock-earth excavation, connection road (vehicle lane) construction, footpath and site pavement, pipe laying, sub-district facility installation and greening.

(1) Rock-earth excavation process

The project will involve earth-rock excavation during the construction of connection roads and pipes, with the construction process as follows: mark off the excavation line and excavation slope → excavate graded slope → trim the slope surface → temporary protection → completion.

(2) Road engineering construction process

The basic procedure of the road engineering construction mainly includes: roadbed excavation → roadbed leveling → road bedding cushion → road base → road deck → construction completion.

(3) Construction process of footpath and site pavement

The construction process of footpath and site pavement is as follows: mark off the excavation line → earth excavation →lay down cushion → lay down pavement material → check pavement → site clearance → construction completion.

(4) Construction process of laying pipes

The construction process of laying pipes is as follows: mark off the excavation line →pipe trench excavation → pipe base construction → pipe water test → pipe trench backfill and ground recovery → completion.

(5) Greening landscape construction process

The construction process of greening landscape is as follows: mark off the greening area → level earth covering →excavate pits → transplant arbors → transplant bush or sow the grass seeds → temporary covering → complete construction.

3.3.3 Construction layout

This project takes the simple construction process and the construction sites are respectively set within the project scope of temporary land occupied according to the sub-project layout except for the connection road project, while its occupied land covers the total area of approx. 3.0 hm^2; during the connection road project construction, material storage, temporary machinery parking etc. are directly arranged within the land requisition red line, while its area can meet the construction site arrangement requirements. Asphalt concrete required for the project shall use the commercial concrete purchased externally and no construction site such as independent mixing station is set in this project.

As the project is located in the city proper center, the construction staff can rent the citizens' housings in the downtown and it is unnecessary to independently set the living camp; and if there is no peripheral area for lease of citizens' housings, the construction staff can erect the temporary living houses near the line by use of colored steel.

3.3.4 Project implementation plan

The construction content of this project has many types and large amount, and during the specific implementation it statistically arrange all specialty types in addition to each monomer construction project; meanwhile, in accordance with the preliminary preparation of the project implementation unit and the requirements of overall project protection, development etc, it shall reasonably identify the kick-off and completion time in combination of the engineering implementation conditions and nature and get linked up in the preliminary preparation and tender stages to arrange the reasonable construction time sequence and orderly carry forward the overall construction; in addition, the overall construction cycle plan starts from 2018 and it is predicted to be completed in 2021, with the duration of 4 years in total. See Table 3.3-1 for detailed implementation schedule and arrangement.

Table 3.3-1 Project implementation schedule plan

Project name	Project name		Engineering construction		Completion acceptance	
	Sub-district name	Community name	Kick-off time	Completion time	Kick-off time	Completion time
Old community regeneration	Nanping sub-district	Dongxing Road Community	August 1, 2018	January 10, 2019	January 10, 2019	January 20, 2019
		Jinzi Street Community	January 20, 2019	August 20, 2020	August 21, 2020	August 30, 2020
		Yangguang Community	October 1, 2018	May 31, 2019	May 31, 2019	June 15, 2019
		Xiangshui Community	September 1, 2019	September 1, 2020	September 1, 2020	September 10, 2020
	Huayuan Road Sub-district	Jinshan Road Community	September 1, 2018	September 1, 2019	September 1, 2019	September 15, 2019
		Jinyan Community	April 1, 2019	October 1, 2020	October 1, 2020	October 10, 2020
		Gulouwan	August 1, 2018	March 1, 2019	March 1, 2019	March 10, 2019
		South Lake Community	April 20, 2020	October 20, 2020	October 20, 2020	October 30, 2020
	Nanshan Sub-district	Huangjueya Community	October 20, 2019	December 1, 2020	December 1, 2020	December 15, 2020
		Nanshan Community	October 20, 2019	December 1, 2020	December 1, 2020	December 15, 2020
Public space regeneration	Existing park regeneration		July 30, 2018	December 30, 2018	January 1, 2019	January 15, 2019
	Existing plaza regeneration		January 1, 2020	July 1, 2020	July 1, 2020	July 10, 2020
	Dilapidated space utilization		May 1, 2019	December 1, 2019	December 1, 2019	December 10, 2019
Slow-walking system regeneration	Nanbin Road slow-walking system		May 1, 2019	January 1, 2020	January 1, 2020	January 10, 2020
	Nan’an District overall space		July 1, 2020	February 1, 2021	February 1, 2021	February 10, 2021
	Key regeneration area		May 1, 2019	October 1, 2019	October 1, 2019	October 10, 2019
	Auxiliary roads	Chaotianmen lower connection road, Hugui Road and Tushan Branch Road	January 10, 2019	March 10, 2020	March 20, 2020	March 31, 2020
		Longhuang Highway expansion and reconstruction	July 20, 2019	March 10, 2021	March 20, 2021	March 31, 2021
	Hiking footpath	Cimu Mountain Footpath, Qingxiang Pavilion Footpath and Zhiyuefeng Footpath	April 10, 2018	July 10, 2018	July 10, 2018	July 20, 2018
		Chuntianling Footpath, Longjing Footpath, Longji Mountain Footpath, Bai'er Mountain Footpath	October 1, 2018	May 1, 2019	May 1, 2019	May 10, 2019
		Other footpaths	June 1, 2019	November 1, 2020	November 1, 2020	November 10, 2020

Project name	Project name		Engineering construction		Completion acceptance	
	Sub-district name	Community name	Kick-off time	Completion time	Kick-off time	Completion time
	Chongwen Road transformation project		July 15, 2018	January 10, 2019	January 10, 2019	January 20, 2019
	Nanshan Mountain Cycling Loop		October 10, 2018	February 10, 2019	February 10, 2019	February 20, 2019

3.4 Project land occupied and earthwork

(1) Quantity of project land occupied

The additional land occupied of this project is the urban connection road with the total land occupied of 404.76hm^2 in the construction scope, and the occupied land types are mainly arid land, other forestry, other meadow, urban residential land, rural housing foundation, road land, fallow land etc.

(2) Earthwork volume

Based on the project feasibility study and the relevant design documents, the excavation cubage in the construction range is approx. 306,100m^3, the landfill about 39,400m^3, the surface clearing approx. 20,400m^3, the existing pavement removal 9,900m^3 and earth spoil 280,100m^3 delivered to the legal spoil area in the vicinity.

Table 3.4-1 General earthwork and rockwork quantity balance (Natural Square)

Unit: 10,000 m^3

Road	Length (m)	Excavation	Landfill	Surface clearing	Existing pavement removal	Earthwork spoil	Destination
Longhuang Highway	622.0	3.64	0.48	0.32	0.99	3.15	Municipal spoil area
Lower connection road under Chaotianmen Bridge	775.5	5.69	0.14	0	0	5.55	Municipal spoil area
Hugui Road	1,403.0	12.5	2.32	1.35	0	11.53	Municipal spoil area
Tushan Branch Road	646.6	8.78	1.00	0.37	0	7.78	Municipal spoil area
Total	/	30.61	3.94	2.04	0.99	28.01	/

Spoil is directly delivered to the legal spoil area in the vicinity (such as Nan'an District Yinglong Spoil Area, Nan'an District Changsheng Garbage Landfill Area isolation-use greenbelt land reclamation and spoil disposal area, Yubei District Shaping Spoil Area).

Nan'an District Changsheng Garbage Landfill Area isolation-use greenbelt land reclamation and spoil disposal area is located at Chayuanshe, Chayuan Xincheng, Nan'an District, which is in the charge of Chongqing Lvzhuang Garden Engineering Co., Ltd., with the total volume of 10 million m^3 and the existing capability of 6 million m^3.

Shaping Spoil Area is located at Shaping exit, Baotou-Maoming Expressway, Shaping Town, Yubei District and the spoil produced north of Jialing River for this project is delivered to this spoil disposal area with the current capability of 2 million m^3.

Yinglong Spoil Area is located in Yinglong Town, Nan'an District, with the current capability

of 1.2 million m^3 and it can satisfy the spoil demand of this project.

3.5 Environmental factors and pollution source intensity analysis

3.5.1 Construction-phase analysis on environmental pollution factors

(1) Water environment

The main sewage during construction mainly contains construction wastewater and domestic sewage of construction staff.

① Construction wastewater

The concrete applied in this project is commercial concrete and no large concrete mixer is set in the construction site, and the construction wastewater mainly includes concrete curing wastewater, wastewater from washing the transportation vehicle tires, and oily wastewater produced from construction machinery repair. The main pollutants are SS and petroleum with the SS concentration of approx. 1,500 to 20,000mg/L and the petroleum concentration of approx. 20 to 50mg/L. Meanwhile, as construction leads to topsoil looseness in the construction area, it is prone to suffer rainfall scouring resulting in SS concentration increase in the surface runoff.

② Construction staff domestic sewage

In accordance with the project construction, about 30 works carry out construction in the site every day and their domestic sewage discharge is calculated under the formula:

$$Q_s=（kq_1v_1）/1000$$

Wherein:

Q_s - living district sewage discharge in t/d;

q_1 - daily domestic sewage quota per person (select and use Table C2, Appendix C, JTJ005-96) in L/(person·d) and this figure takes 100 for this assessment;

v_1 - the number of people in the site, in person;

K - The discharge coefficient in the life and service district, it generally ranges from 0.6 to 0.9 and this figure takes 0.8 for this assessment.

Through calculation, the domestic sewage output is approx. 2.4m^3/d during the project construction. The main pollutants in the domestic sewage are COD, BOD_5, SS and NH_3-N respectively with their concentrations of approx. 300mg/L, 180mg/L, 250mg/L and 30mg/L, and the corresponding pollutant outputs are 0.72kg/d, 0.43kg/d, 0.60kg/d and 0.07kg/d.

(2) Ambient air

The project during the construction involves pavement color change from white to black and new road construction, while the pavement takes asphalt and the main pollutants affecting environmental air are TSP and asphalt fume in the construction process. The main pollution steps involve the work process of asphalt pavement, material transportation and pile-up, earthwork

excavation and backfill etc. and each step mentioned above will produce TSP and asphalt fume pollution to the construction sites and the surroundings under the wind force. In addition, the transportation vehicle travel will produce the secondary dust pollution on the road and the domestic fuel combustion may generate fume.

①Asphalt fume

The project pavement construction takes modified asphalt concrete and there is no asphalt melting station in the site, but only slight asphalt fume is discharged in the spreading process.

② Dust

The dust during construction mainly comes from earthwork or rockwork excavation, construction activity disturbance, and loading, unloading and vehicle transportation of construction materials in bulk such as cement, sand and gravel. The dust source intensity from construction section and running vehicles is related to construction strength, pavement status and weather conditions. Dust concentration gradually decreases with the distance increase.

③ Construction machinery off-gas

Various fuel construction machines and transportation vehicles emit slight off-gas during the construction and transportation, with the main pollutants of CO and NO_2.

④ Analysis on effects of domestic fuel fume

The domestic fuel will produce slight fume and this project takes liquefied gas as energy, while the liquefied gas belongs to clean energy and the fume produced from combustion has limited effects on environmental air.

(3) Noise and vibration

During the road construction, the work machinery has many types, for example there is a drilling machine for foundation treatment; the roadbed filling uses bulldozer, road roller, loader, land leveler etc; and there are carry scraper, land leveler, road roller, asphalt concrete spreading machine, etc. for pavement construction. Such sudden instable noise sources may produce big effects on the surroundings to perturb the residents' normal life. See Table 3.5-1 for the main noise source noise values.

Table 3.5-1 Main construction machinery noise source intensity

SN	Device name	Distance from test point to construction machine	Maximum sound level (dB (A))	Running mode
1	Loader	5	90	Mobile device
2	Bulldozer	5	86	Mobile device
3	Excavator	5	84	Mobile device
4	Concrete tank car	5	85	Mobile device
5	Motorlorry	5	85	Mobile device
6	Vibrating roller	5	86	Mobile device

SN	Device name	Distance from test point to construction machine	Maximum sound level (dB (A))	Running mode
7	Tire roller	5	76	Mobile device
8	Spreading machine	5	82	Mobile device
9	Impact type driller	1	87	Mobile device
10	Air compressor	1	85	Mobile device
11	Diesel generator	1	98	Mobile device

(4) Solid waste

The solid waste during the construction mainly contains spoil, building waste and domestic garbage.

This project has the total excavation cubage of 306,100m^3 (of which there are topsoil of 20,400 m^3 and others of 285,700 m^3), the landfill of 39,400 m^3, the existing pavement removal of 9,900 m^3 and the earthwork spoil of 280,100 m^3 without the debit side.

The domestic garbage output of construction staff is 15kg/d providing the domestic garbage produced during construction is calculated to 0.5kg/person •d.

(5) Ecological environment

This construction project highlights effects on the ecological environment. The effects of this project on ecological environment during construction are embodied in the following aspects:

① Construction land requisitioned and occupied may damage the existing plant resource and vegetation around the project line and further change the existing land utilization nature;

② Excavation, landfill and temporary spoil during construction will lead to water loss and soil erosion;

③ Construction will produce effects on each sensitive zone.

3.5.2 Environmental pollution factor analysis in the operational phase

The public space during the project operational phase may produce slight domestic sewage, solid waste and social life noise and the road may generate traffic noise and vehicle off-gas.

(1) Waste water

The operational phase wastewater mainly comes from the domestic sewage produced by urban residents in the public space. The public space improvement project includes 7 parks and plazas and produces the sewage of 1.4m^3/d in total providing the average sewage output per public space is 200L/d for calculation.

(2) Exhaust gas

① Vehicle off-gas

The pollutants in the vehicle exhaust mainly come from crankcase gas leakage, fuel system

volatilization and exhaust pipe discharge, where the most hydrocarbons and nearly all NOx and CO come from the exhaust pipes. CO is the product from incomplete fuel combustion in the engine; NOx is the product shaped by oxygen and nitrogen of the excessive air in the air cylinder under the high temperature and high pressure; and hydrocarbons come from incomplete combustion of gasoline. As the road traffic volume goes up, the main pollutants of CO, NOx and TSP in the vehicle exhaust will pollute the air environment along the line. Based on the survey, vehicle off-gas has the limited range of effects on sensitive points along the road and the greening and protective forest belt is constructed and recovered to reduce the effects of vehicle off-gas on such points.

As for the vehicle off-gas discharge features, this environment assessment selects NO2 for prediction and evaluation. The assessment takes the mode recommended in the *Specifications for Environment Impact Assessment of Highway (on trial)* (JTJ005-96) to predict the atmospheric pollutant discharge intensity and the specific mode is as follows:

$$Q_j = \sum_{i=1}^{3} A_i \times E_{i,j} \times 3600^{-1}$$

Wherein:

Q_j – Category j gaseous contaminant source discharge intensity (mg/s·m);

A_i – hourly traffic volume of Type i vehicles for the predicted year (set/h);

$E_{i,j}$ – Category j effluent discharge intensity of Type I vehicles for the predicted year (g/set·km).

As China has implement the overall (Euro 2) emission standard for 2004-2006 and the limits under Chinese vehicle pollutant discharge standard becomes stricter day by day, the single vehicle emission factor greatly goes down and at present the standards such as *Limits and Measurement Methods for Emissions from Light-Duty Vehicles (China Stages III and IV)* (GB 18352.3-2005), *Limits and Measurement Methods for Exhaust Pollutants from Gasoline Engines of Heavy-Duty Vehicles (China Stages III and IV)* (GB 14762-2008) and *Limits and Measurement Methods for Emissions from Light-Duty Vehicles* (China Stage V) (GB 18352.5-2013) have been successively implemented.

In 2018, the motor vehicle exhaust pollutants are calculated under Stage III emission limits of *Limits and Measurement Methods for Emissions from Light-Duty Vehicles (China Stages III and IV)* (GB 18352.3-2005) and *Limits and Measurement Methods for Exhaust Pollutants from Gasoline Engines of Heavy-Duty Vehicles (China Stages III and IV)* (GB 14762-2008); in 2024, such pollutants will be calculated in accordance with *Limits and Measurement Methods for Emissions from Light-Duty Vehicles (China Stages III and IV)* (GB 18352.3-2005) Stage IV and *Limits and Measurement Methods for Exhaust Pollutants from Gasoline Engines of Heavy-Duty Vehicles (China Stages III and IV)* (GB 14762-2008) Stage IV emission limits; and in 2032 these

pollutants will be calculated according to *Limits and Measurement Methods for Emissions from Light-Duty Vehicles (China Stage V)* (GB 18352.5-2013) Stage V and *Limits and Measurement Methods for Exhaust Pollutants from Gasoline Engines of Heavy-Duty Vehicles (China Stages III and IV)* (GB 14762-2008) Stage IV emission limits.

Based on the relevant vehicle emission limits, this environmental assessment takes the single vehicle emission coefficient as shown in Table 3.5-2.

Table 3.5-2 Statistics of pollutant output per road (unit: mg/m·s)

Vehicle type	Near term	Medium term	Long term
Small vehicle	0.33	0.18	0.12
Mid-size vehicle	0.42	0.22	0.16
Large vehicle	4.80	3.43	3.43

② Dust

The tires of the vehicles running on the road may produce dust due to pavement contact and further result in dust pollution exerting certain effects on the environment air around the line. It is possible to recover the vegetation along the road and enhance routine road maintenance and management for dust reduction.

As the dusty materials in bulk are transported, it also produces dust pollution due to scattering and squall etc. It is required to reduce dust and material loss by covered transportation of the vehicles carrying the bulk materials.

(3) Noise

The noise pollution sources during the operational phase are mainly the social life noise from the public space and the road traffic noise. The social life noise source has its intensity of approx. 70-80dB(A) and generally satisfies the corresponding functional zone requirements of acoustic environment, leading to the slight effects on the circumstances; moreover, this assessment especially analyzes the effects of road traffic noise on the sensitive points along the line. Various motor vehicles may produce traffic noise in the running process, including noise from engine, emission, vehicle body vibration, transmission and braking etc, and such vehicles are instable sources. In reference of the *Road Construction Project Environmental Impact Assessment Specifications*, the relation between Noise Equivalent A Sound Level and the vehicle speed as well as the calculation results are shown in the following table when various motor vehicles run.

Table 3.5-3 Noise source intensity of each type vehicle at a certain average speed (unit: dB (A))

Vehicle type	Source intensity calculation formula
Small vehicle	L_{OS} =12.6+34.73lgV_S
Mid-size vehicle	L_{OM} =8.8+40.48lgV_M
Large vehicle	L_{OL} =22.0+36.32lgV_L

Notes: sound source height: 1.0m for large and medium-size vehicles, 0.6m for small vehicles, 7.5m from the sound source. Where: S, M and L noted at the low right corner – respectively indicate small, medium and large vehicle; Vi – the average running speed of a certain type vehicle, in km/h.

The vehicle speed is calculated in reference of the following formula:

$$v_i = \left[k_1 \cdot u_i + k_2 + \frac{1}{k_3 \cdot u_i + k_4} \right] \times \frac{V}{120}$$

$$u_i = N_{\text{single-lane hour}} \left[\eta_i + m \cdot (1 - \eta_i) \right]$$

Wherein: v_i - predicted speed of Type I vehicle

k_1, k_2, k_3 and k_4 - regression coefficients;

u_i - equivalent quantity of the certain type vehicles;

$N_{\text{single-lane hour}}$ - vehicle flow rate per hour of the single lane;

η_i - the vehicle type ratio;

m - weighing coefficient of other vehicle type;

v - design vehicle speed.

Table 3.5-4 Common coefficient values at the predicted vehicle speeds

Vehicle type	k1	k2	k3	k4	m
Small vehicle	-0.061748	149.65	-0.000023696	-0.02099	1.2102
Mid-size vehicle	-0.057537	149.38	-0.000016390	-0.01245	0.8044
Large vehicle	-0.051900	149.39	-0.000014202	-0.01254	0.70957

The design vehicle speed is 20 to 40km/h for the road to be constructed and it is possible to calculate and get the single-set average radiant sound level per small, medium or large vehicle during the operational phase in accordance with the foregoing formula, see Table 3.5-4.

Table 3.5-5 Single-set noise source intensity per vehicle type during the operational phase

Road section	Time	Near term			Medium term			Long term		
		Large vehicle	Medium vehicle	Small vehicle	Large vehicle	Medium vehicle	Small vehicle	Large vehicle	Medium vehicle	Small vehicle
Longhuang Highway	Daytime	33.3	31.0	34.8	34.9	32.6	36.3	37.6	35.3	39.0
	Nighttime	29.8	27.5	31.3	31.4	29.1	32.9	34.1	31.8	35.6
Hugui Road	Daytime	47.4	45.1	48.9	48.1	45.8	49.6	53.3	51.0	54.8
	Nighttime	40.8	38.6	42.3	41.6	39.3	43.1	46.8	44.5	48.2
Tushan Branch Road	Daytime	49.3	47.1	50.8	49.3	47.1	50.8	52.7	50.5	54.2
	Nighttime	42.8	40.5	44.3	42.8	40.5	44.3	46.2	43.9	47.7

(4) Solid waste

The solid waste during the operational phase mainly comes from the domestic garbage produced by the urban residents in the public space. The public space quality improvement project includes 7 parks and plazas, while it produces the total domestic garbage of 0.28t/d providing the average domestic garbage produced per public space is 40kg/d.

4 Natural and social environment overview

4.1 Natural environment overview

4.1.1 Geographical location

Nan'an District is situated in the main urban area of Chongqing and on the southern bank of the Yangtze River. Covering an area of 265 square kilometers and located between 106°3'14'' to 106°47'2'' east longitude and 29°27'2'' to 29°37'2'' north latitude, it is bordered by the Yangtze River to the west and north and separated with Jiulongpo District, Yuzhong District, Jiangbei District and Yubei District by the Yangtze River and adjacent to Ba'nan District to the east and south.

4.1.2 Landform

Nan'an District is located in the paralleled ridge-valley of East Sichuan where anticlines and synclines are distributed in parallel. From east to west, there is the Mingyuexia anticline, the Guangfusi syncline, and the Tongluoxia anticline. The anticline develops into mountains and the syncline into valleys. Therefore the combined geomorphic features of low mountains, hills, flat lands and rivers are formed here. Low mountains with an average elevation above 500m are mainly distributed in Nanshan Sub-district and Guangyang Town. Hills with an average elevation between 200m to 500m are mainly distributed in 7 towns, Nanping, Tushan, Jiguanshi, Xiakou, Changshengqiao, Yinglong and Guangyang and 7 sub-districts along the river. Flat lands are generally small in area and scattered in distribution, among which the Guangyangba Garden Spot and Tongyuanju, etc. have a comparatively large area.

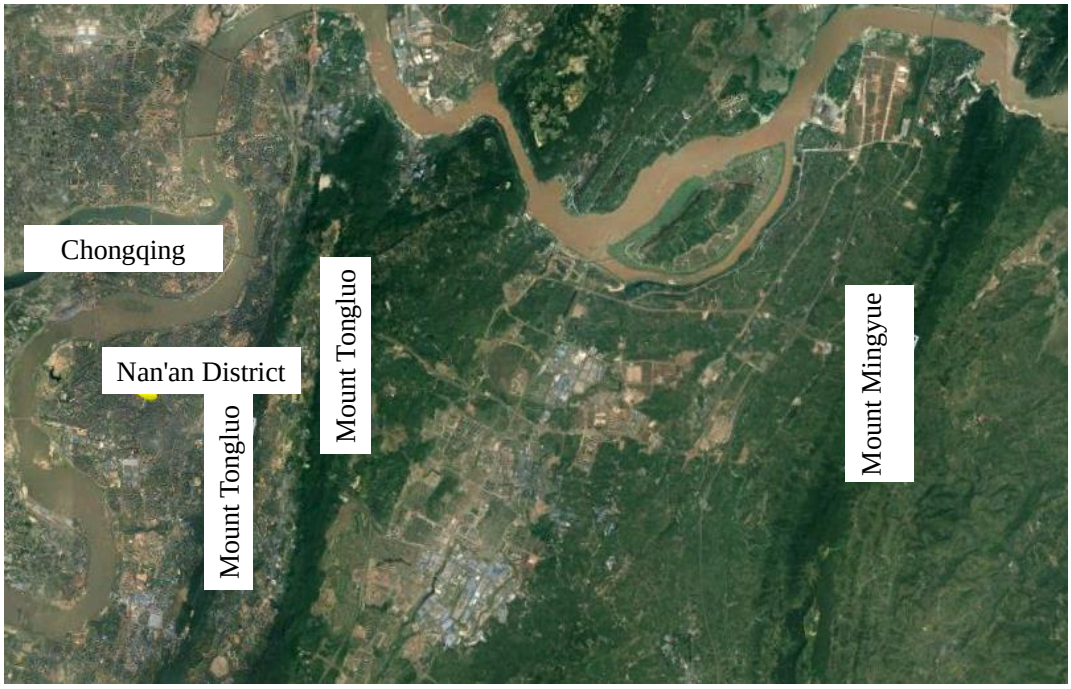


Figure 4.1-1 Nan'an District topographic map

4.1.3 Formation lithology

From top to bottom, the exposed strata in the area are the Q4ml and the J2s sandstone and sandy mudstone in underlying bedrock. The rock layers exposed in the survey area are composed of sandstones - mudstones with different thicknesses of positive sedimentary rhythm layers. They are mainly yellow-gray and gray fine-grained arkoses of medium-thick and thick layer, and purple-red and dark-purple sandy mudstones. The exposed strata are the Q4ml and the J2s sedimentary layer from top to bottom.

4.1.4 Seism

According the *Seismic Intensity Zoning Map of China* (1999), the *Seismic Ground Motion Parameters Zonation Map of China* and the *Research Report on Seismology of Chongqing and Its Adjacent Regions*, the seismic basic intensity is less than magnitude 6 with the peak ground acceleration of 0.05g and the characteristic period of 0.25s.

4.1.5 Climate and weather

Nan'an District is located in the Yangtze River Valley in the southern Sichuan Basin with the subtropical monsoon climate. It is rich in heat and rainfall and has a long frost-free period with less ice and snow, wind and sunshine, but of high humidity due to its cloudy and foggy weather. Spring always arrives early here, summer lasts for a long period, autumn passes quickly and winter is comparatively warm, which are quite distinctive. With an accumulative annual mean temperature of 18.3℃, it reaches the monthly maximum mean temperature in August with 28.1℃ and monthly minimum mean temperature in January with 5.7℃. It has a daily maximum temperature of 43.0℃ and a daily minimum temperature of -1.8℃. With an accumulative annual mean precipitation of 1,082.6mm or so, its heavy rainfall mainly comes from May to September when the maximum precipitation can reach about 746.1mm. Its accumulative daily maximum mean precipitation is 92.9mm, and about 62% of its annual raining days have a daily precipitation more than 25mm. Its hourly maximum precipitation can reach 62.1mm.

4.1.6 Hydrology

Surface water resources are mainly the transit water brought by rivers and streams. The accumulative annual average amount of transit water is 344.75 billion m^3, of which the transit water of the Yangtze River accounts for most of it, and three small rivers with annual water amount of 40.48 million m^3 contribute less than the Yangtze River but more than other surface runoff waters in the area. The groundwater resources are 8.393 million m^3, of which the area from Jiguanshi to Wenfeng on the Nanquan Anticline contains the most abundant resource of 5.168 million m^3, which is a key area for the mining of underground water in the district. Five existing spots for the mining of underground water are: Jiguanshi, Qingshui Stream in Huangjueya, Mount Tushan, Mount Huangshan and Changshengqiao, all of which are metasilicic acid natural mineral water for drinking. Three spots for the mining of geothermal water are: Mount Cimu in Jiguanshi with a single-well discharge of 1,000t in 40 degrees per day; Jiazhugou in Tongluoxia, Nanshan Sub-district (original Nanshan Town) with a single-well discharge of 4,000t in 42 degrees per day.

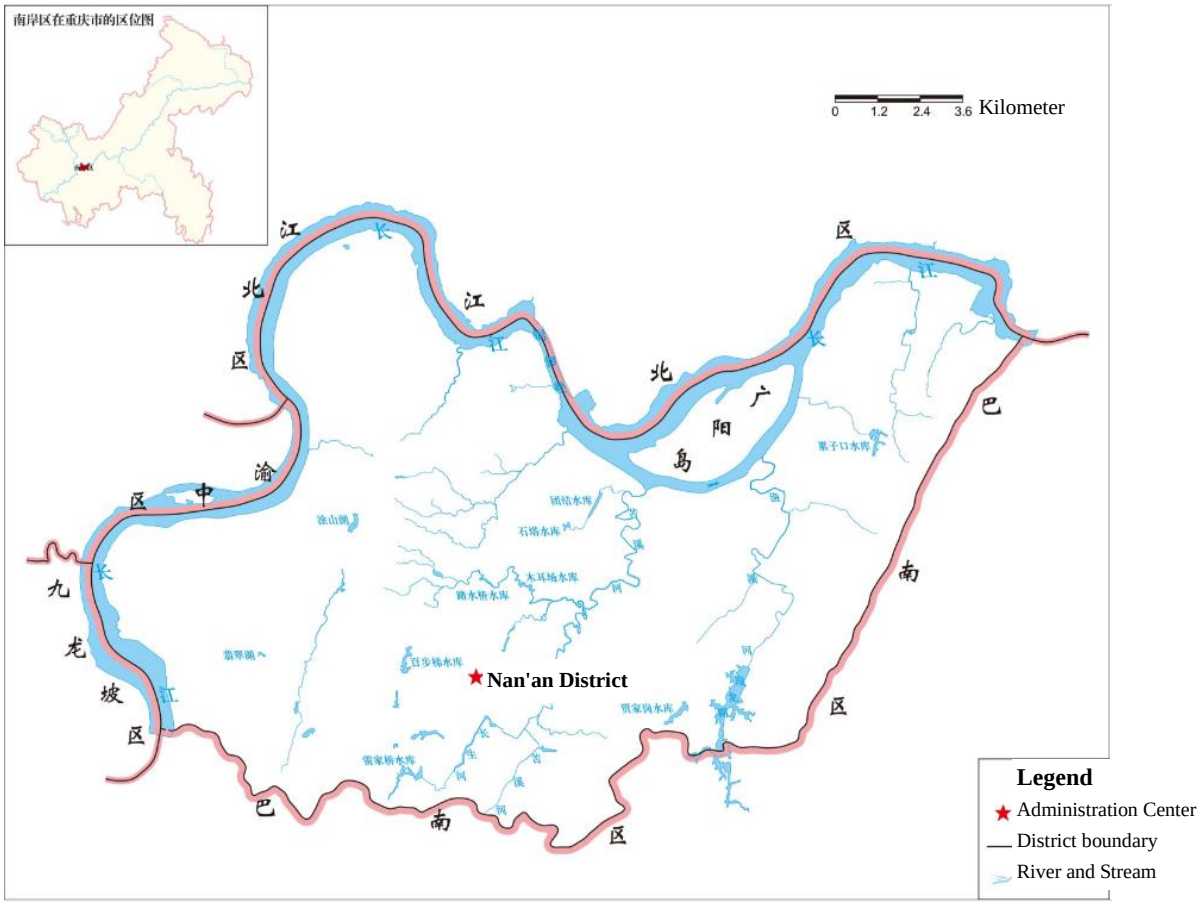


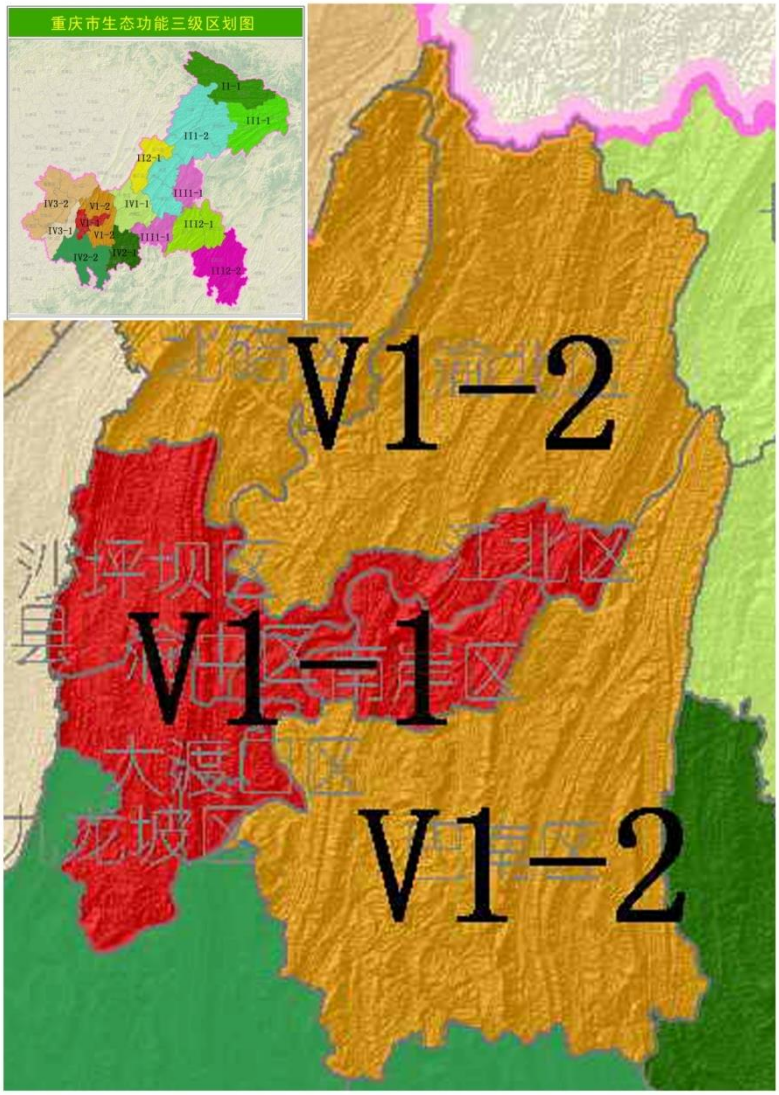
Figure 4.1-2 Nan'an District surface water system

4.2 Ecological environment overview

4.2.1 Ecological function zoning

According to the *Chongqing Ecological Function Zoning*, Nan'an District is classified as the IV Urban artificial regulation ecological zone - IV1 City ecological regulation sub-zone in urban area - IV1-1 Ecological function zone of core urban ecological restoration. IV1-1 Ecological function zone of core urban ecological restoration covers mainly the core urban built-up area whose primary function is ecological restoration.

This ecological function zone consists of Yuzhong District, Dadukou District, Jiangbei District, Shapingba District, Jiulongpo District and Nan'an District, covering an area of 1,440.68km^2. Its major function is the coexistence of urban artificial ecosystem and agricultural ecosystem. The landscape is dominated by hills and plains. The forest coverage rate is 28.2%. Many rivers such as the Yangtze River and the Jialing River flow through this area, and the quantity of accumulative annual average surface water resource is 742 million m^3. The towns, industrial and mining sites in the area are densely distributed, while the forest coverage rate is relatively low, and the ecosystem is seriously affected by human activities. The focus of ecological protection in this area is the forest and green space resources of "Four Mountains" (Mount Jinyun, Mount Zhongliang, Mount Tongluo and Mount Mingyue) area.



4.2.-1 Three-level zoning of ecological function area

The dominant ecological function is ecological restoration. The auxiliary functions include water and air pollution control, landscaping and urban ecological protection. The leading direction of ecological function protection and construction is ecological restoration, pollution control and prevention, and landscaping.

The key task is to improve the industrial structure and repair the partial pollution damage first, and then exercise a strict control over the discharge of industrial and domestic wastewater. Comprehensive treatment should be implemented on abandoned mining areas to restore the ecological function of these areas. Strict ecological environment protection should be carried out in “Four Mountains” area. Circular economy and ecological industries should be strongly encouraged. The protection of natural resources should be improved. The stringent protection of forest and green space resources in the “Four Mountains” area should be carried out in combination with the forest city project; the stringent protection of the core areas of nature

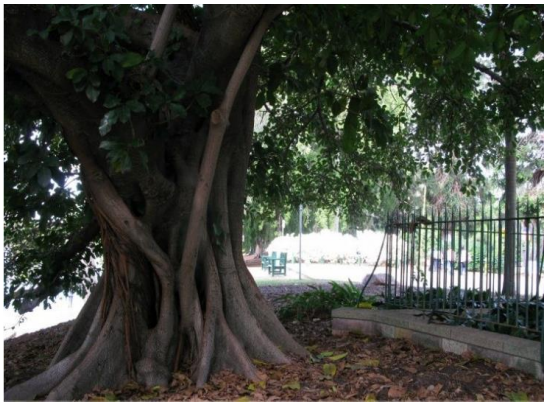
reserves, scenic spots and forest parks of all levels also is requisite; crucial water areas such as the Yangtze River and the Jialing River in the district must be protected with maximum effort.

4.2.2 The status quo of terrestrial plant resource

The zonal vegetation in the project area is subtropical evergreen broad-leaved forest. Due to long-term human activities, the zonal vegetation in the project construction area is degraded. The existing vegetation mainly consists of artificially planted trees, secondary shrubs, and natural weeds. Rare plants and ancient trees are not seen.

The evergreen broad-leaf forests are general distributed in front and in back of residential housing, around the gentle slope and dry land, etc., most of which consist of artificially planted trees, including schima superba, erythrina indica, sinocalamus affinis, ficus virens, ficus microcarpa, cinnamomum camphora (artificial planted), koelreuteria paniculata, paper mulberry, melia azedarach, cedrela sinensis, etc.; the economic fruit forests are scattered. The nursery stocks are mainly ficus microcarpa, osmanthus fragrans, etc.. Some fruit trees are planted in small areas and others are scattered, mainly including citrus fruit trees, pears and loquats; shrubs are around wastelands, vicinity of slopes and roadsides, of which the dominant species are witex negundo, sambucus thunbergiana, sagebrush, scandent hop, cogongrass and pueraria lobata; crop vegetation mainly consists of corn, soybean and sweet potato.

Ficus virens



Ficus microcarpa

Nanshan Botanical Park **Nanshan Single Tree Observation Tower**

4.2.3 The status quo of terrestrial animal resource

The assessment area is mainly located in the built-up area and planning area of the main urban district, where surrounded by many construction activities and human production activities. Due to the influence of human activities, few amphibians, reptiles, mammals and other wild animals choose to inhabit in the area, and no national key protected wild animals, including amphibians, reptiles, mammals, etc. or their inhabits are discovered within 200m of the project area during the investigation.

(1) Amphibian

Along the project area there are the Yangtze River and its river banks, creeks, shrubs, artificial forest lands, and some parts of farmland and fish pond. According to records and judging from the inhabit, there are mainly 2 amphibian species that may inhabit in the assessment area, which are bufo gargarizans and hylarana guentheriare of family Bufonidae, and both of them are anura. Among them, bufo gargarizans widely inhabits in the assessment area, and other three species mainly inhabit in water areas and near-water environments such as farmland, mudflat and creek.

(2) Reptile

Zaocys dhumnade of family Colubridae, gekko subpalmatus of family Gekkonidae, and sphenomorphus indicus and plestiodon chinensis of family Scincidae inhabit in the assessment area.

Zaocys dhumnade usually inhabits in the roadside and grass near the water; sphenomorphus indicus and plestiodon chinensis of family Scincidae are common species in Chongqing, mainly inhabiting in the dank grass, rocks and cracked stonewalls of low altitude regions, plains and mountains; species of family Gekkonidae generally inhabit in the cracks of buildings and rocks, under the rocks and trees, and inside piles of straw or wood. They are all common species in this area.

(3) Mammal

The proposed project area is located in the built-up area and planning area of the main urban district, where surrounded by many construction activities and human production activities. Due to the influence of human activities, mammals inhabiting in the area are comparatively less, only 3, which are pipistrellus abramus of family Vespertilionidae, order Chiroptera, and mus musculus and sewer rat of family Muridae, order Rodentia. These three animals generally inhabit near the residential building area of the proposed project.

4.3 Ecological sensitive points

4.3.1 General description

There are three sensitive points, Nanshan National Forest Park, Liangfengya Municipal Forest Park, and Nanshan Mountain - Nanquan Municipal Scenic Area in Nan'an District. These three sensitive points are overlapped in their geographic areas.

See Fig. 4.3-1 for relative position of sensitive points

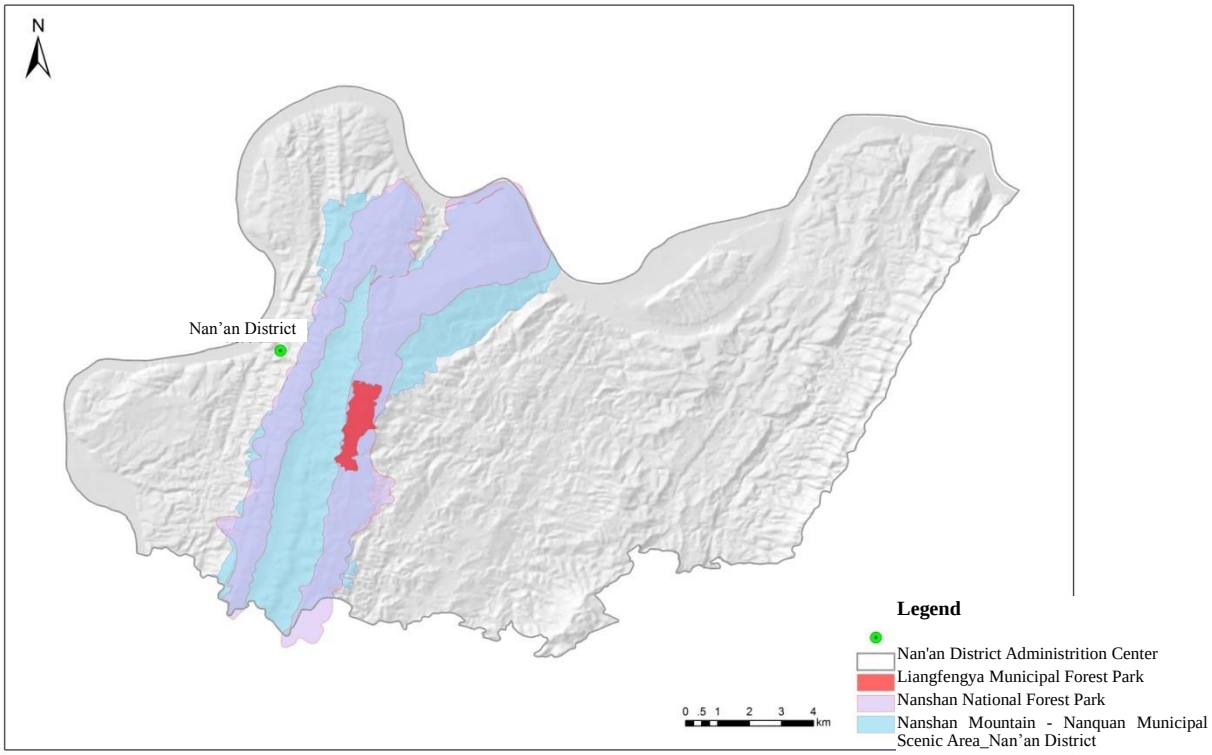


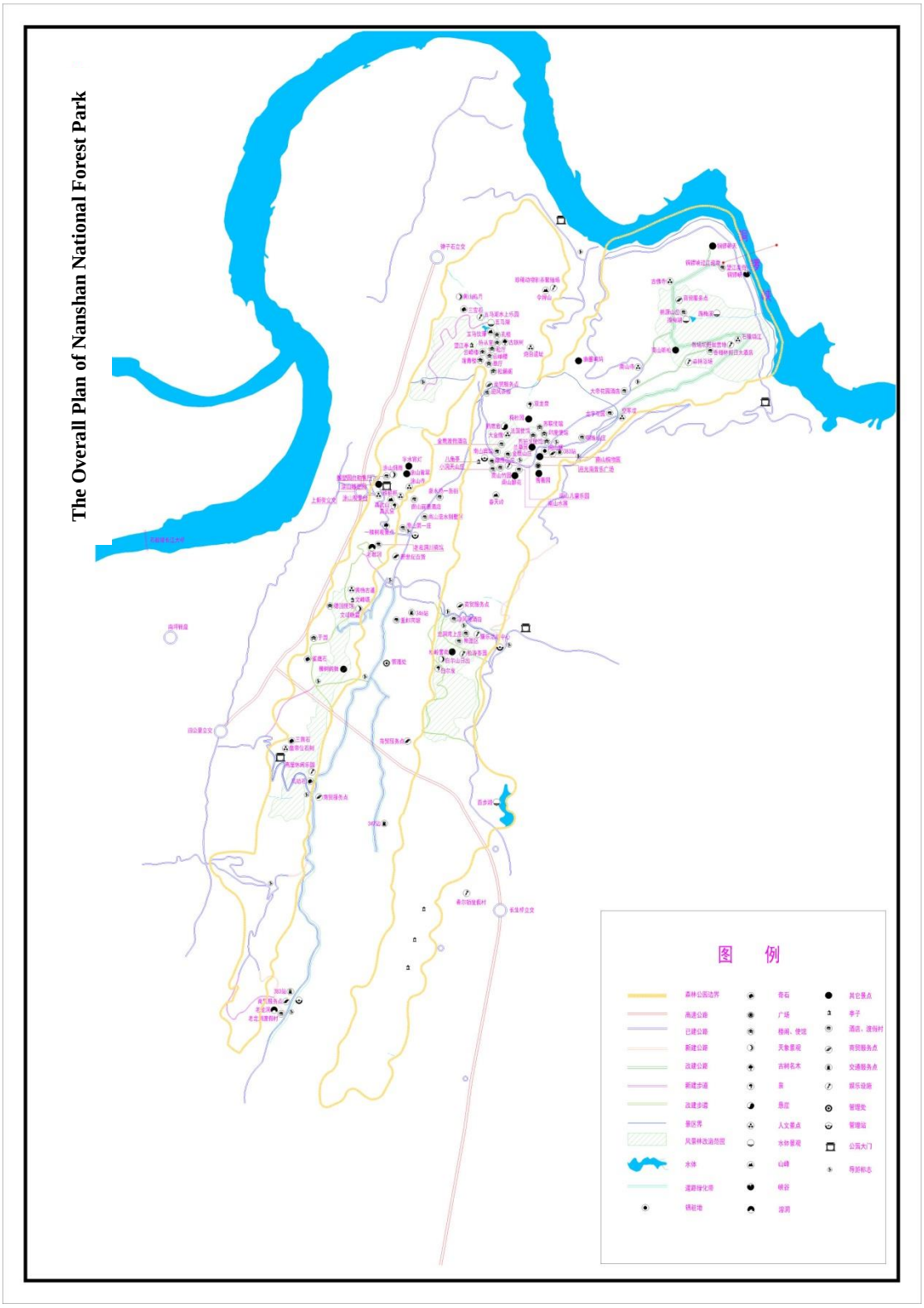
Figure 4.3-1 Relative position of sensitive points in Nan'an District

4.3.2 Overview of Nanshan National Forest Park

(1) Introduction

Located between the main urban district of Chongqing and Chayuan New Area, Nanshan National Forest Park is a forest park in the city. Its geographic coordinates is between 106°34′07″ to 106°39′54″ east longitude and 29°27′50″ to 29°35′36″ north latitude. The Forest Park consists of two mountain ridges, with a width of about 6km from east to west, about 15km from north to south, and a total area of 3,080hm^2.

It was ranked as national forest park by State Forestry Administration in 2004 with 95 planned scenery spots (including artificial ones), 68 of which are original spots and other 27 ones are newly planned. There are 27 important scenery spots.



4.3-2 Nanshan National Forest Park planning drawing

(2) Functional zone division

① Scenery tourism and recreation area Mainly including the Nanshan Botanical Park, the Giant Golden Eagle, etc. in the Nanshan scenic area; Mount Bai'er, etc. in the Liangfengya scenic area; Mount Zhenwu, etc. in the Tushan scenic area.

② Exploration and adventure area mainly including the karst caves, etc. in the Laolongdong scenic area.

③ Tourism area of human landscape Mainly in scenic areas of Mount Huangshan, Mount Tushan, etc..

④ Recreational area and holiday resort mainly in scenic areas of Mount Nanshan, Tongluoxia and Liangfengya.

⑤ Service and management center Located in Huangjueya Town.

⑥ Forest restoration and protection area take artificial planting, cultivation and other measures to restore the forest landscape of abandoned farmlands and the forests of destroyed vegetation or form. In the meantime, the forest landscape transformation will be enhanced. In order to protect areas not being planned or developed, the protection zones therefore are established.

(3) Spatial layout of scenic areas

The Nanshan National Forest Park mainly consists of two mountain ridges. Natural scenery and scenic spots, including forests, geological scenery, waters and so on, are largely distributed along two mountain ridges. The distribution of human landscapes is more concentrated, mainly in scenic areas of Mount Huangshan and Mount Tushan, naturally forming a main tour route of Mount Nanshan - Mount Huangshan - Mount Tushan, and two secondary tour routes, Liangfengya - Laolongdong and Tongluoxia. Therefore, three tour routes and six scenic areas are generally formed.

① Tongluoxia scenic area Located on the northeast of the Forest Park, it covers an area of 715.03hm^2. As a scenic area with mountain and rivers landscape as its main selling point, the scenery resources of forest are mountains, brooks, rocks, streams, waterfalls, and forests. It is classified as a Level III development scenic area of the Forest Park. Its main function is natural scenery tourism and forest recreation.

② Mount Huangshan scenic area Located on the northwest of the Forest Park, it faces the Yangtze River to the north and adjoins scenic areas of Mount Tushan and Mount Nanshan to the south, covering an area of 426.96hm^2. The main scenic spots of the Forest Park, including Huangshan Anti-Japan War Relics Exhibition Gallery, demonstrate a harmonious combination of natural scenery and human landscape. It is classified as a Level I development scenic area of the Nanshan National Forest Park. Its main function is to provide Chongqing Anit-Janpan War and Second Capital culture tourism and enjoyment of natural scenery and mountain recreation.

③ Mount Nashan scenic area Located on the northeastern part of the Forest Park, it borders the Tongluoxia Scenic Area to the north and the Liangfengya Scenic Area to the south and covers an area of 530.57hm^2, including the main scenis areas of the Nanshan Botanical Garden and the Giant Golden Eagle, which integrates natural with human landscapes and can be classified as a

Level I development scenic area of the Nanshan National Forest Park. Its main function is to provide scenery tourism, enjoyment of natural plants and mountain recreation.

④ Mount Tushan cenic area Located in the middle of the western mountain ridge of the Forest Park, it adjoins Mount Huangshan scenic area to the north and the Laolongdong scenic area to the south and covers an area of 254.57hm^2. The main scenic spots of the Forest Park, including the Tushan Temple, the Laojundong Taoist Temple, the Tushan Sculpture and the Single Tree Observation Tower, demonstrate a harmonious combination of natural scenery and human landscape, which is ideal for religious and local culture tourism. It is classified as a Level I development scenic area of the Nanshan National Forest Park. Its main function is to provide scenery, Buddhism and Taoism culture tourism and mountain recreation.

⑤ Liangfengya scenic area Located on the southeast of the Forest Park, it covers an area of 693.75hm^2. Renowned for its forest scenery, the theme of this scenic area is forest ecotourism. It is classified as a Level III development scenic area of the Nanshan National Forest Park. Its main function is to provide the unique forest health care-based tourism through its scenery, forest recreation (forest bathing, forest walks and body building) as well as camping.

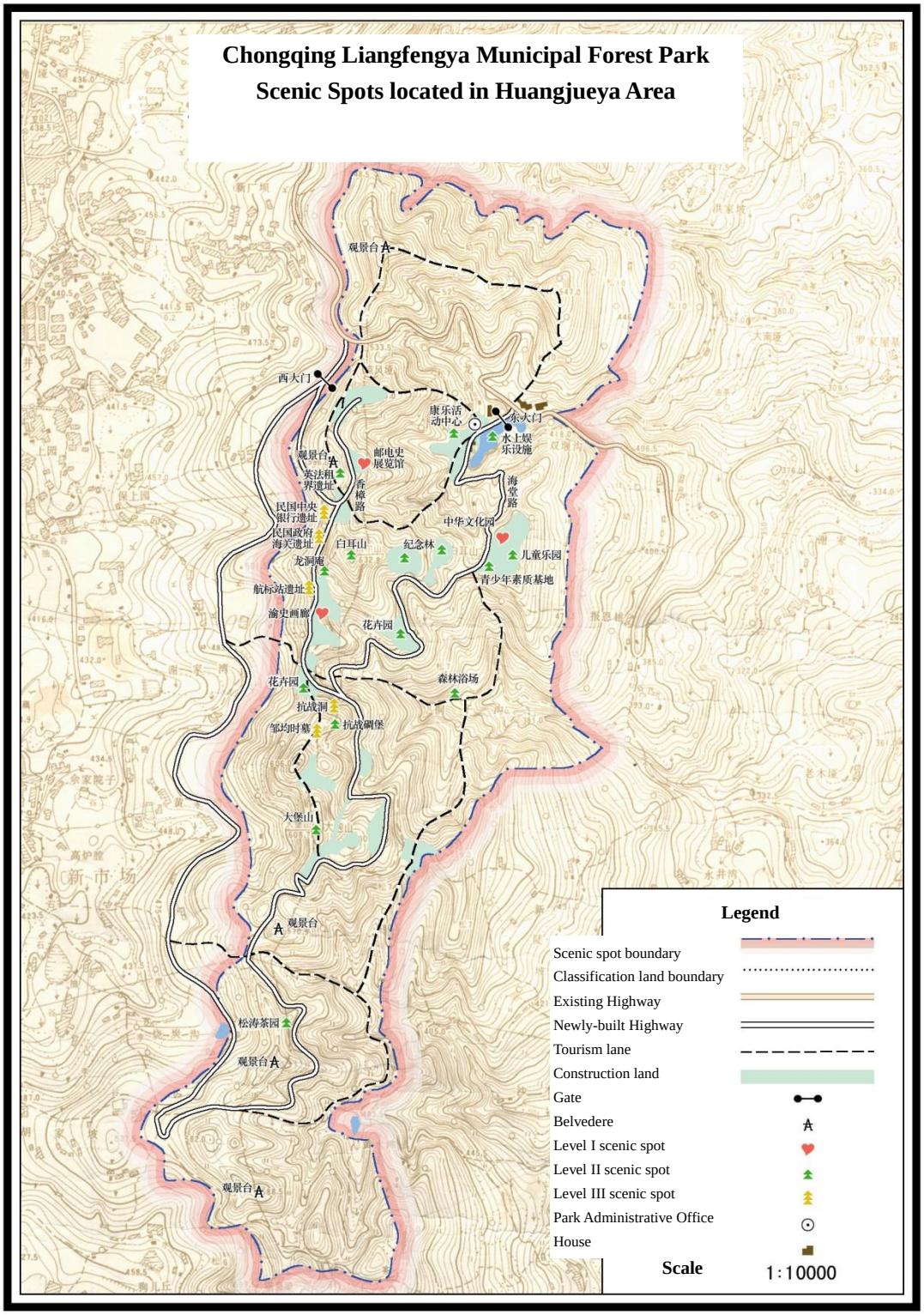
⑥ Laolongdong scenic Area Located at the southern end of the western mountain ridge of the Forest Park, it is adjacent to the Mount Tushan Scenic Area to the north and covers an area of 459.12hm^2. With its main scenic spots, including the Laolong Karst Cave, the Fengdong Stone, etc., it is classified as a Level II development scenic area of the Nanshan National Forest Park. Its main function is to provide the karst cave exploration.

The construction included in this project is the upgrading and transformation of the walking footpath and hiking footpath, that is, the surfacing of the existing footpath, in the Nanshan National Forest Park, while community and public space regeneration is not included in this project.

4.3.3 Liangfengya Municipal Forest Park

(1) Introduction

Chongqing Liangfengya Forest Park was ranked as municipal forest park by Chongqing Forestry Bureau in 1994. Located at the junction of Liangfengya Village, Changshengqiao Town and Lianhe Village, Huangjueya Town, and with its geographic coordinate between 106°31′24″ to 106°31′26″ east longitude and 29°27′12″ to 29°27′16″ north latitude, borders Nanshan Town to the north and Huangjueya Town to the west, and adjoins Changshengqiao Town to the east and state-owned forest to the south, covering a total operating area of 1,009.3hm^2.



4.3-3 Liangfengya Municipal Forest Park planning drawing

(2) Function division

The Liangfengya Forest Park is divided into three areas: forest tourism area, production and operation area, and management and living area.

① The forest tourism area consists of three tourism spaces: forest ecology viewing, ecological tourism and science education.

A. Forest ecology viewing space

A large part of forest in the Lengshuiya area of the Liangfengya Forest Park is planned as an ecological forest viewing space. In this scenic area, forest fire prevention and forest management are organically combined. Its main scenic spots are the Great Karst Cave and Lengshuiya Reservoir.

B. Ecological tourism space

The space of ecological tourism covers the Songtao Tea Garden, the observation platform and the rest pavilion.

C. Science education space

The theme of Science education space is of course the science education and historical and cultural relics tourism, supplemented by the splendid scenery of forest ecology. It covers Chinese Culture Park, the Flower Garden, Chongqing History Gallery, Longdong Nunnery, Bai'er Mountain, the Exhibition Hall of History of Posts and Telecommunications and Memorial Forest.

Table 4.3-1 Rating scale of scenic spots of Liangfengya Forest Park

Name of scenic spot	Level I scenic spot	Level II scenic spot	Level III scenic spot
Science education space	The Exhibition Hall of History of Posts and Telecommunications, Chinese Culture Park and Chongqing History Gallery	Water Park, Kangle Activity Center, Children's Playground, Memorial Forest, Mount Bai'er, Longdong Nunnery and French Concession Site	The Central Bank of the Republic of China Site, the Customs House of the Republic of China Site, the Beacon Station Site, Haitang Road and Xiangzhang Road
Forest ecology viewing space	Tree Seedling Cultivation Field	Botanical Garden and the Great Karst Cave	The Observation Platform and Lengshuiya Reservoir
Forest ecological tourism space	Flower Garden	Forest Baths, the Fortifications of Anti-Japan War, Mount Dabao, Songtao Tea Garden and the Observation Platform	The Caves of Anti-Japan War and Zou Junshi Tomb

② Production and Operation Area centers on the original Tree Seedling Planting Base of Changsheng Tree Farm (covering an area of 53 hectares) and covers some surrounding areas.

③ Management and Living Area refers to the original field of Liangfengya Tree Farm and its surrounding areas.

(3) Landscape resource protection

As a crucial part of the forest part, landscape resources, including all scenery and natural environment, must be protected with stringent requirements and no damage, destroying and deliberate change shall be allowed. According to the landscape resources and protection requirements of Liangfengya Forest Park, two levels of key protection and conventional protection are adopted.

① Areas of key protection

A. Protection range

The route of Liangfengya-Bai'er Mountain- Mount Bai'er -Tongzigou-Mount Dabao -Mount Dabao -Maobiliang is key protection area.

B. Protection requirements

Strict control should be imposed on its natural ecological environment and balance of ecosystems. It is mainly developed for tourism, scientific investigation, exploration and education. The flow of people should be control in some areas. The construction of buildings irrelevant to scenic spot and arrangements inconducive to protection are not allowed.

②Areas of conventional protection

A. Scenery tourism protection area

a. Protection range

The area within 500m radius of the scenic spot is viewing space and the area within the outer edges of every viewing space is the conventional scenery protection area.

b. Protection requirements

The tourism area is a space of beautiful environment for people to enjoy the view. In addition to the landscape construction and facilities directly serving the tourists, the arrangement of other facilities, such as resorts, summer resorts, rest and health care-based facilities, are not allowed. Except the original houses of peasants, factories and mines which will be gradually moved outside the tourism area, water mining and diversion, lumbering, quarrying and soil unloading are strictly prohibited.

B. Scenery protection area

a. Protection range

It covers the area of main and branch tourism routes and within 500m radius of the both sides of footpaths of the entire tourism area. The protection area of the main attractions should cover the area where it can be seen.

b. Protection requirements

All transformations, construction projects and gardening projects in the Park, landscape adjustments must comply with landscape requirements, and their scale, size, shape, color, and

style must blend into the natural landscape of Liangfengya Forest Park in a harmonious manner.

(4) Ecological environment protection

① Range of ecological environment protection

The entire large ecological area Liangfengya Forest Park and others included.

② Requirements of ecological environment protection

It is prohibited to carry out construction activities that will destroy the ecological environment or to engage in the destructive "exploitation and utilization" of the landscape environment, animal and plant resources, and the competent department should coordinate and manage them in a unified manner.

The construction included in this project is the upgrading and transformation of one overall space footpath and two hiking footpaths in Liangfengya Municaipal National Forest Park, that is, the surfacing of the existing footpaths, while community and public space regeneration is not included in this project.

4.3.4 Nanshan-Nanquan Municipal Scenic Area

(1) Introduction

Nanshan-Nanquan Municipal Scenic Area, approved to be a provincial scenic area by Sichuan Province in 1989, was rated as a municipal scenic area by Chongqing Municipal People's Government in 1999. This scenic area is mainly composed of Mount Nanshan and South Hot Spring scenic spots. The assessment area involves Nanshan area.

Nanshan area locates within Nanshan-Nanquan Municipal Scenic Area. It is close to the downtown area. With its coordinates of north latitude 29°12′, east longitude 106°32′ to 106°38′, Nanshan area, covering an area of about 5.667km^2, is a part of the Tongluoxia Mountains and the ribbon-pattern area of Northeast-Southwest direction.

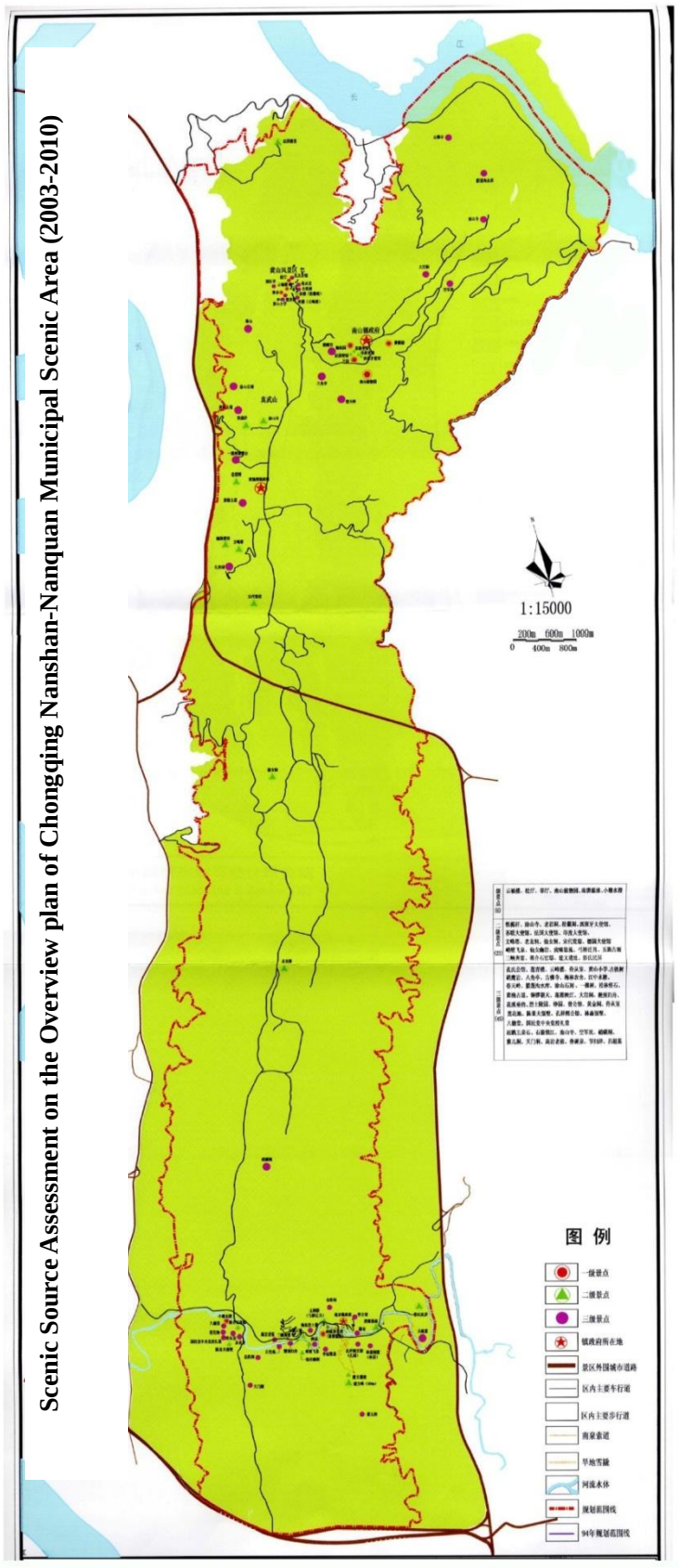


Figure 4.3.-4 Nanshan-Nanquan Municipal Scenic Area layout

(2) Nanshan area landscape characteristic

① Cultural landscape

Nanshan area has a really long history. There still are many relics about King Yu taming the flood and of the New Stone Age existing in Tushan, including Tushan Rock Carvings, Yu Temple, Calling Stone (Hui Gui Shi), etc., which are humanistic resources having great development potential. During the Anti-Japan war, military and political figures of Chongqing, foreign embassies and business tycoons built lots of villas in Huangshan and other places. These relics in the auxiliary capital still were preserved well, enjoying certain popularity at home and abroad.

② Natural landscape

With Nanshan area's height above sea level of 200-681m, its highest place is Spring Ridge (Chun Tian Ling) at an altitude of 681.5m. Nanshan area, as an important flower base in Chongqing, features flourishing flowers and trees, with ten kinds of famous flowers like camellia, fragrans, gardenia, Magnolia denudata, sakura, Malus spectabilis and fragrant thoroughwort blooming here. It is reputed as "Corolla of Mountain City".

(3) Nanshan area planning

According to the planning of Nanshan area, Nanshan area of Nanshan-Nanquan Municipal Scenic Area covers a core area of 5.667km^2, with the following classification of the scenic area and land:

① Scenic area classification

The core of Nanshan area of Nanshan-Nanquan Municipal Scenic Area is divided into Nanshan Scenic Area, Huangshan Scenic Area and Tushan Scenic Area. Among them, Nanshan Scenic Area and Huangshan Scenic Area belong to the Class-I scenic area, and Tushan Scenic Area belongs to the Class-II scenic area.

② Land classification

Land for visiting: as to the east, south and north groups of Tushan Scenic Area, Huangshan Scenic Area and Nanshan Scenic Area within the core area, all visiting places belong to the land for visiting and with the main function of sightseeing.

Land for tourist facilities: Nanshan Town Tourist Street and service reception area, reception points within the core area belong to the land for tourist facilities, and with the main function of tourist reception.

Core protection area: within the planning and control scope of the core of Nanshan area, the mountain forest and woods except the land for visiting belong to the core protection area.

Land for agricultural production: among the above three, the plough land with the current gradient below 25 degrees should be remained for agricultural production in principle, and belong to the limited-development land.

(4) Nanshan area protection requirements

The classification of the land in the protection area is to extend different treatment to the whole scope of the core area based on the landscape value, ecological status, tourist needs and management reality, implement protection by different classes, determine the allowed development level, so as to fully protect the core of Nanshan area, strictly protect the visiting area, preserve the landscape area as the focus, and specially protect important scenic spots.

① Class-I protection area

It contains the natural scenic spots and the nearby touring area that has high requirements for the ecological environment, including the three scenic areas in the core of Nanshan area, namely Huangshan Scenic Area, Tushan Scenic Area and Nanshan Scenic Area.

The natural landscape and cultural relics within the protection area belong to the absolute protection area. Since the scope of the horizontal angle 40° between the scenic spot and the visiting spot through the normal look-up view is the best landscape composing area, any artificial works within that scope irrelevant to tourism shall not be built, and those relevant to tourism shall be strictly approved prior to construction. In other tourist activity area, only visiting roads necessary for touring, sightseeing and rest places can be built. The facilities like pavilions, platforms, buildings or shelfs must be built in harmony with natural environment. Any booth, hotel or restaurant is prohibited here to avoid the destruction and pollution arising from development to the ecological environment.

② Class-II protection area

It is the ecological environment impact protection area, mainly the outer ring of the Class-I protection area. Within this protection area, any project that will heavily destroy the natural environment is not allowed to be built, and wanton felling of trees, excavating the mountain and quarrying are strictly prohibited. Forest fire prevention and growing seedlings shall be well practiced, paddy field loss shall be reduced to protect mountain stability, and the landscape damage and visual pollution shall be avoided. The recuperative project within the area shall be excepted, but its construction shall be based at deserted slopes and vacant farmland, in harmony with the environment and in a moderate scale.

③ Class-III protection area

It contains the residential area, the land for industrial and mining enterprises, the comprehensive service area and recreational activity area within the scenic area. The present industrial pollution within this area must be strictly governed and controlled, and pollutive industrial projects shall be limited strictly. The green coverage ratio of these areas shall be greater than 30%.

④ Outer-ring control area

It is the environment coordination protection area, which is the area out of 1,000m of the east and south planing boundary.

As the protection area mainly includes farmland and woods, the industry involving exhaust gas, wastewater and dust pollution shall be arranged as little as possible. Well digging should be controlled strictly to protect the ecological environment of the scenic area, and the water resource protection should be especially enhanced. In addition, the forest planting green project should be implemented to stabilize the ecosystem of the scenic area.

The Nanshan Sub-district regeneration projects in Nanshan Sub-district are located in the scenic area, including two communities, namely Huangjueya Community and Zhenwushan Community; part of footpaths and hiking footpaths of the overall space locate within the scenic area. This project is to regenerate, upgrade and transform the existing communities and footpaths.

4.4 Overview of social and economic environment

4.4.1 Social and economic conditions of Nan'an District

(1) Population

According to statistics, the household registered population of Chongqing is 33,921,100 in 2016, which increases by 202,700 at a rate of 0.61% compared with that of the last year. Among these people, there are 16,468,700 females, accounting for 48.55%; 19,084,500 urban people at an urbanization rate of 62.6%; 3,819,700 people above 65 years old, accounting for 12.53% of the total population.

The household registered population of Nan'an District is 700,100 in 2016, which increases by 19,000 compared with that in the last year; the permanent resident population of Nan'an District is 873,900 in 2016, which increases by 15,800 compared with that at the end of the last year. In terms of the household registered population, there are 356,200 females, accounting for 50.88%; 640,400 urban people, accounting for 91.47%; 6,174 newborns born during the whole year, with a birth rate of 9.35‰; 3,183 people died during the whole year, with a death rate of 4.82‰; the natural population growth rate is 4.53‰. In terms of the permanent resident population, the urban permanent resident population is 830,000, accounting for 94.97% (permanent resident population urbanization rate) of the total population, which increases 0.4 percentage point compared with that at the end of the last year.

Nan'an District governs eight sub-districts and seven towns in total. This project involves seven sub-districts like Longmenhao, Tongyuanju, Haitangxi, Danzishi, Nanping, Nanshan and Huayuan Road, and three towns including Nanping, Tushan and Jiguanshi. These seven sub-districts and three towns have a household registered population of 574,100 in total, accounting for 82% of that of Nan'an District; female population of 292,400, accounting for 82.09%; urban population of 568,800, accounting for 88.82%.

(2) Economic development

① GDP and composition of three industries

It is shown in the Chongqing statistical yearbook that the GDP of Chongqing in 2016 is

1,755.925 billion yuan, which increases by 184.198 billion yuan at a rate of 11.2% compared with that in 2015. Of the increment, the primary industry realizes an increase of 15.309 billion yuan at a rate of 13.3%; the secondary industry 68.628 billion yuan, 9.7%; the tertiary industry 100.261 billion yuan, 13.3%. As for the fiscal revenue, the general public budget revenue is 222.79117 billion yuan at an increase rate of 7% in 2016; the general public budget expenditure 400.181 billion yuan, 4.9%.

It is reported in the Nan'an District statistical bulletin that the GDP of Nan'an District in 2016 is 74.55 billion yuan at an increase rate of 10.8%. Of the increment, the primary industry realizes an increase of 0.43 billion yuan at a decrease rate of 6.8%; the secondary industry 43.38 billion yuan at an increase rate of 11.3%; the tertiary industry 30.74 billion yuan at an increase rate of 10.3%.

The economic mix of the three industries in Nan'an District has been adjusted from 0.7:59.2:40.1 in 2015 to 0.6:58.2:41.2 in 2016. The secondary industry in Nan'an District is the pillar of economic growth.

② Fiscal revenue

It is shown in the Nan'an District statistical yearbook that Nan'an District realizes the local fiscal revenue of 7.55 billion yuan, which decreases by 2.3% compared with that in 2015; the public fiscal revenue is 7.05 billion yuan, by 8.8%; the tax revenue 5.01 billion yuan, by 6.1%. The fiscal expenditure is 14 billion yuan, which increases by 2.0%.

③ Urban and rural per capita income and expenditure

In 2016, the per capita disposable income of Nan'an District residents is 32,160 yuan, with a year-on-year growth of 8.5%; that of urban inhabitants is 32,983 yuan which increases by 8.3%; that of urban inhabitants 17,839 yuan, by 9.0%. The ratio between urban and rural residents' income has been reduced to 1.85:1.

In 2016, the per capita nonproductive expenditure of Nan'an District urban inhabitants is 22,420 yuan which increases by 10.2%; that of rural inhabitants 11,317 yuan, by 2.1%; the balance of urban and rural residents' savings deposits is 60.16 billion yuan which increases by 7.8%.

4.4.2 Overview of cultural relics

(1) Nan'an District

Chongqing, a time-honored city and the origin of Bayu culture, has left many historical footprints during the long history river. Particularly as the wartime capital in the modern times and the political, military, diplomatic, economic and cultural center of the rear area from the anti-Japanese war, Chongqing has remained lots of cultural heritage. There are 140 pieces of immovable cultural relics existing in Nan'an District, whose historical background can be dated from the Han Dynasty to the modern times (Table 4.4-1). Among them, there are 9 national

cultural heritage protection points, 33 municipal cultural heritage protection points, 43 district-level cultural heritage protection points, and 55 cultural heritage protection points that has not been classed. The immovable cultural relics mainly spread in Nanbin Road, Nanshan Sub-district and Xiakou Town, and the other immovable cultural relics scatters in Tongyuanju Sub-district, Huayuan Road Sub-district, Danzishi Sub-district, Jiguanshi Town, Changshengqiao Town and Yinglong Town.

Table 4.4-1 Cultural heritage protection statistical table (excluding non-classified cultural relics)

Historic period	National	Municipal	District-level
The Eastern Han Dynasty	/	/	Mount Lianhua Cliff Tombs
The Song Dynasty	/	Wangzhuang Kiln Site,Yangjia Guanshan Kiln Site, Laofangzi Kiln Site, Sankuaitian Kiln Site, Miaogang Kiln Site, Yunnan Huidi Kiln Site, Zhongyaosuo Kiln Site, Tushanhu Kiln Site, Jiangyuan Kiln Site, Hangdengchang Kiln Site	/
The Yuan, Ming and Qing Dynasties	Danzishi bas-reliefs on precipices	/	/
The Neolithic Age, the Han, Ming and Qing Dynasties	/	/	Ganxigou ruins
The Ming Dynasty	/	Iron mast, Jinzishan Giant Buddha bas-reliefs on precipices	/
The Qing Dynasty	/	Juelinsi Bao’en Tower, Huangjueya Wenfeng Tower, Laojundong Taoist Temple, Tushan Temple	The site of the former UK Salt Affairs Management Office, Hongxi Chuanshan Weir, the Lius Garden, Changsheng Tombstones, Zishui Inscription, Nantianmen Jiexiao Stele, Xiahou Tushan Inscription
The Late Qing	/	The site of the former	/

Historic period	National	Municipal	District-level
Dynasty _ the Republic of China		Archibald John Little Foreign Firm, the old buildings of Chongqing image	
The Republic of China	Huangshan Anti-Japanese War Ruins, the site of the former Soviet Embassy, the site of the former French Embassy, the site of the former Indian Commissioner's Office, the site of the former US Embassy, the site of the former US Military Guest House, the site of the former UK Embassy	The site of the former Germany Embassy, the site of YU Youren's former Villa, the grave of air force, the site of the former Central Industrial Laboratory	The site of the former *Advance Press*, the site of WANG Lingji's former Villa, the site of DU Yuesheng's former residence, the site of the former General Post Office, Jianyegang Villas, the site of the former Italian Embassy, the site of the former Belgian Embassy, the site of the former residence of American Oriental Banking Corporation's senior executives, the former residence of martyr WANG Pu, Huangxizi Villa, Huangjiaxiang Buildings, the site of the former residence of Yongxing Foreign Firm's senior executives, the Shipping Company of Jufu Foreign Firm, the office building of Jingyi Middle School, the site of the former private Nanshan Middle School
1894	/	/	The former residence of SHI Guangnan
1891	/	/	The site of the former Asiatic Petroleum Company, the site of the former Andasen Foreign Firm
1900	/	/	The site of the former Yangjiagang UK Bar
1902	French navy barrack	/	/
1911	/	Jiguanshi French Church	/
1915	/	The site of the former Brunner Mond Foreign Firm	/

Historic period	National	Municipal	District-level
1920	/	/	The site of the former Zhoujiawan Villa
1921	/	/	The site of the former UK Association Hospital
1927	/	Ciyun Temple	/
1940	/	/	The site of the former US Embassy Bar, the site of the former US Embassy Villas, the site of the former New China Trust Savings Bank
1951	/	/	Zhuzhihong Monument
1960	/	/	Tomb of YANG Fangling
1986	/	Yangtze River Cableway	/

Apart from the above cultural relics, there are 62 non-classified cultural heritage protection units. They are the site of the former Spanish Legation, the site of the former General Post Office Villa, Wangshan Villa, Jianyegang Air-raid Shelter, the site of the former Chinese Theater and Art Club, the villa of the third ambassador in the UK Embassy, Cimushan Feed Canal, the former residence of HE Beiheng, the site of Lawyer Xiong's former residence, the site of Panwenhua's former residence, the site of the former BOC Currency Issuing Office, Kongxiang Park, the ruins of Quanshan Battery, the site of the former Central World Broadcasting Station of the Republic of China Government, the site of the former UK Naval Training Base, the site of the former Qianghua Shipping Company, Building 70 and 71 of Haishi Branch Road Mansion, Huangjiaxiang Air-raid Shelter, Taichangxiang Mansion, Tomb of XI Zhengming, Caoziba Mansion, Taipingxiang Mansion, Jianyegang Stone Memorial Gate, the site of the former Guangyi Middle School, the site of the former Ma'anshan Villa, Ma'anshan Huanglianbin Villa, the site of the former Lianhuashan Handling Station Dormitory, the Grave of Martyr ZHOU Junshi, Miaozigang Trench, Lianhuashan Villa, the former residence of WEN Youzhang, the former residence of FAN Chongshi, Shizhen Building, Monument to Martyr WANG Tianxing, Xiahao Dongjiaqiao Dwellings, the Fans Compound, Jianjiabian Compound, Jianjiabian Ancient Well, Tongjing Temple, Jielong Bridge, Changsheng Old Bridge, Tangkan Village Anti-Japanese War inscription on precipices, Laojunpo Batanyan bas-reliefs and inscription on precipices, Laojundong stone inscription, Nanping Ancient Buddha, Jinzi Stronghold, and Xujiawan Tombs.

(2) Introduction of physical cultural resources in the vicinity of the project activities

① Nanbin Road historial buildings

Nanbin Road runs along the Yantze river on its right bank. By the road there is a belt of historical buildings of the Allies during the second World War when Chongqing was the temporary capital of China. These historical buildings include assets affiliated to the US Embassy, Belgium Embassy, Italy Embassy (These are District Level Cultural Relics

Protection Unit), French navy barracks (National Level Cultural Relics Protection Unit). Given its premium location, along the road there are other historical buildings belonged to trade companies and upper class. See figure 4.1-1 for the location relationship and site photo.

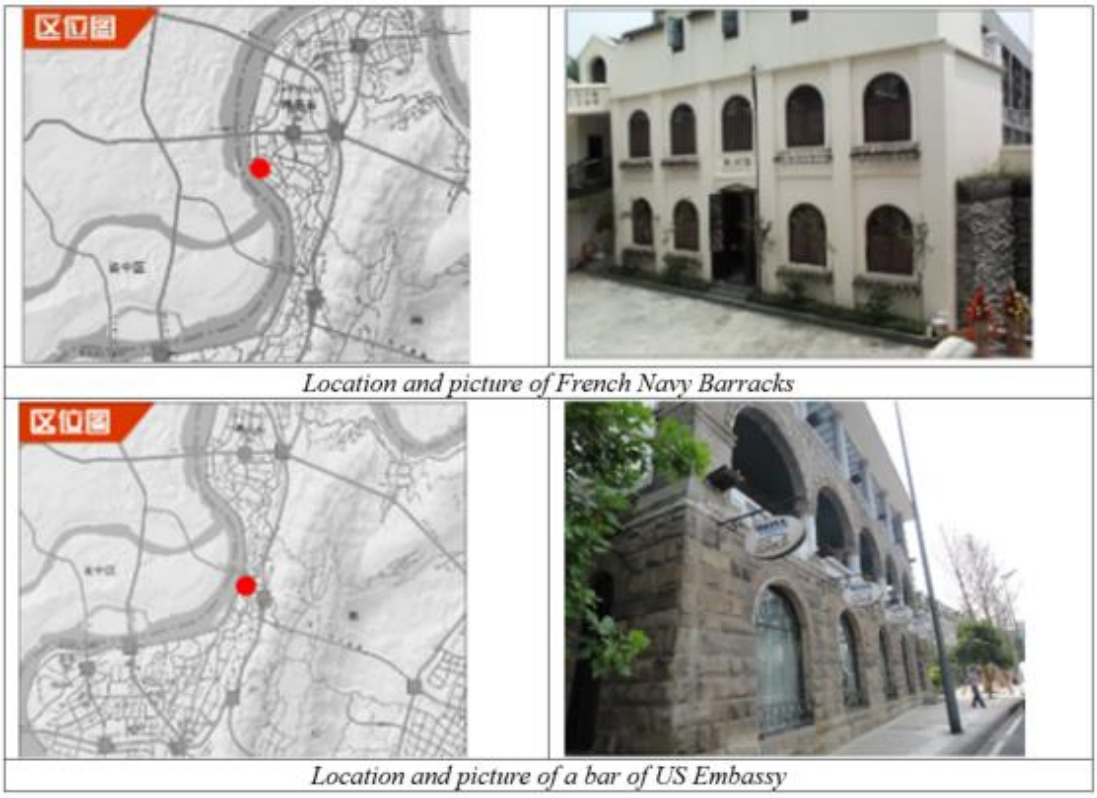


Figure 4.1-1 Historical buildings by Nanbin Road

② Laojun Taoist Temple

Laojundong Taoist Temple is located by Longhuang Road, on which pedestrian walkway will be implemented. The temple is a municipal level cultural relics protection unit. The main features are temple in a stone cave and stone carving.

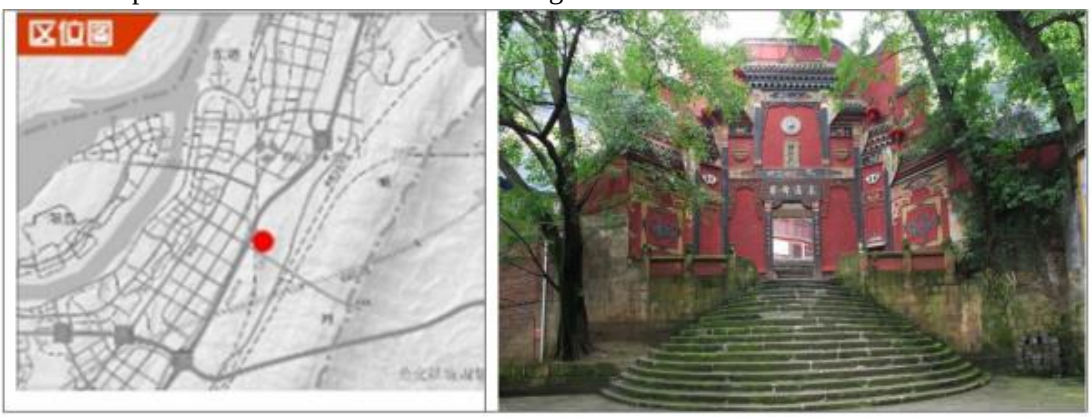


Figure 4.1-2 Laojun Temple

③ Chongqing Anti-Japanese War Ruins Museum

Chongqing Anti-Japanese War Historical Site Museum has 15 historical buildings scattered

on an area of about 500mu. These buildings were constructed during the second World War and include residences of then top leaders of Chinese government and military, US military advisers, bomb shelter, etc. The site is located in a hilly and well vegetated area and featured beautiful landscape as well. In the whole it is a national level cultural relics protection unit. Within the area the project will support improvement of several pedestrian walkways.

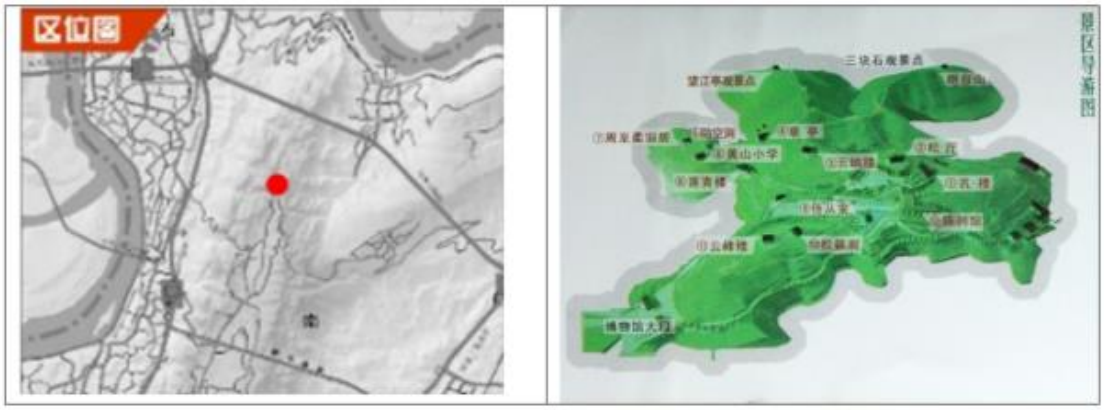


Figure 4.1-3 Chongqing Anti-Japanese War Historical Site Museum

4.5 Environmental quality status and assessment

4.5.1 Surface water environmental quality status

Cuntan section locates in the north of Nan'an District urban built-up area, and Yuzui section locates in the lower part. To know about the regional environmental status of surface water, this assessment refers to the water quality monitoring data of the Yangtze River Yuzui section and Cuntan section from Chongqing Jiangbei District Environmental Monitoring Station Data Report [JH (J) Zi [2015] No. WT100] for analysis.

(1) Monitoring factors

pH, BOD_5, COD, NH_3-N, petroleum.

(2) Monitoring time

The Yangtze River Yuzui section: January 4, 2015, April 7, 2015, July 1, 2015 and October 8, 2015

The Yangtze River Cuntan section: August 2015

(3) Assessment standards and assessment methods

The water quality shall be in accordance with Category-III waters standard specified in *Environmental* Quality *Standards for Surface Wate*r (GB3838-2002) and shall be assessed through the single factor index method with its formula as follows:

$$S_{i,j}=C_{i,j}/C_{si}$$

Wherein,

$S_{i,j}$ —— the standard index of single water quality parameter i at the point of j;

$C_{i,j}$ —— the pollution monitoring concentration of Category-i pollutants at the point of j (mg/L);

C_{si} —— the assessment standards for Category-i pollutants (mg/L);

pH standard index:

$$S_{pH,j} = \frac{pH_j - 7.0}{pH_{su} - 7.0} \qquad \text{pHj} > 7.0$$

Wherein,

SpH_j —— the standard index of pH at the point of j;

pH_j —— the monitoring value of pH at the point of j;

pH_{su} —— the upper limit of pH in the water quality standard.

It is shown in the above formula that, when $S_{i,j}>1$, the DO value exceeds the standard; when $S_{i,j}\leq 1$, the DO value does not exceed.

(4) Assessment standards

The Yangtze River shall be in accordance with Category-III standard specified in *Environmental Quality Standards for Surface Wate*r (GB3838-2002).

(5) Monitoring and assessment results

See Table 4.5-1 for the data statistics of the Yangtze River Yuzui section and Cuntan section.

Table 4.5-1 The Yangtze River monitoring data statistical table [unit: mg/L (excluding pH)]

River	Item	pH	COD	BOD_5	Ammonia nitrogen	Petroleum
Yangtze River Left Yuzui section	Monitoring value	7.53~8.10	10L~11	0.7~1.4	0.025L~0.198	0.01L~0.03
	Exceeding rate	0	0	0	0	0
	$S_{i,j}$	0.27~0.55	0.50~0.55	0.18~0.35	0.03~0.20	0.02~0.60
Yangtze River Middle Yuzui section	Monitoring value	7.58~8.02	10L~11	0.8~1.3	0.025~0.347	0.01L~0.03
	Exceeding rate	0	0	0	0	0
	$S_{i,j}$	0.29~0.51	0.50~0.55	0.20~0.33	0.03~0.35	≤0.02~0.60
Yangtze River Right Yuzui section	Monitoring value	7.56~8.07	10L~11	0.6~1.3	0.025L~0.392	0.01L~0.02
	Exceeding rate	0	0	0	0	0
	$S_{i,j}$	0.28~0.54	≤0.50~0.55	0.15~0.33	0.03~0.35	≤0.02~0.40
Yangtze River Cuntan section	Monitoring value	8.25	11.4	0.74	0.085	0.019
	Exceeding rate	0	0	0	0	0

River	Item	pH	COD	BOD_5	Ammonia nitrogen	Petroleum
	$S_{i,\ j}$	0.63	0.57	0.19	0.085	0.38

It is known from Table 4.5-1, all monitoring factors of the Yangtze River Cuntan section and Yuzui section conform to the Category-III standard specified in *Environmental Quality Standards for Surface Wate*r (GB3838-2002), and the water quality is overall good.

4.5.2 Ambient air quality status

To know about the ambient air quality status of the area, this assessment sets two on-site monitoring points, separately in Nanhu Park and No. 135 of Chongwen Road, and refers to the ambient air monitoring data of Area A, Phase I of Panlong Huayuan and Nan'an District Nanping Regular Monitoring Point from the Monitoring Report of Chongqing Kaichuang Environmental Monitoring Co., Ltd. [KCH (J) Zi [2017] No. 357] for analysis. See Table 4.5-1 for specific monitoring points.

(1) Monitoring factors

Nanhu Park: PM_{10}, SO_2, NO_2

No. 135 of Chongwen Road: PM_{10}, SO_2, NO_2

Area A, Phase I of Panlong Huayuan: PM_{10}, SO_2, NO_2

Nanping Regular Monitoring Point: PM_{10}, SO_2, NO_2, $PM_{2.5}$

(2) Monitoring time

The monitoring points of Nanhu Park and No. 135 of Chongwen Road monitor 24-hour average concentration from December 16, 2017 to December 22, 2017;

The monitoring point of Area A, Phase I of Panlong Huayuan monitors 24-hour average concentration from June 7, 2017 to June 13, 2017;

Nanping Regular Monitoring Point monitors 24-hour average concentration of PM_{10}, SO_2, NO_2 from April 18, 2015 to April 24, 2015, and that of $PM_{2.5}$ from July 26, 2017 to August 1, 2017.

(3) Assessment methods

Based on the ambient air quality status, this assessment adopts the assessment method specified in *Technical Guidelines for Environmental Impact Assessment --- Atmospheric Environment* (HJ2.2-2008), calculates the percentage of the max concentration at each monitoring point in each time divided by corresponding standard quality concentration limits, and evaluates the compliance result. The assessment methods are as follows:

$$I_{ij}=C_{ij}/C_{0j}*100\%$$

Wherein:

I_{ij} —— the percentage of the max measured value of the pollution factor j at the status

monitoring point i divided by the standard limit —— standard occupying rate, when the value is between 0～100%, it conforms to the standard; when it is greater than 100%, it exceeds the standard;

C_{ij} —— the measured value of the pollution factor j at the status monitoring point i (mg/m^3);

C_{0j} —— the environmental quality standard of the pollution factor j (mg/m^3).

(4) Assessment standards

The monitoring point of No. 135 of Chongwen Road shall be in accordance with the Class-I concentration limit specified in *Ambient Air Quality Standards* (GB 3095-2012).

The monitoring points of Nanhu Park, Area A, Phase I of Panlong Huayuan and Nanping Regular Monitoring Point shall be in accordance with the Class-II concentration limit specified in *Ambient Air Quality Standards* (GB 3095-2012).

(5) Assessment results

See Table 4.5-2 for ambient air status monitoring statistics and assessment results.

Table 4.5-2 Ambient air status monitoring statistics and assessment results (unit: mg/m^3)

Monitoring point	Pollution factor	24-Hour average concentration range	Standard value	Exceeding rate (%)	Max standard occupying rate (%)
Nanhu Park	SO_2	0.011~0.014	0.15	/	9.3
	NO_2	0.031~0.036	0.08	/	45.0
	PM_{10}	0.065~0.072	0.15	/	48.0
No. 135 of Chongwen Road	SO_2	0.016~0.019	0.05	/	38.0
	NO_2	0.039~0.042	0.08	/	52.5
	PM_{10}	0.075~0.081	0.05	/	162.0
Area A, Phase I of Panlong Huayuan	SO_2	0.014~0.022	0.15	/	14.7
	NO_2	0.012~0.025	0.08	/	31.3
	PM_{10}	0.041~0.050	0.15	/	16.7
Nanping Regular Monitoring Point	SO_2	0.008~0.032	0.15	/	21.3
	NO_2	0.028~0.059	0.08	/	73.8
	PM_{10}	0.044~0.091	0.15	/	60.7
	$PM_{2.5}$	0.009~0.053	0.075	/	70.7

Note: as PM_{10} has no hourly standard concentration, the 1-hour average concentration assessment standard in this assessment is the triple of its 24-hour average concentration.

It is known in Table 4.5-2, all monitoring factors of the monitoring points of Nanhu Park, Area A, Phase I of Panlong Huayuan and Nanping Regular Monitoring Point conform to the Class-II standard specified in *Ambient Air Quality Standards* (GB3095-2012), and the regional ambient air quality is good; although No. 135 of Chongwen Road locates at Nanshan-Nanquan Municipal Scenic Area and adopts the Class-I standard, it is also in the urban built-up area and

close to the highway, obviously influenced by social activities and transportation. Therefore, its PM_{10} exceeds the Class-I standard, and the max exceeding rate reaches 62%.

4.5.3 Acoustic environmental quality status

(1) Monitoring points distribution

Based on the project layout, 19 noise monitoring points in total are arranged for this assessment, and please see Table 4.5-3. See Figure 4.5-3 for specific monitoring points.

Table 4.5-3 Table of noise monitoring points

SN	Name	Remark
1	Chongqing Nanshan Railway Workers' Sanatorium (Category-I area)	Status value
2	Chongqing Anti-Japanese War Ruins Museum (Category-I area)	
3	East Bridgehead of Chaotianmen Yangtze Grand Bridge	
4	Floor 1, Fuchun Huayuan (7 floors), Northeast Side of Chaotianmen Lower Connection Channel	
5	Floor 4, Fuchun Huayuan (7 floors), Northeast Side of Chaotianmen Lower Connection Channel	
6	Floor 9, Fuchun Huayuan (7 floors), Northeast Side of Chaotianmen Lower Connection Channel	
7	Floor 2, Residential Building (5 floors) of Chongqing Armed Corps Police Hospital (Category-IV area)	
8	Floor 5, Residential Building (5 floors) of Chongqing Armed Corps Police Hospital (Category-IV area)	
9	Building D2, Guoji Xincheng, Yangguang 100	
10	Building 2, Yangguang Lvzhou	
11	Food and Medicine College of Chongqing Radio & TV University	
12	Residential Buildings of Danzishi New Street	
13	Dormitory buildings of No. 11 Secondary School	
14	Teching buildings of Longmenhao Primary School	
15	Building 12, R&F Modern Plaza	
16	Xingxin Jiayuan	
17	Shangxin Shanshui	
18	Shenghuiyuan	
19	Tiantaigang Primary School	

(2) Monitoring item

Equivalent continuous sound level A.

(3) Monitoring time and monitoring method

Monitoring the noise value in the day and at night for two days. Adopting the monitoring method specified in *Acoustical Environment Quality Standard* (GB3096-2008).

Monitoring frequency: two times a day, one in the day and the other at night.

(4) Assessment of acoustic environment status

Table 4.5-4 Acoustic environment status monitoring statistics and assessment results [unit: dB(A)]

Time / Sampling site	December 16, 2017		December 17, 2017		Standard value	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
1	52.1	44.4	52.5	44.5	55	45
2	51.5	44.1	51.2	43.8		
3	65.2	52.4	66.1	52	70	55
4	56.2	47.1	55.7	46		
5	56.9	47.1	56.1	46.5		
6	58.1	48.6	58.5	48.1		
7	59.2	49.6	58.7	49		
8	59.5	49.7	57.8	49.1		
9	58.2	48.1	56.9	47.5	60	50
10	57.3	47.5	57	47.2		
11	54.5	45.7	54	45.2		
12	55.6	47.5	55.1	47.1	70	55
13	54.6	45.3	54.2	45.5	60	50
14	54.9	45.8	54.5	45.2		
15	57.2	48.5	56.5	48.1	70	55
16	54.5	45.6	54.1	45.8		
17	57.5	48.7	57	48.4		
18	57.1	48.5	57.2	48.3		
19	54.9	46.1	54.3	46.3	60	50

It is shown in the monitoring results, all the noise values at Z1~Z19 monitoring points in the day and at night conform to related standards in *Acoustical Environment Quality Standard* (GB3096-2008), and the status of acoustic environment quality is good.

Table 4.5-1 Monitoring points distribution figure

5 Analysis of alternatives

5.1 With/without project

The analysis of the impact with/without project, namely the analysis of the environment development trend, refers to the analysis of the dominating development trend of the regional environmental conditions and the industry involved environment problems, without this project.

The investigation and survey uncover the following problems of the area covered by the project at present.

(1) Old communities

Most of the communities in Nan'an District are old and shabby, where there is a high degree of holistic environment aging, and crowded and shabby residences, most of which were built during 1980s and 1990s and part of which have additional illegal buildings; the infrastructures are backward and inadequate, including rusting guardrails, deficient lighting facilities, narrow streets, roadside and road occupying vehicle parking which occupies not only the traffic passage but also the pedestrian passageway, road chaos caused; the road surface gathers water and the greening rate is low. The entire population aging is severe. The population of Nan'an District is increasing progressively year by year, but with the construction of Jiangnan New City, the population gradually flows to Jiangnan New City, most people that used to live in the old city of Nanping have moved out, and the current non-native residents are mostly non-native tenants, including teachers, workers, home service handymen, etc. Communities have no property management or security, with burglaries happening, and cannot attract non-native people, and thus the population increase is slow. It is imperative to revitalize the old communities of Nan'an District to attract non-natives. The per capita income here decreases. Local residents are mostly engaged in retail, food service industry, handling of materials, etc., and their monthly incomes are mostly lower than RMB 3,000; most of them live in one or two-bedroom residences, with a per capita housing area of 17m^2. The income of most migrant workers is lower than RMB 2,000, with a per capita housing area of 15m^2. The non-native resident communities generally have no management or maintenance, and their public infrastructures and environment sanitary conditions cannot meet the increasingly material civilization demand of the residents.

(2) Slow walking system

The constructed space of Nan'an District and the waterfront space at west side of Nanbin Road are not well connected: the existing Nanbin Road separates Nan'an District from the waterfront space, and residents and the Yangtze River are separated; roads have no clear functions and bear excessive traffic pressure; the function of the slow traffic is neglected. The entire zone of Nanbin Road is not well connected with the constructed space of Nan'an District, which is worsened by the large altitude difference. Residents within the constructed area cannot frequently utilize the waterfront space along Nanbin Road, and cannot enjoy the water approaching effect in

a close distance, especially the external traffic node space of Dongshuimen Bridge, Yangtze River Bridge and Caiyuanba Yangtze River Bridge, etc. The walking environment along both sides of the urban main road is poor. Part of the sidewalk has no separation of pedestrians and automobiles or the walking space is too narrow. Part of the road is occupied by vehicles. The shading effect along the two sides is not good, and the landscape is shabby, without good landscape experience. Most of the secondary roads lack crossing facilities, including traffic lights, blind roads, etc., and it is dangerous for pedestrians to cross the roads; The walking path is too narrow and the isolation effect is inadequate. There is poor connectivity between constructed Nan'an District and Nanshan Mountain. According to the current situation, there are only two main roads going up the mountain between the whole constructed Nan'an District and Nanshan Mountain, namely, Longhuang Highway and Guangqian Road. The existing roads fail to reserve enough slow walking space. Traffic jams are caused by pedestrians crossing roads disorderly and the coexistence of people and vehicles, which will be more dangerous for pedestrians. Due to the greatly changing local road linear slope and insufficient traffic capacity of the nodes, the traffic jams in the morning and evening peak hours are also caused at the intersection of Shangxin Street-Longmen Road, and the intersection of Shangxin Street-Qianqu Road (Longhuang Highway); the traffic jam at the intersection of Nanbin Road-Longmen Road is more striking in the morning. There is no uniformity between the landscapes at both sides, and even no landscape coordination in some sections. The walking conditions are poor. The hiking footpath facilities on Nanshan Mountain are pretty rudimentary. There are no enough safety precautions or warning signs, and the environment along both sides of the trail is messy, which needs sorting out. Facilities of rest benches, stools, toilets, trash cans and like are in shortage as well.

(3) Public space

The public space is in disorder, road surfaces are damaged with water accumulated in the hollow, and the parking on public roads is disorderly; the greenbeltscape has such problems as disorderly landscape plant growth, trees not timely trimmed shading lighting, and inappropriate disposition of afforestation. There is no enough fitness or entertainment facilities in many parks, or even no such facilities, which leads to the situation that the parks fail to have enough attractions and residents will not spend long time in staying in the park. The sanitation of the square is poor, the trash can and other facilities are less, the surrounding vendors have poor awareness of environmental protection, and sanitation management needs improving continuously. The situation that vehicles occupy the square for parking is severe, which causes condensed leisure space of the square and weakened functions of the square. It is imperative to improve the public space.

If the project is completed, old communities will have re-paved road surfaces and re-laid underground pipelines, which give more smooth roads and more reasonable overall design, on the basis of the overall transformation. At the same time, the community green space planed and renovated in a unified manner, and the additionally installed energy-saving lamps, leisure chairs and other infrastructures, will improve the living conditions of the residents, as well as the

community environment and the community livable index. After the completion of the transformation, the community's roads, afforestation and public facilities will be “fundamentally changed”, and the community environment will acquire a completely new outlook. After the slow walking system is completed, residents may utilize the waterfront space of Nanbin Road more frequently, and can closely enjoy the water effect, and the rate of the node traffic will be increased, with footpath and roadway facilities perfected, and security improved. After the improvement of the public space, the attraction of all the parks will be increased, and the environmental sanitation conditions of the square and the situation of disorderly vehicle parking will be improved.

On the contrary, if the project is not implemented, the above situations of the old communities will not be significantly improved, the drawbacks will be gradually highlighted, and the impact of the alternative without the project on the external environment is obvious.

Compared with the alternative without the project, this project is a project that benefits the people’s livelihood, with its positive environment benefit larger than its negative benefit. The project has a far-reaching impact on improving the living environment and quality of life of the residents, shaping the image of Nan’an District, and promoting the urban construction and the sustainable development of economy, society and environment of Nan’an District.

5.2 Comparison of alternatives

The old communities of this project are existing communities, and the transformation and improvement of existing parks and squares in the public space will not involve newly acquired land. The waste land to be used and the site for shaping the public space connecting the rail transit and hiking footpath have been determined. Walking footpaths, hiking footpaths, and Longhuang Highway will be upgraded and transformed along the existing roads. There is only one scheme for Tushan Branch Road. Therefore, there are no disputes or other site selection alternatives to compare for the foregoing projects. According to the information of this project, the urban connecting road of Hugui Road has alternatives to compare, and this comparison is mainly for the alternatives of the urban connecting road of Hugui Road.

In the design of Hugui Road are three alternative routes, namely the turning back curve route, the three-layer helical interchange and the Taichang Road east extension. The turning back curve route is recommended (Figure 5.2-1 to 3).

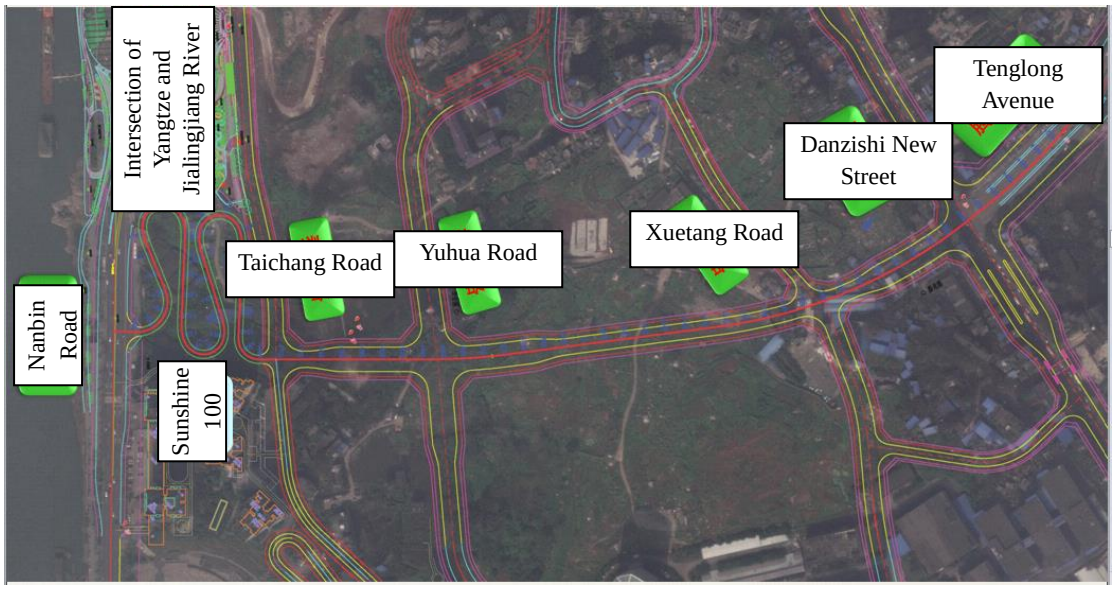


Figure 5.2-1 Alternative 1 The turning back curve route

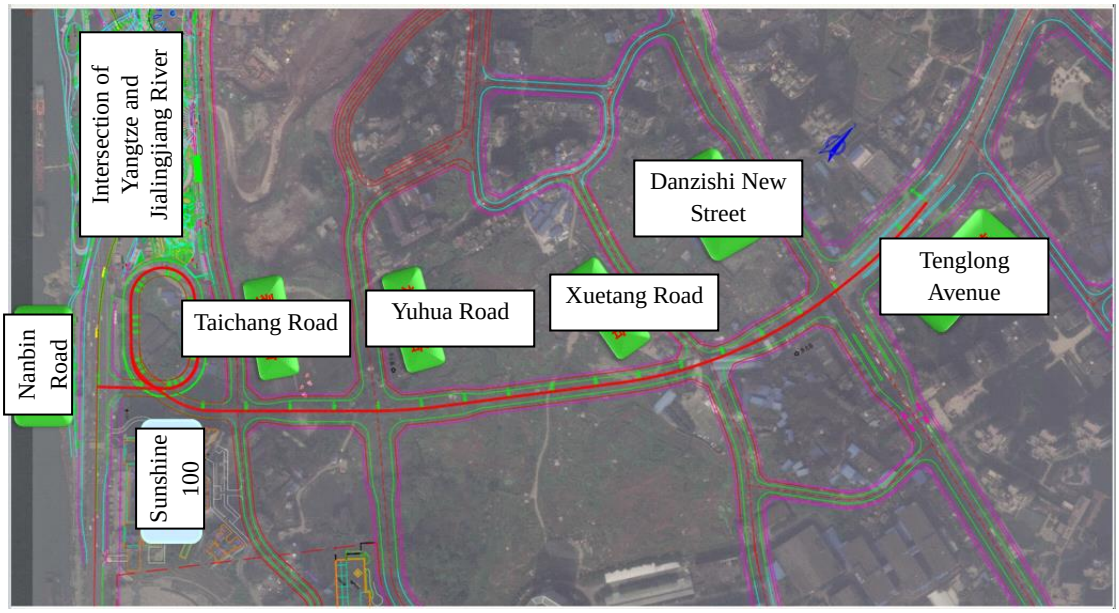


Figure 5.2-2 Alternative 2 The three-layer helical interchange

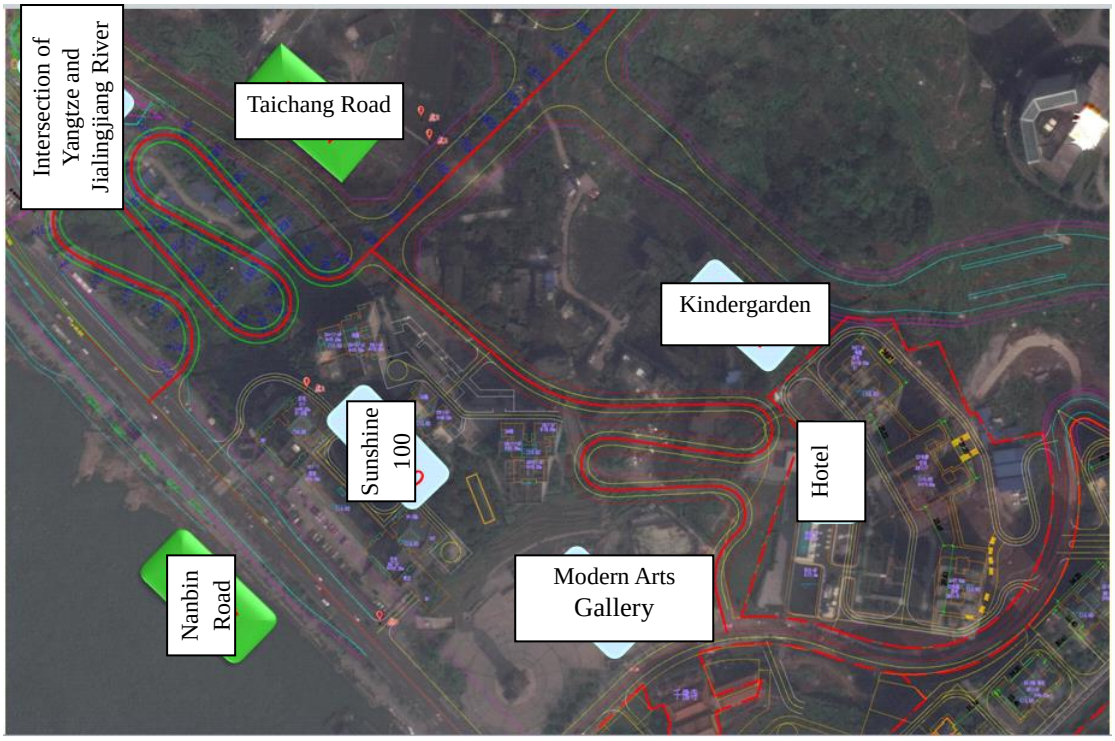


Figure 5.2-3 Alternative 3 Taichang Road east extension

This Assessment has compared such three alternatives. See Table 5.2-1 for details.

Table 5.2-1 Comparison of Hugui Road alternatives

	Alternative 1 (recommended)	**Alternative 2**	**Alternative 3**	**Comparative result**
Name of alternative	The turning back curve route	The three-layer helical interchange (including bridge)	The turning back curve route + Taichang Road east extension	/
Route length	1403m	1947m	3413m=1403m+2010m	/
Traffic function	From the starting point to Taichang Road, the two-way two lanes are adopted, which have poor traffic capacity and poor connection with the surrounding roads.	The same as Alternative 1	The bypass diversion will be added to relieve traffic pressure, in addition to the Alternative 1.	Alternative 3 is better
Design standard	20Km/h	20Km/h	20Km/h	Equal
Land Occupation	Approx. 4.22hm^2	Approx. 4.82hm^2	Approx. 6.63hm^2	Alternative 1 is better
Type of land	Construction land,	Construction	Construction land, bare	Equal

	Alternative 1 (recommended)	**Alternative 2**	**Alternative 3**	**Comparative result**
Name of alternative	The turning back curve route	The three-layer helical interchange (including bridge)	The turning back curve route + Taichang Road east extension	/
occupied	bare land, secondary shrub-grassland	land, bare land, secondary shrub-grassland	land, secondary shrub-grassland	
Earthwork volume	Route excavation of earth and stone ＞ filling	Route excavation of earth and stone ＞ filling	Route excavation of earth and stone ＞ filling, and the earthwork volume is far larger than that of Alternative 1 and 2.	Alternative 1 and 2 are better
Impact on atmospheric environment	The route from Danzishi New Street to Nanbin Road will be shorted, and the exhaust emission will be reduce, which will contribute to the atmosphere environment.	The route from Danzishi New Street to Nanbin Road will be shorted, and the exhaust emission will be reduce, which will contribute to the atmosphere environment.	The route from Danzishi New Street to Nanbin Road will be shorted, and the exhaust emission will be reduce, which will contribute to the atmosphere environment.	Equal
Distance from sensitive points/number	The shortest distance to Yangguang 100 is about 16m	The shortest distance to Yangguang 100 is about 16m	The shortest distance from the starting point to Taichang Road and Yangguang 100 is about 16m; the shortest distance between east extension and Yangguang 100 is about 6m, the hotel 6m, and the planned kindergarten 20m.	Alternative 1 and 2 are better
Impacts of noise	The traffic noise will have impact on the Yangguang 100 Community.	The traffic noise will have impact on the Yangguang Sunshine 100 Community.	The traffic noise will have impact on the Yangguang 100 Community, and the bypass is near residences, hotels and planned kindergarten.	Alternative 1 and 2 are better

	Alternative 1 (recommended)	Alternative 2	Alternative 3	Comparative result
Name of alternative	The turning back curve route	The three-layer helical interchange (including bridge)	The turning back curve route + Taichang Road east extension	/
Impact on vegetation	The artificial grassland, street trees and secondary shrub-grassland will be mainly impacted during the construction phase, after which they will be recovered.	The artificial grassland, street trees and secondary shrub-grassland will be mainly impacted during the construction phase, after which they will be recovered.	The artificial grassland, street trees and secondary shrub-grassland will be mainly impacted during the construction phase, after which they will be recovered.	Equal
Impact on animals	In constructed urban areas, there are mainly people and vehicles and less large animals, mainly rodents and birds, which will be relatively greatly impacted during the construction phase.	In constructed urban areas, there are mainly people and vehicles and less large animals, mainly rodents and birds, which will be relatively greatly impacted during the construction phase.	In constructed urban areas, there are mainly people and vehicles and less large animals, mainly rodents and birds, which will be relatively greatly impacted during the construction phase.	Equal
Project expenses of construction and erection	RMB 80 million	RMB 180 million	RMB 120 million	Alternative 1 is better
Conclusions	Alternative 1 is better			

According to Table 5.2-1, compared in terms of engineering, Alternative 1 has shorter route, equal road design standard, and less engineering investment, but Alternative 3 has stronger traffic functions; in terms of environment protection, Alternative 1 occupies the least land area, the earthwork volume of Alternative 1 and 2 is far less than that of Alternative 3, Alternative 1 and 2 have less sensitive points nearby, Alternative 3 will involve many very near sensitive points and thus Alternative 3 will have greater noise impact on such sensitive points. Such three alternatives have no very significant difference in terms of the type of land occupied, their impacts on atmospheric environment, vegetation and animals, etc., but Alternative 1 is relative better. To sum

up, Alternative 1 is relatively better in terms of engineering and environment protection; therefore, the environmental impact assessment approves Alternative 1 as the recommended plan.

6 Prediction and assessment of environmental impacts

Based on the previous analysis of the project and the environment, this Assessment considers that the major environmental and social impacts of the project are as follows:

Only the construction of the supporting roads (Longhuang Highway, Hugui Road and Tushan Branch Road) under the slow walking system of this project will involve the newly acquired land, other sub-projects will be upgraded on the basis of existing roads, communities or public space, and a single sub-project is small. Therefore, this project has smaller direct impact on the environment and the society.

The length of Longhuang Highway, Hugui Road and Tushan Branch Road is respectively 621.972m, 1,403m and 646.578m, which will newly occupy land areas of 404.76 hm2, including 67mu of newly acquired land of the project, about 4.47 hm2. The purpose of their construction is to provide the supporting infrastructure facilities for Nan'an District, connect the footpath and the roadway, improve the traffic conditions in the region, and promote the improvement of the road traffic system. The proposed road is located in the built-up area of Nan'an District and does not involve environmental sensitive areas. Its main impacts are the impact of the construction on atmospheric environment, acoustic environment and water environment, as well as the possible water and soil loss, and the social impact on the life, travel and safety of the residents around the project area during the construction phase, and mainly the noise impact during the operational phase.

The other two sub-projects of the slow walking system project are the slow walking footpath and the hiking footpath. Some of the walking and hiking footpaths are located in Nanshan National Forest Park, Liangfengya Municipal Forest Park and Nanshan-Nanquan Municipal Scenic Area. Such walking and hiking footpaths are existing footpaths which will not involve land requisition and resettlement. The main impacts come from the construction phase. Attention should be paid to the coordination of the regeneration and the protection objectives and functions of the above-mentioned ecological sensitive areas, the protection of ecological sensitive areas during the construction phase and the strict management during construction, etc.

The old community regeneration is to improve the streets, public space and water supply and drainage facilities in old residential areas. In the project, Nanshan Sub-district Community is located in Nanshan-Nanquan Municipal Scenic Area, but the proposed community for regeneration is residences built in recent decades, which is neither a scenic spot, nor historical buildings, and the proposed regeneration activities will not have impact on the landscape and the protection objectives in the scenic area. Its main impacts are the social impact on the life, travel and safety of the residents (especially the elderly and the children) during the construction phase, and the construction wastes produced by the implementation of the project.

The sub-projects of the public space regeneration are to transform and improve the existing 3

parks and 2 Plazas, and to utilize the waste land, without involving the newly acquired land. The main environmental impacts are the impact of the construction on atmospheric environment, acoustic environment and water environment during the construction phase, as well as the possible water and soil loss, and the social impact on the life, travel and safety of the residents around the project area during the construction phase, and there will be little impact during the operational phase.

6.1 Prediction and assessment of environmental impacts during construction phase

6.1.1 Impacts on water environment

The water pollution sources of this project during the construction phase mainly include the construction wastewater and the sanitary sewage of construction personnel.

(1) Construction wastewater

The concrete is required for the supporting road subgrade and pavement construction of this project, the road regeneration and improving infrastructures like water supply and sewage conduits in all the sub-projects, and the street facility transformation and addition. The concrete used in this project is commercial concrete. Large concrete mixing facilities will not be erected in the construction site. The wastewater produced by the project is mainly the concrete curing wastewater in the supporting road construction, the wastewater from washing the transportation vehicle tires, the oily wastewater produced by the maintenance of the construction machines, etc. Compared with similar projects, the construction wastewater to be produced during the supporting road construction phase may be 15m^3/d. The main pollutants are SS and petroleum pollutants. The construction wastewater will be reused or used for reducing dust in the construction site and roads after the treatment of the oil separation and grit chamber erected in the construction site, without being discharged outside.

(2) Sanitary sewage from constructors

The construction of the supporting road works requires more labors than the other works. It is estimated that 30 people/d will be employed during peak construction period. The sanitary sewage will be discharged 2.4m^3/d. The main pollutants are COD, BOD5, SS and ammonia nitrogen. Sanitary sewage is strictly forbidden to be discharged directly into the natural water body. The river beach should be avoided at construction site selection (for example, the beach under Dafosi Bridge). If it is impossible to connect with the existing municipal sewage pipe network, the sewage should be regularly sucked by the fecal suction truck to the sewage treatment plant for treatment after being collected and pretreated by the biochemical pool; if the municipal sewage pipe network can be connected, the sewage shall be discharged to the municipal sewage pipe network after being collected and pretreated by the biochemical pool.

(3) Impacts of non-point loss caused by rainfall on water environment

During the construction of supporting road works, the exposed excavation and filling side slope will generate a large amount of soil and water loss in the local conditions of heavy rainfall, which will flow into the surrounding water, and have impact on the water environment. Therefore, attention should be paid to the protection of exposed slopes during construction. During the construction of the project, the plastic film or non-woven fabrics should be applied to cover the excavation and filling slopes without protective measures, topsoil stockpiling location, stockpiling yard and the like, and measures like woven soil bags as fence and intercepting ditches should be taken around the topsoil stockpiling location and the stockpiling yard. These measures will greatly reduce the topsoil's exposure and the erosion of the rainwater, reduce the loss of the surface source, and will have little impact on the surrounding water environment.

6.1.2 Impacts on ambient air

The impact of the project construction phase on ambient air is mainly manifested itself in the transportation of project materials, the construction of supporting road works, etc., and the main pollutants are TSP and the exhaust gas from transport vehicles and motive power machines. The road engineering involves the excavation and filling of earthwork, asphalt paving and other operations, and the main pollutants are asphalt fume, TSP and exhaust gas.

(1) Impacts of asphalt fume

Roads will be newly constructed during the construction phase of this project, the road surface will have asphalt pavement, and the asphalt for the project will be externally purchased. On the construction site, there are no processes of asphalt boiling, stirring, etc., and thus there will be no environmental problem of asphalt fume (which contains Benzo[a]pyrene) in the process of asphalt boiling and stirring. The externally purchased asphalt will be used directly on the construction site to pave the road, the road pavement period is short, and the measure of water cooling will be taken. Therefore, the asphalt fume generating during the road pavement will have little impact on the ambient air.

(2) Impacts of rising dust

During the construction phase, the dust mainly comes from the excavation of earthwork, the disturbance of construction activities, loading and unloading of bulk construction materials like cement, sand and gravels, vehicle transportation, etc. According to the data of similar construction, the dust produced by the excavation of earthwork on the construction site, construction activities, loading and unloading of bulk materials will mainly impact the scope of 50m around the construction site, and 80 to 150m in the direction down the wind of the construction site. The dust produced by vehicle transportation will affect the ambient air along both sides of the road. When the dust accumulated on the road is 0.1kg/m^2, the impact range of the road dust is between 10 to 20m. During the construction, the tires of all transportation vehicles into and out of the construction site should be cleaned to avoid the soil being brought onto the urban roads. At the same time, spraying water in the construction area accumulating a great amount of dust and on the

transportation road 200m outside the construction site (2 to 3 times at ordinary times, and 4 to 5 times from July to September). These will decrease the rising dust in the air by over 70% and effectively reduce the impact of the rising dust on the near ambient air.

The impact of the rising dust on ambient air during the construction phase is temporary and will disappear with the completion of the construction.

(3) Analysis of impacts of the exhaust of machines and tools

The exhaust gas pollutants from transport vehicles and construction machines during the construction phase are mainly CO and hydrocarbons. According to the pollutant emissions from the exhaust gas of construction machines used in similar projects, it can be predicted that the emission of CO and hydrocarbon pollutants in the exhaust gas of construction machines is little. It is estimated that during the project construction, the exhaust gas of the construction machines will have little impact on the ambient air quality around the project area.

(4) Analysis of impacts of living fuel exhaust gas

This project uses the liquefied gas (LPG) as the living fuel. LPG is a clean energy, and the exhaust gas produced by the burning of LPG has little effect on the ambient air.

6.1.3 Impacts on acoustic environment

(1) Construction site noise impact prediction

This project uses fewer high-noise equipment for the construction of the footpath, the site pavement and the afforestation, but the machines and transportation facilities for the excavation of earthwork, pipeline laying and road engineering will produce high noise during use, which will easily have impact on the nearby acoustic environment; therefore, this Assessment will predict and analysis the impact of the construction noise on the acoustic environment.

Based on the common construction machines used in China currently, the noise values of construction machines are listed in Table 3.5-1.

There are many kinds of construction machinery. The common characteristic of construction machinery is the high noise value, which impacts the construction site. At the same time, it is difficult to take the sound absorption, sound insulation and other measures to control their impact on the environment.

The prediction mode is as follows:

① A construction noise source can be approximated as a point acoustic source, and the noise value of different distance of each construction machine can be calculated according to the noise attenuation mode of such point acoustic sources. The attenuation mode of point acoustic source is as follows:

$$L_P = L_{P_o} - 20L_g\left(r/r_o\right)$$

Wherein:

LP— the sound pressure level (SPL) r (m) away from the sound source, dB (A);

LPO— the sound pressure level (SPL) r_o (m) away from the sound source, dB (A);

② Computational formula of predicted equivalent sound level (Leq) at the predicted point;

$$L_{eq} = 10\lg\left(10^{0.1L_{eqg}} + 10^{0.1L_{eqd}}\right)$$

Wherein:

L_{eqg}- Contribution value to the equivalent sound level at the predicted point of the sound source of the construction project, dB (A);

L_{eqb}- Background value at the predicted point, dB (A).

Predict the pollution scope (the distance from the operation point to the place where the noise value reaches the standard) of the construction machine noise in Table 3.5-1 with the formula. See Table 6.1-1 for the noise impact of construction machines at difference distances.

Table 6.1-1 Predicted results of the construction machine noise impact scope (Unit: dB (A))

Distance m / Noise source	10	20	50	70	100	150	200
Loader	84.0	74.4	70.0	67.1	64.0	60.5	58.0
Bulldozer	80.0	70.4	66.0	63.1	60.0	56.5	54.0
Excavator	78.0	68.4	64.0	61.1	58.0	54.5	52.0
Concrete tank truck	79.0	69.4	65.0	62.1	59.0	55.5	53.0
Truck	79.0	69.4	65.0	62.1	59.0	55.5	53.0
Vibrating roller	80.0	70.4	66.0	63.1	60.0	56.5	54.0
Pneumatic tyre roller	70.0	60.4	56.0	53.1	50.0	46.5	44.0
Paver	81.0	71.4	67.0	64.1	61.0	57.5	55.0
Impact drilling machine	67.0	57.5	53.0	50.1	47.0	43.5	41.0
Air compressor	65.0	55.5	51.0	48.1	45.0	41.5	39.0
Diesel generator	78.0	68.5	64.0	61.1	58.0	54.5	52.0

According to the foregoing table, the contribution value of the construction machine to the acoustic environment is 51.0 to 70.0dB (A) at 50m away from such construction machine, 45.0 to 64.0dB (A) at 100m, and 39.0 to 58.0dB (A) at 200m.

When the distance between the construction machine and the site boundary is less than 50m in the daytime and less than 200m at night, the noise of the construction machine can easily exceed the requirements of the *Emission Standard of Environment Noise for Boundary of Construction Site* (GB12523-2011) at the construction site boundary. In addition, the daytime noise of the area 150m and the night noise of the area 200m away from the main construction machines will easily exceed the requirements of the Category 2 standard in *Environmental Quality Standard for Noise* (GB3096-2008).

According to the site survey, the sensitive points within 50m away from the road edge among the acoustic environment sensitive points along Longhuang Highway mainly include the residential buildings close to Longhuang Highway of Shanghao Community, Longmen Haoyue Community and Shenghuiyuan; the sensitive points within 50m away from the road edge among the acoustic environment sensitive points along Hugui Road mainly include the International New City (Guoji Xincheng), Sunshine 100 (Yangguang 100); the sensitive points within 50m away from the road edge among the acoustic environment sensitive points along Tushan Branch Road mainly include R&F Modern Plaza Community, Xingxin Jiayuan Community, Tushan Primary School, R&F Modern Plaza 12#, the dormitory buildings of Chongqing No.11 Middle School and the planned Aoyuan Jingdian Community. The daytime construction will cause certain disturbance. The night construction will greatly impact the residents, so the operation time should be strictly controlled and the night construction should be reported to the local environmental protection department.

The Environmental Impact Assessment has the following requirements to the construction process: ① High-noise construction sites should be located in areas far away from the environmental sensitive points; ② Large machines should be kept far away from sensitive objects, and when the construction is conducted near residences, schools and other facilities, fences should be erected, and the construction should be accelerated to reduce the time of the impact on the sensitive objects; ③ Choose low noise equipment, strengthen the repair and maintenance for construction machines, and ensure that they are in the best working condition; ④ The construction time shall be reasonably arranged and the night construction shall be prohibited, but when the construction must be conducted at night due to the requirement of the construction technology, the night construction procedures shall be handled and the surrounding people shall be informed; and ⑤ Strengthen communication with nearby residents before construction to gain their understanding and support.

The impact of the construction noise on the surrounding environment may be furthest reduced by taking foregoing nose control measures.

6.1.4 Impacts of solid wastes on environment

(1) Analysis of impacts of disused earth and stone on environment

The disused earth and stone of this project mainly comes from the supporting road works. The total excavated earth and stone of this project is about 249,200.00m^3, filling about 3u 8,000.00m^3, cleared surface about 20,400.00m^3, broken old pavement 9,900.00m^3, disused earth and stone 224,600.00m^3, and no borrowed earth or stone. Waste slags will be directly transported to surrounding legal slag disposal fields (for example, Nan’an District Yinglong Slag Disposal Field, Nan’an District Changsheng Refuse Landfill, isolating green belt land reclamation spoil ground, etc.).

The rising dust and traffic noise during the transportation of the earth, stones and

construction wastes may have certain impact on the environment along the line. Therefore, transport vehicles are prohibited from over-speed and overload; at the same time, fences and covering measures will be taken to prevent the waste slags from falling on the road to intensify the impact of the rising dust. After the management of transport vehicles is strengthened, the transportation of the waste earth and stones and the construction wastes will have little impact on the environment.

In summary, the earth and stone produced by the project will have little impact on the environment after disposal.

(2) Analysis of impacts of municipal solid wastes on environment

The maximum output of municipal solid wastes in the project construction phase is about 30kg/d. If municipal solid wastes are stacked disorderly, the construction site image and sanitation will be affected; at the same time, breeding bacteria, flies, mosquitoes and others may be harmful to the health of constructors.

The project plans to take measures of collection at fixed points and regular clearing and transportation for the municipal solid wastes. At the construction camp, the management of municipal solid waste sorting will be adopted. Special people will be employed to regularly clear up the waste which will be delivered to the nearby refuse treatment station for treatment, and shall be prevented from scattering on the way to the station. At the same time, special attention should be paid to the maintenance and management of the temporary dump sites, and prevention of the wastes from scattering everywhere caused by stacking wastes randomly, and at the same time, spray germicides and pesticides to the stacking point to reduce the breeding of mosquitoes and germs.

6.1.5 Impacts on ecological environment

Only the construction of the three supporting roads in this project involves the newly acquired land. According to the field survey, the project land is mainly dry land, shrubs, grassland, homestead and vacant land. Part slow walking footpaths and hiking footpath are located in ecological sensitive areas, which will be analyzed in detail in the section 6.3 of this Report.

(1) Analysis of impacts on plant resources and vegetation

This project is located in the central area of the city, so the native vegetation and plant resources have disappeared. The existing plants in the project area are mainly artificial cultivated plants and secondary developing plants, which is a typical urban ecosystem. The supporting road works cover areas of about 404.76hm^2. During the construction of such works, the ecosystem of the project area will be directly affected. The project land occupation will cause direct damage to the vegetation like shrubs and grasslands, and the crops scattering in the construction area, and the plant biomass and crop yields will lose.

The vegetation at the permanently occupied land area of the supporting road works will

disappear forever. According to the project plan, the permanently occupied land area of the project is small, and the project occupies less forests, grassland and arable land, and thus will have less impact on the vegetation biomass and the crop yield in the project area. Plant species within the project area are widely distributed in the area. The construction of the project will not lead to the reduction of species, and will have little impact on regional plant diversity. After the completion of the construction, the loss of the plant diversity can be compensated by the recovery of vegetation and artificial planting.

(2) Impacts on animals

① Impacts on amphibians

The impacts of the project on the amphibians are mainly caused by the road excavation, the construction site levelling and so on. The habitat of some amphibians at the shoal land on river banks, gullies, shrubs, grassland and artificial woodlands will be destroyed, and there will be very few amphibians that may be crushed to death due to the implementation of the construction, but as there are limited habitats for amphibians like river beaches in the project area (for example, the beach under Dafosi Bridge), and the vibration and the mechanical noise during the construction phase will cause disturbance to the surrounding active individuals, and drive them away from the project construction area.

② Impacts on reptiles

There are four kinds of reptiles in the project area. Among them, the ptyas dhumnades is active mostly near farmlands, vegetable fields, stream, and the land occupation for construction, installation for excavation and site levelling will interfere with their activities. Gekko subpalmatus, sphenomorphus indicus and eumeces chinensis are active mostly at rock walls and bare grounds. In the urban ecological system where the project area is located, there are fewer such habitats and fewer reptiles, and the construction will have limited impact on the existing habitats, so reptiles will be less impacted by the project construction.

③ Impacts on mammals

There are no large mammals in the assessed area, and there are only such three kinds of small animals as the pipistrellus of vespertilionidae, chiroptera, the mus musculus of muridae, rodentia, and sewer rats. The pipistrellus mostly inhabits residential areas. All of these are common in the region. The project will not occupy a large area of land, and will have little impact on their population. The two kinds of murine are detrimental, which should be prevented and controled during the construction phase.

6.1.6 Social impacts

(1) Construction camps

It is not considered at present to separately set up construction camps. If they cannot be rented, construction camps will be set up according to the actual situation at the project

construction phase in accordance with relevant requirements in the *Environmental Management Plan*.

(2) Old communities regeneration project

① Impacts of construction on environment

During community transformation, the construction needs mechanical operation and transportation of building materials, and the noise of machines, construction operations and construction vehicles will affect residents' rest and life to some extent. The transformation of community road surfaces and exterior facades may involve enclosure for construction, causing inconvenience for residents to travel and affecting traffic efficiency. In addition, construction operations and vehicles may bring about air pollutions like rising dust. However, all these impacts are temporary and acceptable to most residents.

② Provisional impacts on stores in communities

The old communities are mostly in the central area of Nan'an District, surrounded by community convenience stores, hair salons, fruit stores, restaurants and other business forms, and the noise of machines, construction operations and construction vehicles due to the project construction will affect their normal business activities to some extent. The delivery vehicles of the stores will not be able to pass smoothly due to the construction, and the external vehicles will not be able to get in smoothly, which will have a negative impact on the external transportation and sales of the products. The revenue of the stores may be impacted.

③ Management and maintenance cost increase after transformation

The cost of greening, cleaning and maintenance, maintenance of street lamps, maintenance of fitness facilities, and transformation of fire-fighting facilities may increase after the project completes the transformation of the facilities and environment of the old community. Therefore, the residents of the communities will bear certain property management fees. Residents say a modest increase in property management fees is acceptable.

(3) Public space regeneration

① Impacts of project construction on environment

During the construction of the public space project, there will be pungent smell, noise and dust pollution during the cleaning and transportation of wastes. The earth borrowing, dust and noise cause an unfavorable influence to the activities of nearby residents, and temporary travel inconvenience to the public. If not properly treated, they will bring about secondary pollution. During the construction, the construction vehicles, waste residues, waste earth, wastewater and other problems may pose a threat to the personal safety of local residents, especially the elderly, children and pregnant women. Through the communication with the Project Owner, the Project Owner indicates that more attention will be paid to these problems during the project construction, the publicity and education as to construction safety will be conducted, and relevant measures will

be taken to reduce adverse impact.

② Impacts on traffic efficiency and safety of surrounding residents and vehicles

Some parks, Plazas and roads may be closed due to the construction of the project, which will affect the passage of surrounding residents, students and vehicles, and temporarily affect the leisure of surrounding residents. Nanping is located in the core of Nan'an District, with heavy traffic and large flow of people, and thus traffic jams and low traffic efficiency may be caused due to the passage of construction vehicles and the roads closed for construction.

③ Impacts on stores around public space

There are some convenience stores, restaurants and other business forms near the three parks, and more retail, catering, entertainment and other stores in the three Plazas. As the construction noise of the project will affect the customers in and out of such store to some extent, their normal business activities will be impacted. The delivery vehicles of the stores will not be able to pass smoothly due to the construction, which will have a negative impact on the external transportation and sales of the products, and the revenue of the stores may be impacted.

(4) Slow walking system transformation project

①Land requisition and resettlement

The three connecting roads will have impact on the Tushan Town and Longmenhao Sub-district in Nan'an District. They will involve the permanent requisition of rural collective land of 14.2mu, including 6.5mu of arable land, 2.5mu of farming land for other purposes (planting a small number of trees, etc.), 3.9mu of homestead, and 1.3mu of unused land, and the number of people affected by such land requisition is 14 households of 36 people. The state-owned land allocated will be 112.85mu. The demolished rural houses cover 1,450m^2, demolished urban residences 539m^2, demolished non-residence houses on state-owned land 4,464.32m^2, and demolished houses with limited property rights 4,636.8m^2, and the number of people affected by such house demolition is 31 households of 90 people. The economic income and livelihood patterns of these affected families will be affected differently. The project unit shall assist agencies and departments at all levels to deal with the land requisition well and the livelihood recovery of the affected people. All types of compensation should be paid to the affected people in full and in time.

② Impacts of project construction on transportation efficiency and safety of surrounding residents

The safety impact of the project construction is mainly manifested itself in its impact on the surrounding residents, students and vehicles. Some of the slow walking roads have already been narrow or had intersecting flows of pedestrians and vehicles. Upon the commencement of the construction, the closed construction road or passage of transport vehicles may pose a threat to the personal safety of local residents, especially the elderly, children and women. The noise and dust

generated by the construction may have an impact on nearby residents and vehicles, causing traffic jams, low traffic efficiency and inconvenience to the street crossing.

③ Road safety and disturbance near school

Tushan Branch Road in Nan'an District is close to Tushan Campus of Longmenhao Primary School. Currently the road ends at the gate of the school; students and school workers use the existing road. By design the road will be provided with pedestrian and will extend along the east side of the school and connect to an existing dead-end road. This road extension will provide access to the students and school workers to the residential buildings in the north, compared to currently dirt trails. The potential negative impacts include road safety and nuisance during construction due to the proximity of the road to the school.

④Impacts of slow walking system construction on environment

The slow walking system involves many roads and a large quantity of construction, and the sewage, wastewater, dust and exhaust gas produced by the construction may have adverse effects on water environment and ecological environment. The solid wastes produced by the construction may have adverse effects on the environment. The mountain hiking trail project will be implemented on Nanshan Mountain, which may have adverse effects on the ecological environment of Nanshan National Forest Park.

6.1.7 Cumulative effects

Of the proposed physical works in Nan'an district, three road connections are of relatively larget scale. Namely,

i) Longhuang road widening: 769m in length, 12m in width, widen approx. 2.5m each side;

ii) Hugui Road 1,403m long and 12m-24m wide; including existing and new alignments;

iii) Tushan Branch Road 647m long, 26m wide, including existing and new alignment.

Figure 6.1.7-1

Their locations are shown in the Figure 6.1.7-1. Given the distances of each road to the other, it is not anticipated that their construction impacts would overlap.

neighborhood rehabilitation works in Nan'an involve 10 communities, as is shown in Figure 6.1.7-2. Because these old neighbrhoods are densely populated, construction impacts, adding other works if impelemented at the same time, may have overlap and lead to cumulative effects. Figure 6.1.7-3 shows spatial pattern of the

project supported neighborhoods, pedestrian walkway, hiking trail and 3 road connections. It is observed that cumulative impacts is likely to happen within the neighborhoods where pestrian walkway will be implemented as well.

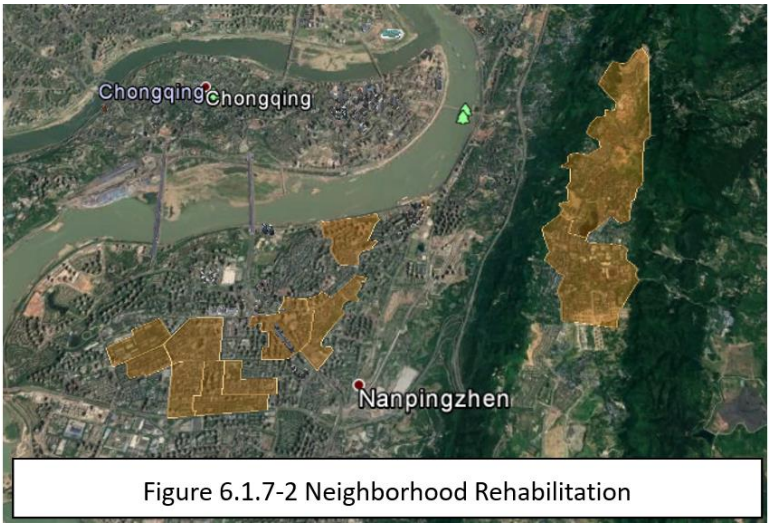


Figure 6.1.7-2 Neighborhood Rehabilitation

The project construction-phase is 3-5 years, and the construction cycle has a long span of time. According to the project implementation plan, the project is divided into sub-phase construction, and there are no plans for simultaneous construction of more sites at the same time. Therefore, the different sub-items of the project have little influence on each other. The scale of proposed works is also small and localized, and it is not easy to have cumulative effects.

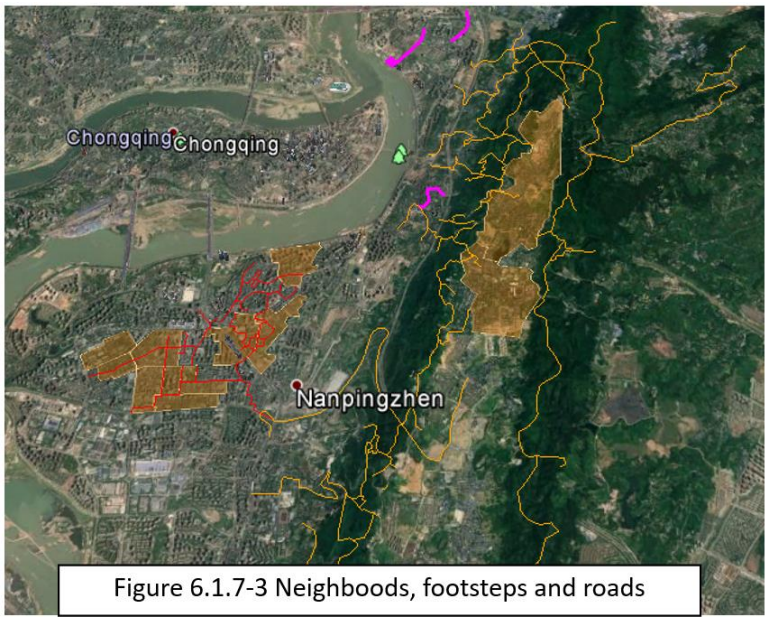


Figure 6.1.7-3 Neighboods, footsteps and roads

Other development activities considered: according to the existing data and site survey, the planned construction of the Aoyuan Jingdian Community which is near the Tushan branch road will be completed soon (the specific time is uncertain). No other projects are being implemented or will be implemented near Hogui Road and Long Huang Highway.

Therefore, the construction management department should coordinate the construction arrangement of the project in a timely manner, make preventive measures in advance, and reasonably arrange the construction time and construction period of each different construction point to avoid a large cumulative impact.

6.2 Environmental impact prediction and assessment during operational phase

During the operational phase of this project, sub-projects of the public space may produce a small amount of sanitary sewage, solid wastes, social life noises, etc., and the supporting road

project of the slow walking system may produce traffic noise and automobile exhaust.

6.2.1 Impacts on water environment

After the road project is completed and operated, the road runoff generated will be collected by the supporting rainwater collection system along both sides of the road, and finally discharged to the surface water body, and the impact of the concentration of the suspended solids and silt in the water on rivers will be reduced after degradation or sedimentation. At the same time, the road management should be strengthened at the operational phase, regular inspections and maintenance should be maintained, the pollutants left by the transport vehicles on the road should be timely cleared, and the road surface should be kept clean, so as to achieve the goal of improving runoff water quality and protecting the surface water bodies. Such warning signs as “slow down and safe driving” should be erected along the road.

The new wastewater during the operational phase is mainly the sanitary sewage produced by urban residents at the public space. There are 6 public space regeneration projects, including parks, Plazas, the waterfront space under Dafosi Bridge, etc., each of which has been designed with public toilets, and 1.2m^3/d of sewage will be generated, according to the average amount of sewage generated in each public space of 200L/d. After the implementation of this project, the area will be connected with the rainwater and sewage pipe networks. The small amount of sanitary sewage produced by the sub-projects of the public space will be collected and then flow into the municipal sewage pipe network under the action of gravity flow, and finally flow into the sewage treatment plant for discharge after reaching standards, which will not have impact on the water environment.

6.2.2 Impacts on ambient air

The supporting road works of this project will provide the supporting infrastructure facilities, connecting the footpaths to form a footpath network and playing the role of motor vehicle roads at the same time (with speed limited at 30km/h). Motor vehicles will emit exhaust gas and produce noises.

The air pollution source of the project during the operational phase is mainly the vehicle exhaust emission on the road of the road projects. The main pollutants in the vehicle exhaust are carbon monoxide, carbon dioxide, smoke, hydrocarbons, etc. The type of the pollution source is dispersed and flowing line source. The height of the emission source is low. The pollutants diffuse within a small area. Due to the change of traffic flows in the day and at night, the pollution in the day will be heavier than that at night. It is suggested that relevant departments should strengthen their management and strictly implement the provisions of the state pertaining to vehicle exhaust emission standards, reduce the emission of vehicle exhaust pollutants, and plant green belts outside the side ditches along the two side of the road, so as to purify the air. The amount of vehicle exhaust produced during the operational phase is limited, which will not change the level of the atmospheric environment function zone, and will have small impact.

6.2.3 Impacts on acoustic environment

(1) Strong noise source

The noise pollution sources in the operational phase are mainly the social life noise and the traffic noise of the road in the public space. The strength of the social life noise source is about 70 to 80dB (A), which can generally meet the requirements of the corresponding acoustic environment function area, and has little outside impact. This Assessment will focus on the impact of the road traffic noise on the sensitive points along the route.

See Table 3.5-5 for the noise source strength of various types of vehicles.

(2) Predicted content

The impact of the emitted noise of various vehicles on the ambient noise of the sensitive points along both sides of the road is to be predicted.

(3) Predicting methods

The Assessment will conduct the prediction with the mode recommended by the guiding rules.

①In the case of vehicle type i in motion in the daytime, the traffic noise value per hour at the predicted point can be calculated with the following formula:

$$\mathrm{Leq(h)}_i = \left(\overline{L_{0E}}\right)_i + 10\lg\frac{N_i}{TV_i} + 10\lg\left(\frac{7.5}{r}\right) + 10\lg\left(\frac{\psi_1+\psi_2}{\pi}\right) + \Delta L - 16$$

Wherein:

$L_{eq}(h)_i$: Equivalent noise level per hour of vehicle type i, dB (A);

L_{0Ei}: Speed of vehicle type i: V; A-weighted average sound level of energy at the place of 7.5m away in horizontal distance, dB (A);

N_i: Daytime, Average traffic flow per hour of vehicle type i passing some predicted point at night, Unit/h;

T: Time to calculate equivalent sound level, 1h;

V_i: Running speed of vehicle type i;

r: The distance from the center line of the lane to the predicted point, m;

Ψ_1, Ψ_2: the aperture angle from the predicted point to the two ends of the road section with definite length (rad radian);

ΔL: correction caused by other factors, calculated with the following formula:

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

$$\Delta L_1 = \Delta L_{slope} + \Delta L_{road\ surface}$$

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

Wherein:

ΔL_1: Correction caused by the route factor, db (A);

ΔL slope: Correction of the road longitudinal slope, dB (A);

ΔL road surface: Correction caused by the road pavement materials, dB (A);

ΔL_2: Acoustic attenuation caused by transmission, dB (A);

ΔL_3: Correction caused by reflecting, etc., db (A).

ΔL_{atm}, ΔL_{gr}, ΔL_{bar}, ΔL_{misc}: Calcualted and obtained according to the methods defined in the guiding rules.

②The traffic noise value received by sensitive points from all types of vehicles in daytime and night hours should be calculated with the following formula:

$$(L_{Aeq})_{交} = 10\lg\left[10^{0.1(L_{Aeq})_L} + 10^{0.1(L_{Aeq})_M} + 10^{0.1(L_{Aeq})_S}\right] \quad \text{……（Formula 5-3）}$$

Wherein:

(L_{Aeq}) traffic: The traffic noise value received by sensitive points in daytime and night hours, dB;

$(L_{Aeq})L$, $(L_{Aeq})M$, $(L_{Aeq})S$ are respectively the traffic noise value received by sensitive points in daytime or night hours from large, med-size and small vehicles, dB.

③ A single vehicle running radiation noise level

Small vehicle: L_{OS} =12.6+34.73lgV_S

Mid-size vehicle: L_{OM}=8.8+40.48lgV_M

Large vehicle: L_{OL} =22.0+36.32lgV_L

Where, S, M and L respectively represent small, medium and large type of vehicle.

V_i refers to the average running speed of that type of vehicle, km/h.

Where, the vehicle speed is calculated with reference to the following formula:

$$v_i = \left[k_1 \cdot u_i + k_2 + \frac{1}{k_3 \cdot u_i + k_4}\right] \times \frac{V}{120}$$

$$u_i = N_{\text{Single lane per hour}} \left[\eta_i + m \cdot (1 - \eta_i)\right]$$

Wherein:

vi refers to the predicted speed of vehicle type i;

k_1, k_2, k_3 and k_4 refer to the regression coefficient;

u_i refers to the equivalent vehicle unit of that type of vehicle;

$N_{single\ lane\ per\ hour}$ refers to the traffic flow on one lane per hour;

η_i refers to the vehicle type ratio of that vehicle type;

m refers to the weighting coefficient of the other vehicle type;

v refers to the designed vehicle speed.

④ Road surface correction ($\Delta L_{road\ surface}$)

See Table 6.2-1 for noise correction without road surface.

Table 6.2-1 Noise correction of different road surfaces (Unit: dB (A))

Road surface type	Correction of different running speeds, km/h		
	30	40	≥50
Asphalt concrete pavement	0	0	0
Cement concrete pavement	1.0	1.5	2.0

⑤ Longitudinal slope correction

Large vehicle: ΔLslope=98×β dB(A)

Mid-size vehicle: ΔLslope=73×β dB(A)

Small vehicle: ΔLslope=50×β dB(A)

The road longitudinal slope correction should be calculated with the following formula:

Where, β refers to the longitudinal slope degree of the road, %.

⑥ Acoustic attenuation caused by transmission

1) Attenuation of barriers (A_{bar})

Calculating attenuation of acoustic shadow zones at the two sides of the high embankment or low cutting

In the case of the predicted point at the insonified zone, Abar=0;

In the case of the predicted point at the acoustic shadow zone, Abar depends on the acoustic path difference.

Calculate δ with the following figure, $\delta=a+b-c$, and then find A_{bar} with the following figure.

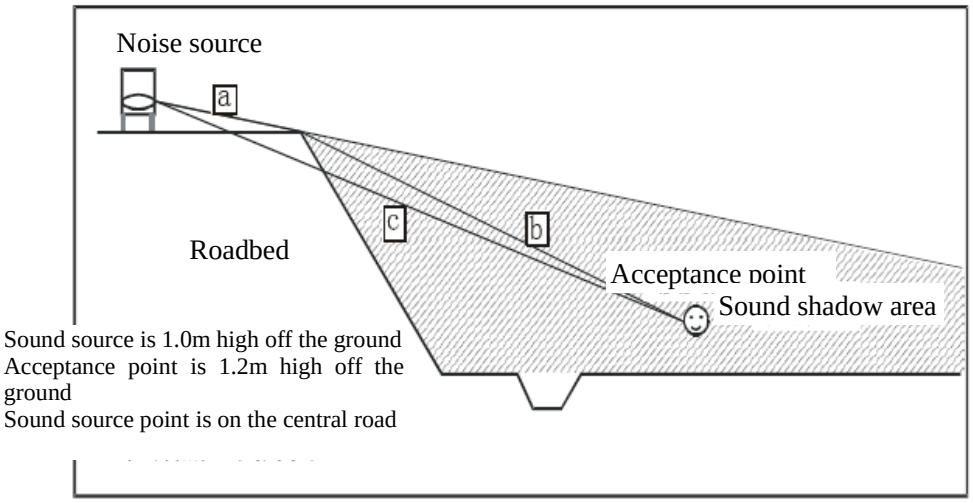


Figure 6.2-1 Acoustic path difference δ computing sketch map

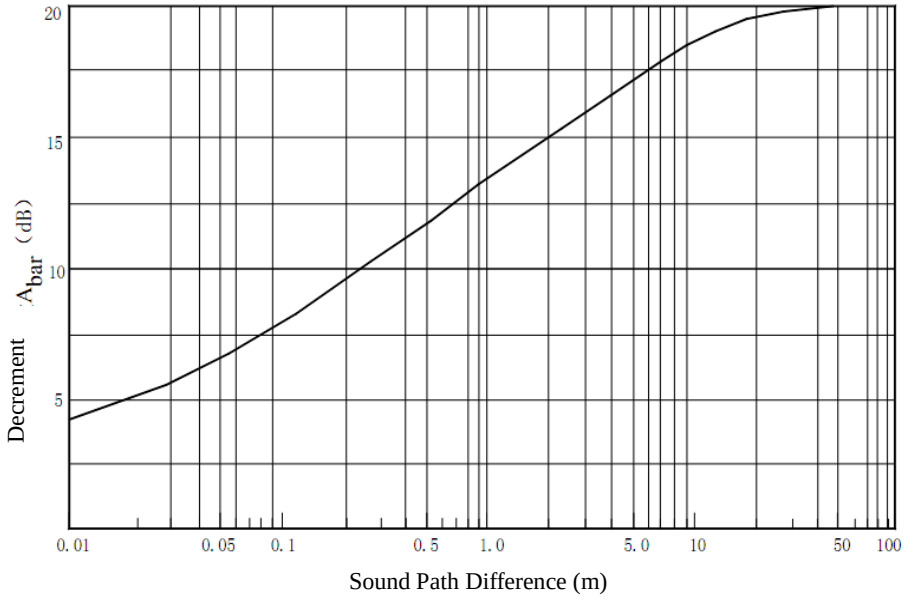


Figure 6.2-2 Graph of relation between noise attenuation Abar and acoustic path difference δ

2) Calculation of the sound attenuation ΔL_{ground} absorbed by the ground

When the sound wave travels through loose ground,

$$\Delta L_{ground}=A_{gr}$$

Or mixed ground most of which is loose ground, and provided that only A-weighted sound pressure level is computed at the accepting point, the following formula can be used to calculate Agr:

$$A_{gr}=4.8-(2h_m/r)[17+(300/r)]\geq 0 \text{ dB}$$

Wherein:

Agr refers to the attenuation caused by the ground effect, dB;

r refers to the distance between the sound source and the accepting point, m;

hm refers to the average ground clearance of the traveling path, m;

hm = Area F/r, calculated with Figure 6.2-3.

If the A_{gr} worked out is negative, it can be substituted with 0.

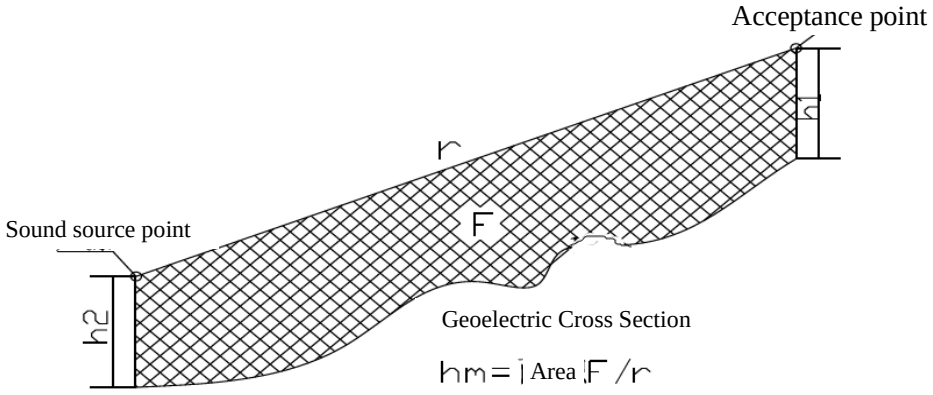


Figure 6.2-3 Method to estimate average clearance hm

⑦ Correction of reflected sound $\Delta L_{reflection}$ from buildings at two sides

Correction of influence factors of landforms and reflection of buildings at two sides When the space between buildings at two sides is less than 30% of the total effective height, their reflected sound correction should be:

When the buildings at two sides are reflectors:

$$\Delta Lreflection=4Hb/w \quad \leq 3.2dB$$

When the buildings at two sides have general absorbing surfaces:

$$\Delta Lreflection=2Hb/w \quad \leq 1.6dB$$

When the buildings at two sides have completely absorbing surfaces:

$$\Delta Lreflection \approx 0$$

Wherein:

w refers to the space between the reflectors of the buildings at two sides of the road, m.

Hb refers to the average height of the structures, h, calculated with the average height of the lower of the two sides of the road, m.

(4) Prediction of traffic noise

① Prediction of the noise radiation value along two sides of the route

After the road of this project is placed in service, the vehicles in motion on the road can be deemed as the line noise source according to the analysis of the characteristics of the traffic noise and of the vehicle radiated noise. In order to reflect the impacted range of the vehicle radiation

noise on both sides of the road, the equivalent sound levels of all types of vehicles have been predicted at the places at two sides of the road of 10m, 30m, 50m, 80m, 120m, 150m and 200m away from the road center line in the conditions of open terrain and no building for separation. In the prediction, the ratio of the traffic flows in the daytime and at night is 9:1, with the average traffic flow per hour and the traffic flow at the peak hour selected, the vehicle speed and all parameters considered, and the years of prediction including short-term (1 year), mid-term (7 years) and long-term (15 years). See Table 6.2-2 for the predicted noise results.

Table 6.2-2 Results of predicted traffic noise during operational phase of the road (Unit: dB (A))

Title of road	Period of prediction		10m	30m	50m	80m	120m	150m	200m
Longhuang Highway	Near term	Daytime	61.0	56.2	54.0	52.0	50.2	49.2	48.0
		Nighttime	54.5	49.7	47.5	45.4	45.4	42.7	41.4
	Medium term	Daytime	62.3	57.5	55.3	53.2	51.5	50.5	49.2
		Nighttime	55.7	51.0	48.7	46.7	44.9	44.0	42.7
	Long term	Daytime	63.7	58.9	56.7	54.7	52.9	51.9	50.7
		Nighttime	57.2	52.4	50.2	48.1	46.4	45.4	44.2
Hugui Road	Near term	Daytime	59.0	54.3	52.1	50.0	48.3	47.3	46.0
		Nighttime	52.5	47.7	45.5	43.5	43.5	40.8	39.5
	Medium term	Daytime	59.8	55.0	52.8	50.7	49.0	48.0	46.8
		Nighttime	53.2	48.5	46.3	44.2	42.5	41.5	40.2
	Long term	Daytime	61.1	56.4	54.1	52.1	50.3	49.4	48.1
		Nighttime	54.6	49.8	47.6	45.6	43.8	42.8	41.6
Tushan Branch Road	Near term	Daytime	61.0	56.2	54.0	52.0	50.2	49.3	48.0
		Nighttime	54.5	49.7	47.5	45.5	45.5	42.7	41.5
	Medium term	Daytime	62.7	57.9	55.7	53.7	51.9	51.0	49.7
		Nighttime	56.2	51.4	49.2	47.2	45.4	44.4	43.2
	Long term	Daytime	64.4	59.6	57.4	55.4	53.6	52.7	51.4
		Nighttime	57.9	53.1	50.9	48.8	47.1	46.1	44.9

② Predicted noise value of all sensitive objects along the road

This Assessment made prediction for the sensitive points able to represent the acoustic environment condition along the road, and the surrounding sensitive points, based on the characteristics of the construction, the distribution of the environmental sensitive points along the road (Figure 1.7-1 to 1.7-3), the current traffic noise situation, the type of impacts, and other factors. The project set up representative monitoring points to reflect the different background noises in the project area.

See Table 6.2-3 to 5 for the results of prediction.

Table 6.2-3 Results of predicted traffic noises at acoustic environment sensitive points along Longhuang Highway during the operational phase Unit: dB (A)

SN	Name of sensitive points	Location to the road edge/nearest distance (m)	Nearest distance to road center line (m)	Altitude difference with the road (m)	Acoustic function zone	Period	Background value	Environmental noise prediction (dB)			Standard exceeding volume (dB)		
							(dB)	Near term	Medium term	Long term	Near term	Medium term	Long term
1	Longmenhao Sub-district Residential building at Shanghao Community	7.4	16.4	0	Category 4a	Daytime	57.2	61.5	62.3	63.4			
						Nighttime	48.5	54.3	55.2	56.4		0.2	1.4
2	Longmen Haoyue	23.6	31.6	0	Category 4a	Daytime	57.2	59.0	59.5	63.4			
						Nighttime	48.5	51.2	51.9	52.7			2.7
3	Shenghuiyuan	33.4	41.4	0	Category 2	Daytime	57.2	58.6	59.0	59.5			
						Nighttime	48.5	50.6	51.1	51.8	0.6	1.1	1.8
4	Shuanghongyuan	85.9	93.9	0	Category 2	Daytime	57.5	58.1	58.2	58.5			
						Nighttime	48.7	49.6	49.9	50.2			0.2
5	Longmen Jiayuan	167.5	175.5	0	Category 2	Daytime	57.5	57.8	57.9	58.0			
						Nighttime	48.7	49.6	49.3	49.6			
6	Shangxin Shanshui	51.7	59.7	0	Category 2	Daytime	57.5	58.4	58.6	59.0			
						Nighttime	48.7	50.1	50.5	51.0	0.1	0.5	1.0
7	Dormitory buildings of Chongqing No. 39 Secondary School	192.1	200.1	0	Category 2	Daytime	57.5	57.8	57.8	58.0			
						Nighttime	48.7	49.1	49.3	49.5			

Table 6.2-4 Results of predicted traffic noises at acoustic environment sensitive points along Hugui Road during the operational phase Unit: dB (A)

SN	Name of sensitive points	Location to the road edge/nearest distance (m)	Nearest distance to road center line (m)	Altitude difference with the road (m)	Acoustic function zone	Period	Background value	Environmental noise prediction (dB)			Standard exceeding volume (dB)		
							(dB)	Near term	Medium term	Long term	Near term	Medium term	Long term
1	Area D, International New City (Guoji Xincheng),	15.6	19.6	0	Category 4a	Daytime	58.2	60.7	61.0	61.7			
						Nighttime	48.1	52.5	53.0	54.0			

	Sunshine 100 (Yangguang 100)												

Table 6.2-5 Results of predicted traffic noises at acoustic environment sensitive points along Tushan Branch Road during the operational phase Unit: dB (A)

SN	Name of sensitive points	Location to the road edge/nearest distance (m)	Nearest distance to road center line (m)	Altitude difference with the road (m)	Acoustic function zone	Period	Background value	Environmental noise prediction (dB)			Standard exceeding volume (dB)		
							(dB)	Near term	Medium term	Long term	Near term	Medium term	Long term
1	R&F Modern Plaza	35.4	42.7	0	Category 2	Daytime	57.2	59.5	60.2	61.2		0.2	1.2
						Nighttime	48.5	51.8	52.7	53.9	1.8	2.7	3.9
2	Xingxin Jiayuan	14.3	21.6	0	Category 4a	Daytime	54.5	60.7	62.0	60.3			
						Nighttime	45.8	53.7	55.2	53.3			
3	Planned Aoyuan Jingdian	10.0	17.3	0	Category 4a	Daytime	54.5	61.9	63.3	64.8			
						Nighttime	45.8	55.0	56.6	58.1		1.6	3.1
4	R&F Modern Plaza 12#	17.6	24.9	0	Category 4a	Daytime	54.9	60.1	61.4	62.7			
						Nighttime	45.8	53.0	54.4	55.9			0.9
5	Teching buildings of Tushan Primary School	11.9	19.2	0	Category 2	Daytime	54.9	61.4	62.7	64.2	1.4	2.7	4.2
						Nighttime	45.8	53.0	55.9	57.4	3.0	0.9	7.4
6	Dormitory buildings of No. 11 Secondary School	2.0	9.25	0	Category 2	Daytime	54.6	68.2	69.8	71.5	8.2	9.8	11.5
						Nighttime	45.5	61.6	63.2	64.9	11.6	13.2	14.9

(3) Analysis of prediction results

It can be known from the predicted results in Table 6.2-2 that with the increase of the traffic flow, the traffic noise value will gradually increase and its impacted scope will gradually expanded.

After the reconstruction of Longhuang Highway is completed, the predicted noise value at the place of 30m away in daytime hours in the short term, middle term and long term can meet the standard of Category 2 in the *Environmental Quality Standard for Noise*. The predicted noise value at the place of 30m away in night hours in the short term can meet the standard of Category 2 in the *Environmental Quality Standard for Noise*, and those in the middle term and long term respectively exceed 1.0 dB (A) and 2.4dB (A).

After the construction of Hugui Road is completed, the predicted noise value at the place of 30m away in both daytime and night hours in the short term, middle term and long term can meet the standard of Category 2 in the *Environmental Quality Standard for Noise*.

As per noise prediction results, after reconstruction of Tushan Branch Road, the predicted noise value at 30m at daytime in near, middle and long term can meet Category 2 standard of A*coustical Environment Quality Standard* (GB3096-2008); the predicted noise value at 30m at night in near term can meet Category 2 standard and that of middle and long term respectively exceeds 1.4dB(A) and 3.1dB(A).

It can be known from the predicted results in Table 6.2-3 that without any measure taken, in different years of prediction, with the increase of traffic flow, the operation of the road will have increasing impact of noise in the daytime and at night on all the sensitive objects.

Within the range of 30m along two sides of Longhuang Highway, the noise values of the acoustic environment sensitive objects in daytime hours in the short term, middle term and long term can meet the standard of Category 4a in the *Environmental Quality Standard for Noise*, and the maximum standard exceeding volume at night in the middle term is 0.2 dB (A), in the long term, 2.7dB (A). Outside the range of 30m, the noise values in daytime hours in the short term, middle term and long term can meet the standard of Category 2 in the *Environmental Quality Standard for Noise*, and the maximum standard exceeding volumes of the noise values in night hours are respectively 0.6 dB(A), 1.1 dB(A) and 1.8 dB(A).

The noise values of the acoustic environment sensitive objects along the two sides of Hugui Road in both daytime and night hours in the short term, middle term and long term are able to reach relevant standards in the *Environmental Quality Standard for Noise*.

Within the range of 30m along two sides of Tushan Branch Road, the noise values of the acoustic environment sensitive objects in daytime hours in the short term, middle term and long term can meet the standard of Category 4a in the *Environmental Quality Standard for Noise*, and the maximum standard exceeding volume at night in the middle term is 1.6 dB (A), in the long

term, 3.1dB (A). Outside the range of 30m, the maximum standard exceeding volumes of the noise values in daytime hours in the short term, middle term and long term are respectively 8.2 dB(A), 9.8 dB(A) and 11.5 dB(A), in night hours are respectively 11.6 dB(A), 13.2 dB(A) and 14.9 dB(A).

This Environmental Impact Assessment suggests that the project should plant protective forest belts of trees along both sides of the road, which may reduce the traffic noise by 3 to 5 dB (A). When the land along the two sides of the road is developed, the first row of the buildings near the road should be designed for those with low noise standards, such as commercial, industrial and trading, public places, etc. as barriers. The plane structure of the buildings near streets should be designed as the u-shaped structure against the road. It should be avoided that the bedroom faces the road. The non-residing rooms of kitchens, toilets, and the like should be arranged to face the road. Special noise monitoring and treatment funds should be reserved, and the monitoring should be strengthened during the operational phase. If the noise of the operational phase disturbs people, the residences and schools affected by excessive noise should be additionally equipped with sound insulation windows which can reduce noise by 15 to 20dB (A) and thus the impact of the traffic noise of the operational phase on residents and schools can be reduced greatly.

After measures are taken, the acoustic environment along both sides of the road can meet the corresponding acoustic environmental quality standards, and the impact of the road traffic noise on residential areas can be reduced to the acceptable range.

6.2.4 Impacts of solid wastes on environment

Solid wastes during the operational phase are mainly the municipal solid wastes produced by urban residents at the public space. The public space improvement project totally includes 6 parks and Plazas, and the municipal solid wastes of 0.24t/d will be produced according to 40kg/d per public space component averagely. The municipal solid wastes will be collected at fixed places, cleared and transported by the environmental sanitation department regularly, and will not have impact on the environment after being properly treated.

6.2.5 Impacts on ecological environment

The construction of this project will cover the old community regeneration, the public space regeneration and the slow walking system regeneration. The slow walking system and the regenerated old community have no obvious impact on the ecological environment. Therefore, the following analysis is for the regenerated public space.

(1) Analysis of impacts on animals and plants

During the construction of parks, according to different themes of spring, summer, autumn and winter, plants of all seasons were introduced, including crape myrtle, prunus lannesiana, yulan magnolia, malus spectabilis, camellia, azalea, lignum cinnamomi camphorae, elaeocarpus decipiens, cinnamomum japonicum, hibiscus syriacus, machilus, excoecaria sebifera, koelreuteria paniculata, autumn blaze, ginkgo trees, oriental plane, cotinus coggygria, cypresses, podocarpus

macrophyllus, five-leaved pine, plum blossom, phyllostachys edulis, etc. As a rural area originally, this area was mainly able land and shrubs. After the construction of parks, the trees planted and the habitat created in the project area can increase the diversity of species in the region and attract more animals to this area.

(2) Impacts on ecological system

The ecosystem in urban parks is a man-made environmental system. The main factors that affect the ecological environment of the parks include vegetation, soil, topography, water bodies and human activities. The construction of the parks enhances the natural undulating topography and the smooth and changing water profile, providing a variety of ecological environment for the landscape plants. The various landscape plant communities in the parks are collocated by designers according to the ecological habits of various landscape plants and people's aesthetic needs. The landscape plants have the functions of adjusting urban local balance of ecological environment like landscaping, air purifying, and wind prevention and sand fixation. After the parks are completed, the regional biodiversity of the city can be recovered and the quality of the ecological environment can be improved, which will benefit the stability of the local ecosystem.

6.2.6 Social impacts

(1) Analysis of social impacts of old communities regeneration project

① Promoting community safety and enhancing residents' sense of safety

As the old communities have been for long years out of repair, the fire facilities have been badly damaged, and most of the fire hoses are not serviceable. In case of a fire disaster, they cannot work. The lack of lighting and safety monitoring facilities in the communities causes inconveniences to the residents at night, as well as frequent occurrence of burglary and robbery cases, and residents dare not go out at night. The parking management is not good enough, so that the fire engine assess is blocked. It would be difficult for the fire engine to enter the community in case of fire. Someone even died in the fire disaster of the Railway Community for this. The old and messy electric lines, and the excessive private illegal connections, will easily cause fire disasters. The road surface hollows and damaged retaining walls give rise to the water accumulation in rainy days, where it is not easy for the elderly to walk but easy for them to fall down. These problems result in the lack of community security, and the security of residents, especially the elderly and other vulnerable groups, is hard to be guaranteed. Through the construction of the project, regulated parking management, increased fire protection facilities and improved roads can significantly enhance the residents' sense of security.

② Improving infrastructures of communities and the living comfort of residents

For long years out of repair, the old communities generally have neither property management nor funds for overhaul. Residents complain most the problems of electric line aging, house leakage, blockage in septic tanks and pipelines. In addition, residents also report the lack of fitness equipment and sites for rest and activities in the communities. This project improves

residents' living conditions through maintaining and improving community infrastructures, and increases the frequency of the activities of the residents in the community, and their chance of communication between each other, through the increase of the fitness and leisure facilities.

③ Improve community sanitation and the life quality of residents

The old communities generally have no property management services. Generally, each household pays RMB 3 to 10 of cleaning fee to employ a cleaner for simple cleaning, and 47.3% residents are not satisfied with the community sanitation. Commonly, old communities suffer the problems of fliers, poor sanitation, pet wastes, used furniture stacked disorderly in the community, overflowing sewage for water pipe aging and leakage, blockage in septic tanks, etc., which bring great inconvenience to residents' life. Through the regeneration and transformation of such communities, the community sanitation can be improved, so the life quality of residents can be promoted.

④ Adding value to property

Due to their age and poor environment, old communities are located at the prime area of Nan'an District, but there is a big gap between their prices and those of the surrounding newly constructed commercial residential buildings. The regeneration and transformation of the old communities will facilitate the increase of their prices and rents. Residents will earn more from house sales and lease and thus increase their incomes.

⑤ Promoting community interaction and social integration

With the increase of community fitness facilities, recreational facilities and the space for leisure activities, residents will have more opportunities of activities in the community, with community life enriched, community interaction promoted, neighborhood integration enhanced, so as to enhance community identity and sense of belonging.

⑥ Analysis of impacts on safety of teachers and students in the school

Tushan Branch Road is designed as two-way four lanes, with a standard road breadth of 26m. The road is close to Tushan Campus of Longmenhao Primary School, so the running of road traffic and vehicles must have certain impacts on the travel safety of teachers and students in the school.

(2) Public space regeneration

① Increasing the utilization of the public space and giving residents better leisure experience.

The public space is not well utilized. Nanhu Park is mainly composed of a circle trail and lawns, without enclosed communication space for multiple people. Guohuishan Park has only a few footpaths, cluttered interior space and lack of guardrails and other safety precautions for such footpaths, so there are fewer people there, it has almost been abandoned. The space in Houbao Park is relatively narrow, and the situation of private occupation of the site for business is severe.

Huigong Road Plaza -Pedestrian Mall can only be called a connecting road where there is little space to stay. People just pass Nanping Plaza where there is no enough space for evacuation and transparency. The vacant space under Dafosi Bridge is not well utilized.

Through the implementation of the public space project, the activity space of parks will be re-planned, and seats, fitness, entertainment and other leisure facilities will be added to the public space to enhance its leisure and entertainment functions. The infrastructures of garbage cans, public toilets, street lamps and guardrails will be increased, and the convenience and safety of residents to utilize such facilities will be enhanced. The traffic and the pedestrian systems of Plazas and pedestrian streets will be re-arranged to keep vehicles and pedestrians in order, and improve the convenience of utilization. All these measures are to let the residents who use the public space, especially the low-income groups in nearby old communities, get better leisure experience in the public space.

② Building a city culture image display window and enhancing the space vitality

The original parks and Plazas have no cultural connotations, except the tea culture atmosphere of Nanhu Community. A large number of non-native residents go to Nanhu Community to enjoy tea and chat, and such tea culture has become the leisure card of Nanhu Community. The implementation of projects like integration of regional landscape elements in Hongsheng Plaza and Nanhu Park Leisure Tea Culture & Food Street will enhance the cultural connotation of the public space, intensify the culture rendering and increase activity facilities, to build a city culture image display window of Nan'an District and enhance the space vitality.

③ Improving the surrounding business environment and promoting economic development and employment

The construction of the project will give the residents a better public space environment. With the increase of the visitors to parks and Plazas, the number of consumers will increase, thereby giving impetus to the development of the commerce and the service industry around the public space, promoting the economic growth, providing more jobs for the residents of the project area, especially the vulnerable groups such as women, impoverished people and non-native people of the project area, and thus increasing the income of the residents.

④ Improving accessibility and safety of the public space

Accessibility and safety of the public space are important constraints for residents to have leisure in the public space. Guohuishan Park fails to have enough connecting roads and its footpaths have no safety measures like guardrails, without good accessibility and safety, so that its green space is abandoned and wasted. Houbao Park has height difference and lacks the slow walking footpath, not friendly for the disabled and children. Nanping Plaza is located between two roadways, the situation that motorcycles occupy the Plaza space for parking is severe, and thus pedestrians have no good experience in passage.

The project will regenerate and transform the existing parks and plazas, regulating the environment around parks and the situation of occupying roads for parking, re-arranging the vehicle and pedestrian systems of Nanping Plaza and the pedestrian street, re-allocating facilities and safety protection facilities for Guohuishan Park to revitalize the wasted green space in the park, so as to improve the accessibility and safety of the public space and increase the attraction of the pubic space for residents.

⑤ Economic benefit of urban green space

The regeneration of the public space will, on the one hand, lead to the price increase of the surrounding old communities, and according to the feasibility report, the price of the surrounding old communities will increase by 20%; on the other hand, bring about the ecological benefits of carbon sequestration, oxygen release, and dust retention, thus generating certain economic value, and according to the feasibility report, the total economic benefits of the green space of this project will be RMB 1,050,100.00/year.

(3) Social impact of slow walking system transformation project

① Regenerating the street nodes, providing residents with experience in comfort communication and characteristic walking

The slow walking system project provides convenient and safe node space for slow walkers, strengthens the function of life communication, and creates comfortable and high-quality communication space, by regenerating the living street node Plazas, renovating the greenery landscape, regenerating the facades around the Plazas, renovating walls, canopies and shop windows, simultaneously arranging public tables and chairs, and upgrading the urban furniture like trash cans and street lamps. Large areas of densely afforested roadside green space frequently used will be built as important nodes of the slow walking system, with facilities regenerated and afforested, diversified landscape designed, recreation lawns and ornamental plants added, to provide the green, interesting and recreational public space. Characteristic walking experience will be provided for slow walkers by choosing the slow walking road entrance Plaza with the characteristics of the mountain city, designing characteristic regeneration, designing the culture wall, and building recreational nodes offering cultural landscape experience.

② Enhancing the road connectivity to make the traffic circulation more smooth

This project further optimizes the urban road network, and improves the connectivity and accessibility of constructed Nan’an Distract and Nanbin Road waterfront space and Nanshan Mountain, to facilitate the travel of residents, improve the efficiency of the roads and make the urban traffic flow more smooth, by opening some dead end roads, building the landscape space to isolate some slow walking space and the roadway space, and constructing such three supporting roads of Hugui Road, Tushan Branch Road and Longhuang Highway.

③ Improving the pedestrian environment and the comfort level of citizens’ walking

experience

The walking environment along both sides of the existing urban main road of Nan'an District is poor. Part of the sidewalk has no separation of pedestrians and automobiles or the walking space is too narrow. Part of the road is occupied by vehicles. The shading effect along the two sides is not good, and the landscape is shabby, without good landscape experience. Most of the secondary roads lack crossing facilities, including traffic lights, blind roads, etc., and it is dangerous for pedestrians to cross the roads; The walking path is too narrow and the isolation effect is inadequate.

The pedestrian environment and the comfort level of citizens' walking experience, especially the elderly, the disabled and other special groups, will be improved by newly adding or widening existing footpath space, adjusting the floor decoration, increasing the road crossing facilities, increasing supporting facilities of the slow walking space, as well as the supporting design and blind road facilities for the disabled, building some landscape nodes and viewing balconies, optimizing the landscape of the slow walking space, adjusting the green plants on streets, etc.

④ Improving the environment of the hiking footpaths and providing green and comfortable mountain climbing experience

The hiking trail facilities on Nanshan Mountain are pretty rudimentary. There are no enough safety precautions or warning signs, and the environment along both sides of the trail is messy, which needs sorting out. Facilities of rest benches, stools, toilets, trash cans and like are in shortage as well.

A comfortable mountain climbing environment with winding paths will be created and the public will be provided with green and comfortable mountain climbing experience, by regenerating the environment along the hiking footpaths, trimming the green plants around and along the two sides of the routes, regenerating the footpath decoration, and strengthening the landscape design.

⑤ Advocating low-carbon and green life, and reducing the urban heat island effect

The original and artificial landscape quality will be improved by regenerating Nanshan Mountain hiking trials and optimizing the gradation of the slow walking footpath. Enhancing the afforestation of the entire slow walking system, making the urban slow walking interesting, and increasing the flow of people using the hiking trail, are conducive to advocating a low-carbon and green lifestyle, and reducing urban motor vehicles' trip and greenhouse gas emissions, as well as improving the ecological environment of hiking footpaths, enriching the landscape gradation, forming the ecological green veins of the city, and facilitating the reduction of the urban heat island effect.

6.3 Prediction and assessment of environmental impacts on sensitive Areas

The project will involve such three sensitive points as Nanshan National Forest Park,

Liangfengya Municipal Forest Park and Nanshan-Nanquan Municipal Scenic Area. See Figure 6.3-1 for the positional relation between the project and the sensitive points. See Figure 6.3-2 for the site survey of the sensitive points.

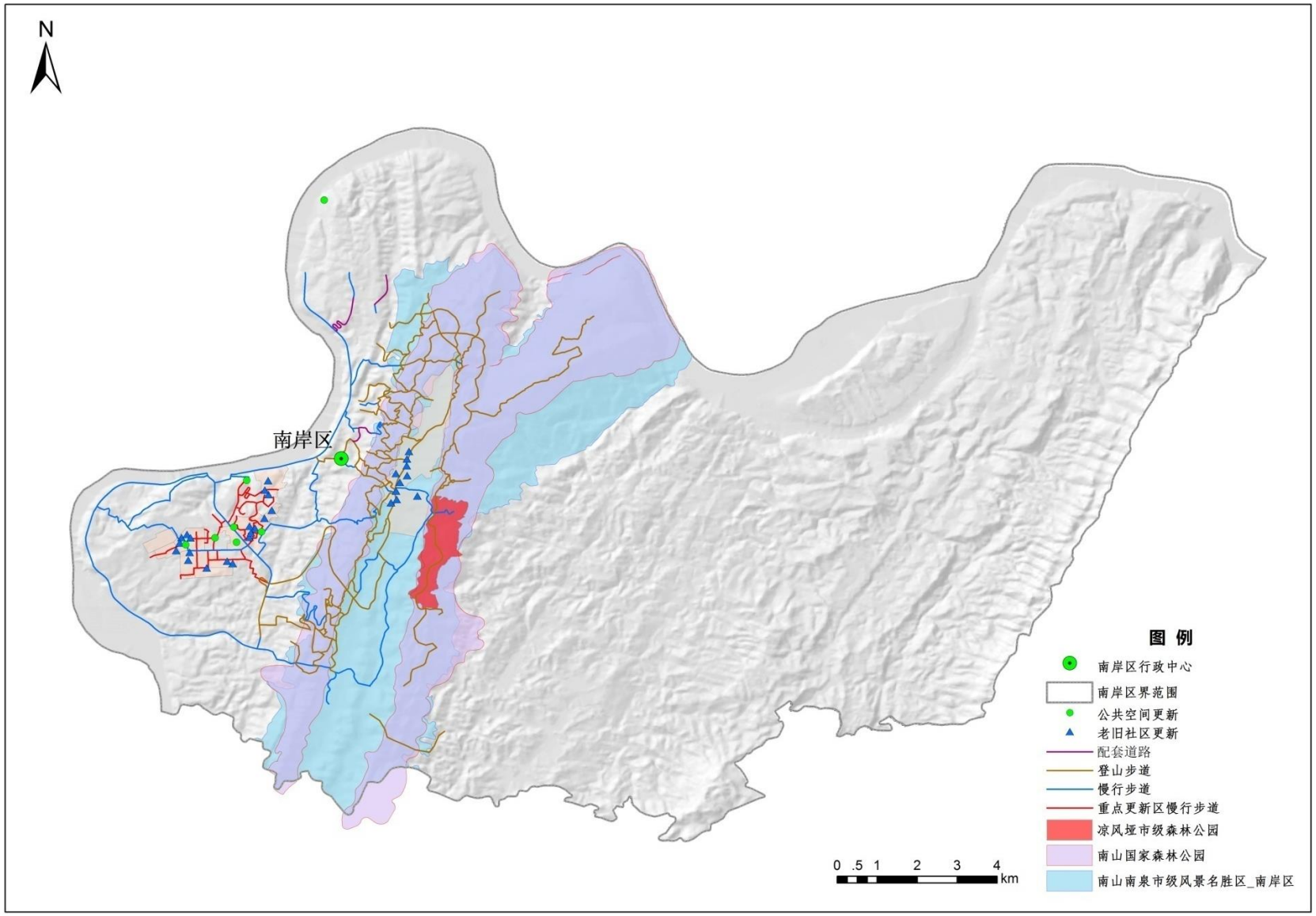


Figure 6.3-1 Positional relation diagram of the project and the sensitive points

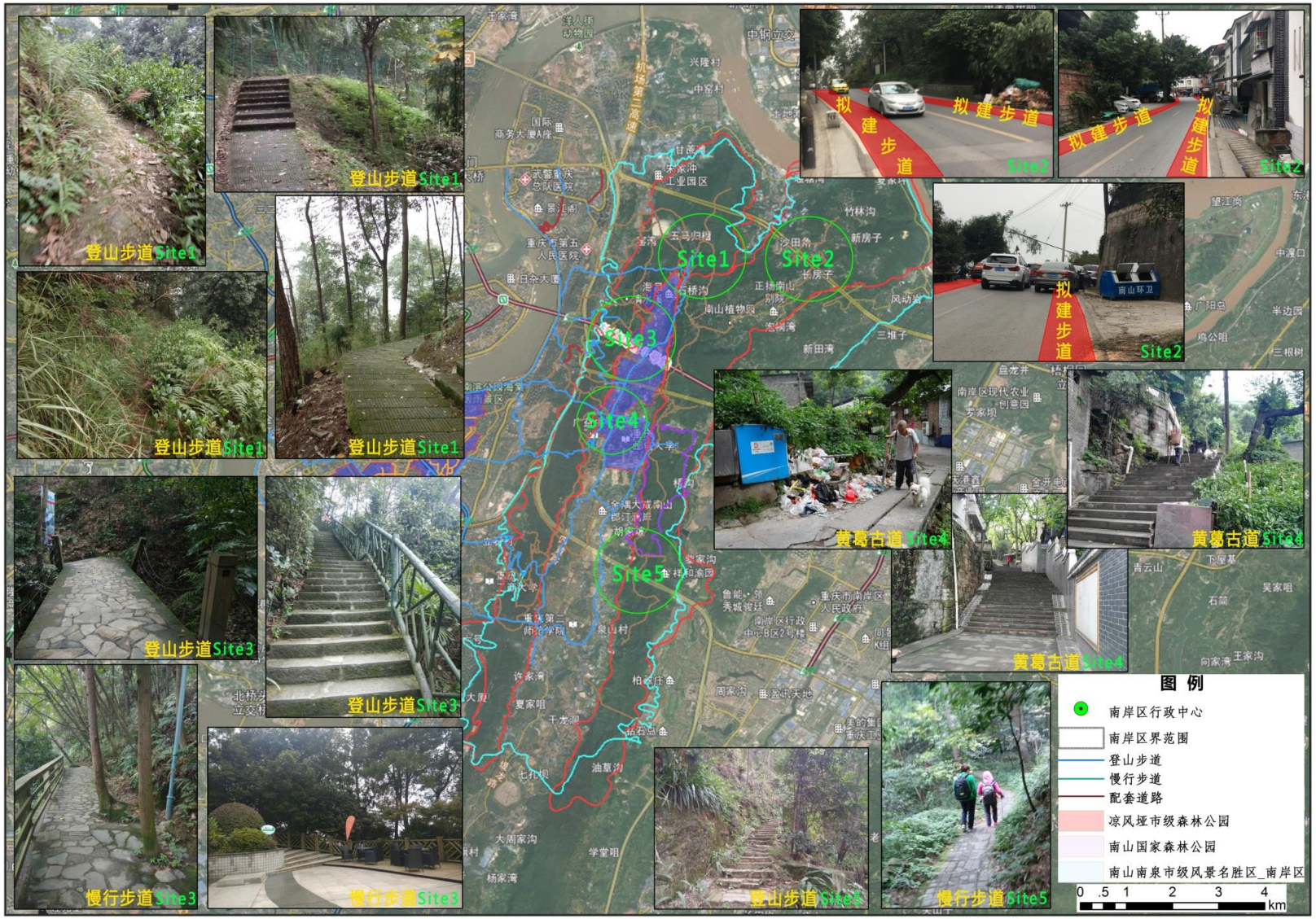


Figure 6.3-2 Site survey of the sensitive points

6.3.1 Analysis of the impact of the project on Nanshan National Forest Park

(1) Positional relation between the project and the forest park

Based on the vector data of the planning area of Nanshan National Forest Park, and with application of the space analysis tool of Arcgis, it can be known that in this project, only slow walking footpaths and hiking footpaths are located in Nanshan National Forest Park (Figure 6.3-3), including 19 overall space footpaths, which are 11,142m in total, the longest one is 2,347m, and the shortest, 11m, and 82 hiking footpaths, which are 51,551m in total, the longest one is 3,445 m, and the shortest, 11m. No community regeneration projects or public space regeneration projects are involved.

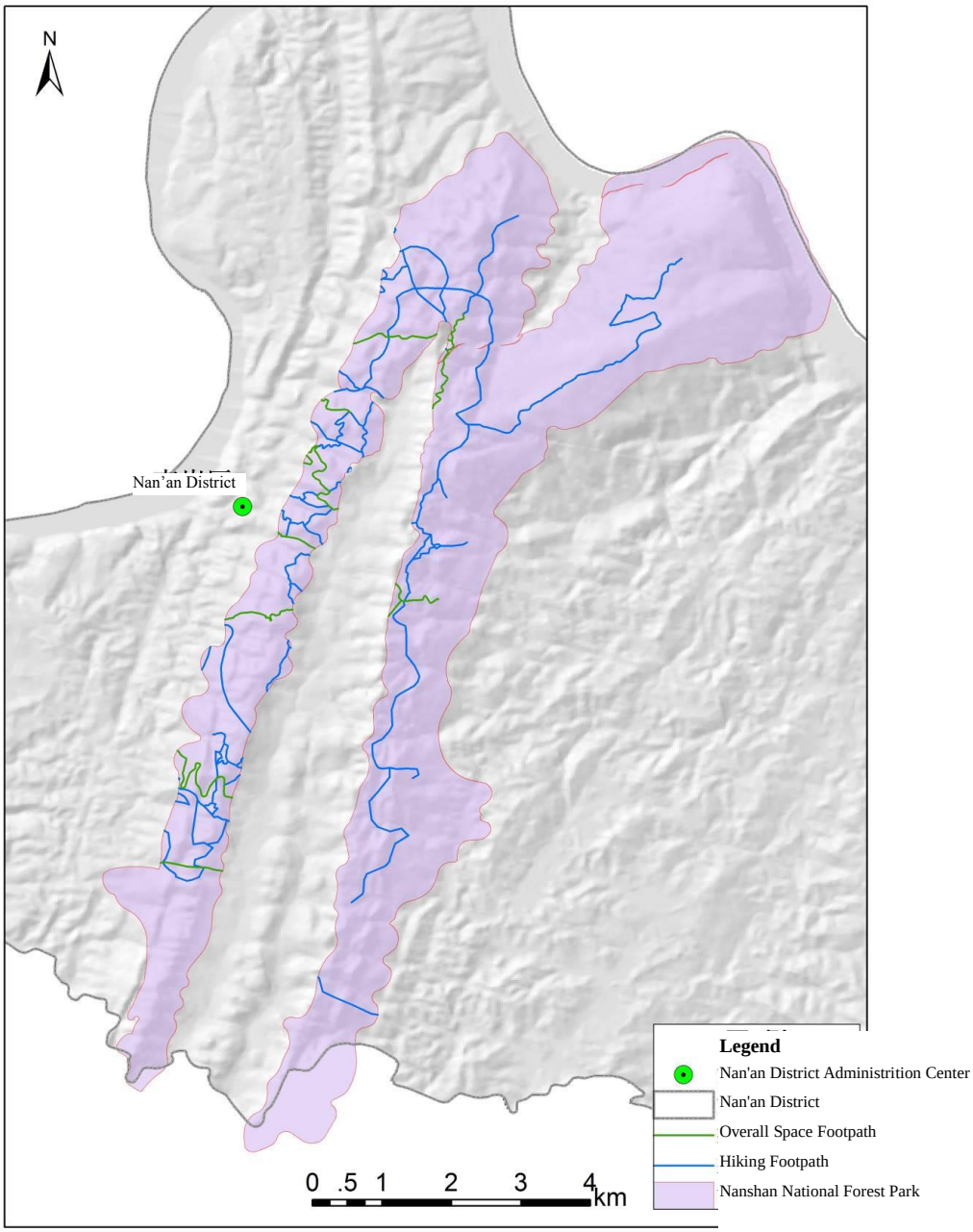


Figure 6.3-3 Projects located in Nanshan National Forest Park

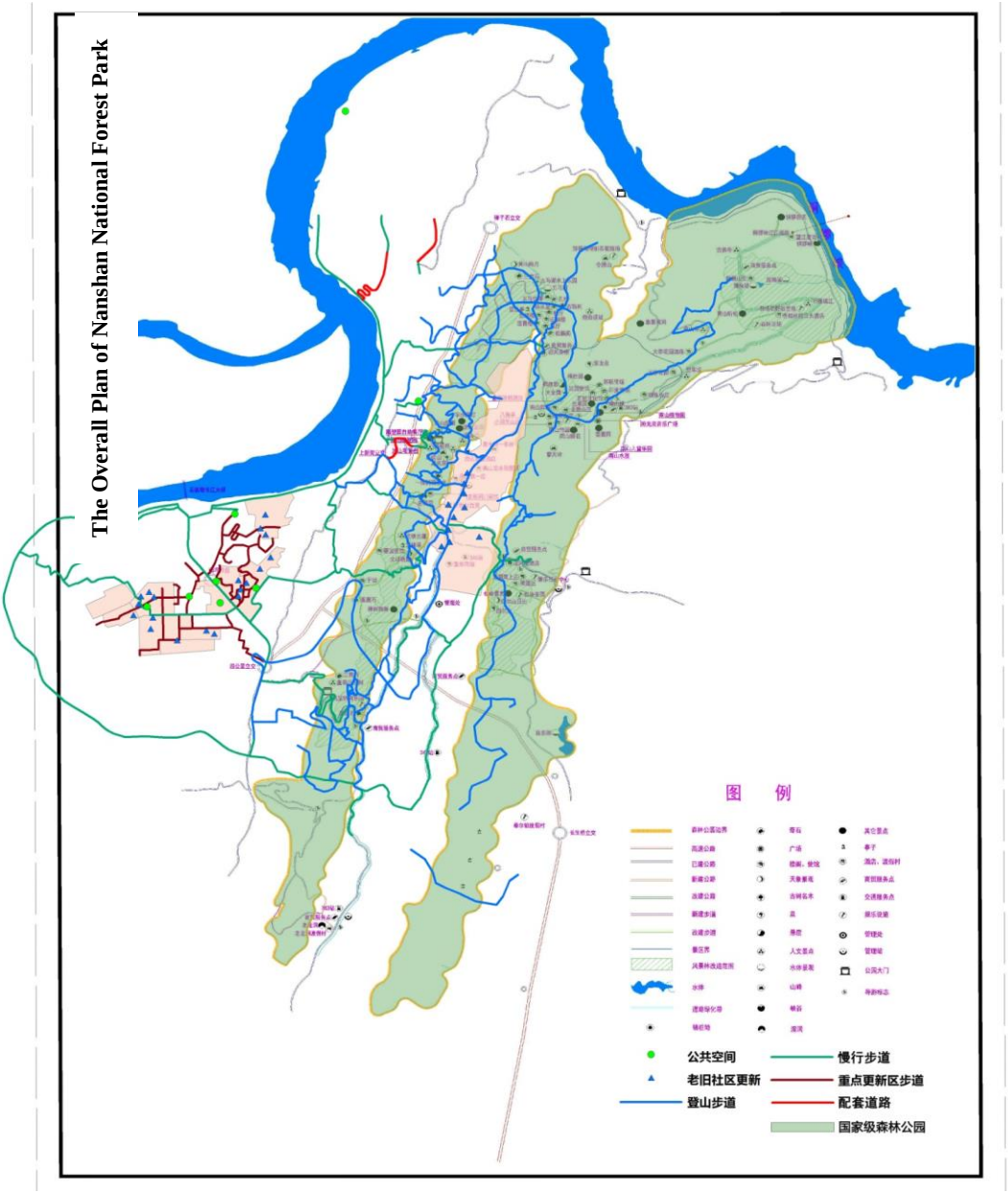


Figure 6.3-4 Positional relation diagram of the project and Nanshan National Forest Park

(2) Analysis of the impact of the project on the forest park

① Impacts of the project implementation on the structure and function of the forest park

According to Figure 6.3-3, the projects located in the forest park only include slow walking footpaths and hiking footpaths. The content of the project is to open dead end roads, regenerate the road surface, install rest facilities, install the distribution and pipeline facilities, etc., involving a small quantity of earthwork excavation, footpath surface pavement, street facility installation and other construction techniques with minor environmental impact. The footpaths involve a small quantity of construction, and will not involve the newly acquired land, so the construction period is short, which will not have obvious impact on the forests and vegetation in the forest park, and will not impact the structure and function of the forest park.

② Impacts of the project implementation on the landscape and scenic spots of the forest park

According to Figure 6.3-4, the footpath construction will not occupy the land of any landscape or scenic spots, and will not destroy the original landscape or scenic spots. During the project implementation, a small number of roads will be located near some scenic spots, but during the implementation of the project, the construction scope will be strictly controlled, with the enclosure erected, special people arranged for management and publicity and education strengthened. After such measures are taken, the project will have little impact on the scenic spots in the forest park. After the completion of the project, its impact on the scenic spots will disappear, and the connectivity among the south-north vertical landscape, the east-west horizontal landscape and all the scenic spots in the forest park will be improved obviously, which will facilitate the visitor sightseeing in the forest park.

(3) Conclusion of the impact of the construction on the forest park

According to the above description, the construction phase of this project involves the areas near the scenic spots, but will not have direct impact on the forests, vegetation and existing scenic spots in the forest park. It will have little impact on the structure, functions and landscape of the forest park. With the completion of the project, such impact will disappear. The project construction is consistent with the nature of Nanshan National Forest Park, meets the requirement of protecting Nanshan National Forest Park, and conforms with relevant policies, laws and regulations of the state and Chongqing.

6.3.2 Analysis of the impact of the project on Liangfengya Municipal Forest Park

(1) Positional relation between the project and the forest park

Based on the vector data of the planning area of Liangfengya Municipal Forest Park, and with application of the space analysis tool of Arcgis, it can be known that in this project, there is one overall space footpath and two hiking footpaths located in Liangfengya Municipal Forest Park (Figure 6.3-5). The overall space footpath is 548m long. The two hiking footpaths are 3,080m long totally, respectively 2,546m and 535m long. No community regeneration projects or public space regeneration projects are involved.

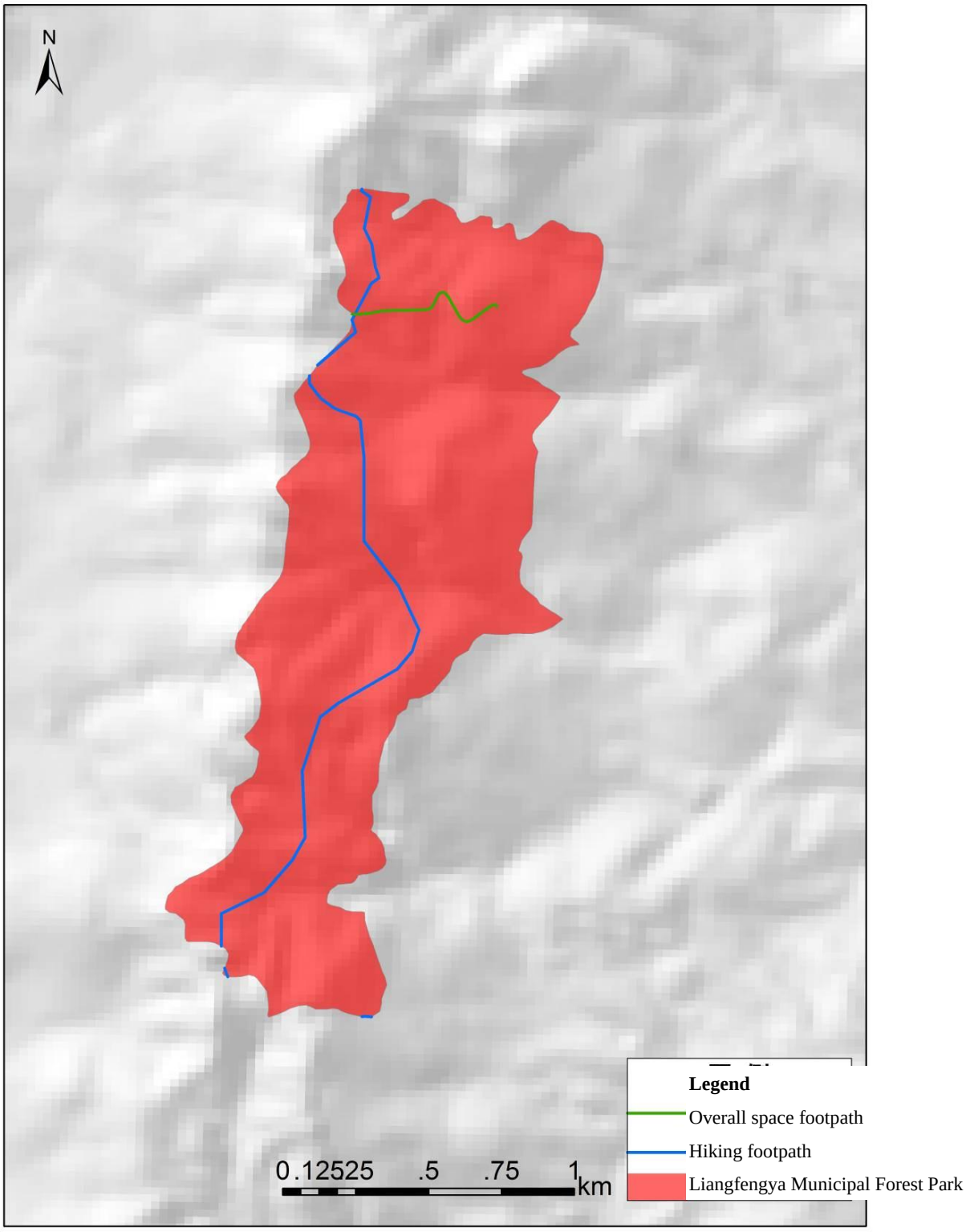


Figure 6.3-5 Projects located in Liangfengya Municipal Forest Park

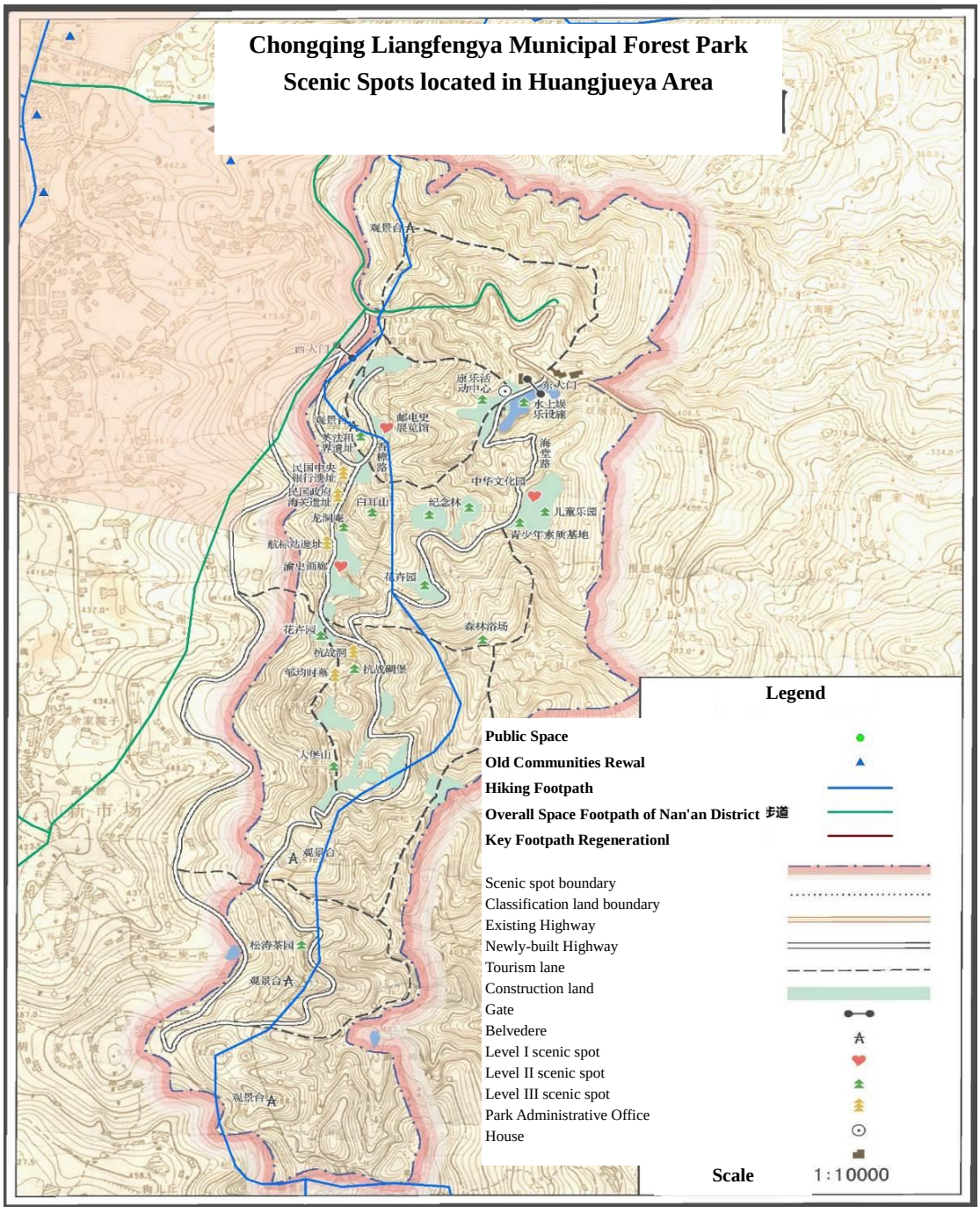


Figure 6.3-6 Positional relation diagram of the project and Liangfengya Municipal Forest Park

(2) Analysis of the impact of the project on the forest park

① Impacts of the project implementation on the structure and function of the forest park

According to Figure 6.3-5, the projects located in the forest park only include one overall space footpath and two hiking footpaths, 3,628m totally, which can be a very small quantity of construction. The content of the project is to open dead end roads, regenerate the road surface, install rest facilities, install the distribution and pipeline facilities, etc., involving a small quantity of earthwork excavation, footpath surface pavement, street facility installation and other

construction techniques with minor environmental impact. The footpaths involve a small quantity of construction, and will not involve the newly acquired land, so the construction period is short, which will not have obvious impact on the forests and vegetation in the forest park, and will not impact the structure and function of the forest park.

② Impacts of the project implementation on the landscape and scenic spots of the forest park

According to the feasibility report and Figure 6.3-6, the footpath construction will not occupy the land of any landscape or scenic spots, will not destroy the original landscape or scenic spots, and will not involve any water body. During the project implementation, a few roads will be located near some scenic spots, but during the implementation of the project, the construction scope will be strictly controlled, with the enclosure erected, special people arranged for management and publicity and education strengthened. After such measures are taken, the project will have little impact on the scenic spots in the forest park. After the completion of the project, its impact on the scenic spots will disappear, the connectivity among the south-north landscape and scenic spots in the forest park will be improved, and the project will vertically connect the observation deck, the UK and French Concession historical sites, Bai'er Mountain, Flower Garden, Forest Bath Yard, Songtao Tea Garden and other scenic spots. The footpath construction will not occupy the land of any landscape or scenic spots, will not destroy the original landscape or scenic spots, and will facilitate the visitor sightseeing in the forest park.

(3) Conclusion of the impact of the construction on the forest park

According to the above description, the construction phase of this project involves the areas near the scenic spots, but will not have direct impact on the forests, vegetation and existing scenic spots in the forest park. It will have little impact on the structure, functions and landscape of the forest park. With the completion of the project, such impact will disappear. The project construction is consistent with the nature of Liangfengya Municipal Forest Park, meets the requirement of protecting Liangfengya Municipal Forest Park, and conforms with relevant policies, laws and regulations of the state and Chongqing.

6.3.3 Analysis of impacts of the project on Nanshan-Nanquan Municipal Scenic Area

(1) Positional relation between the project and the scenic area

Based on the vector data of the planning area of Nanshan-Nanquan Scenic Area, and with application of the space analysis tool of Arcgis, it can be known that in this project, the Nanshan Sub-district Regeneration Project of Nanshan District is located within such scenic area, including two communities, namely Huangjueya Community and Zhenwushan Community; some overall space footpaths and hiking footpaths are located within the scenic area, including 45 overall space footpaths and 106 hiking footpaths (Figure 6.3-7). With the application of the space analysis tools of Arcgis and others, it has been know that the overall space footpaths located in the scenic area are 30,031m long in total, the longest one of which is 2,670m and the shortest one, 41m, and the

hiking footpaths located in the scenic area are 72,145m long in total, the longest one of which is 3,445m and the shortest one, 2m. No public space regeneration projects are involved in the scenic area.

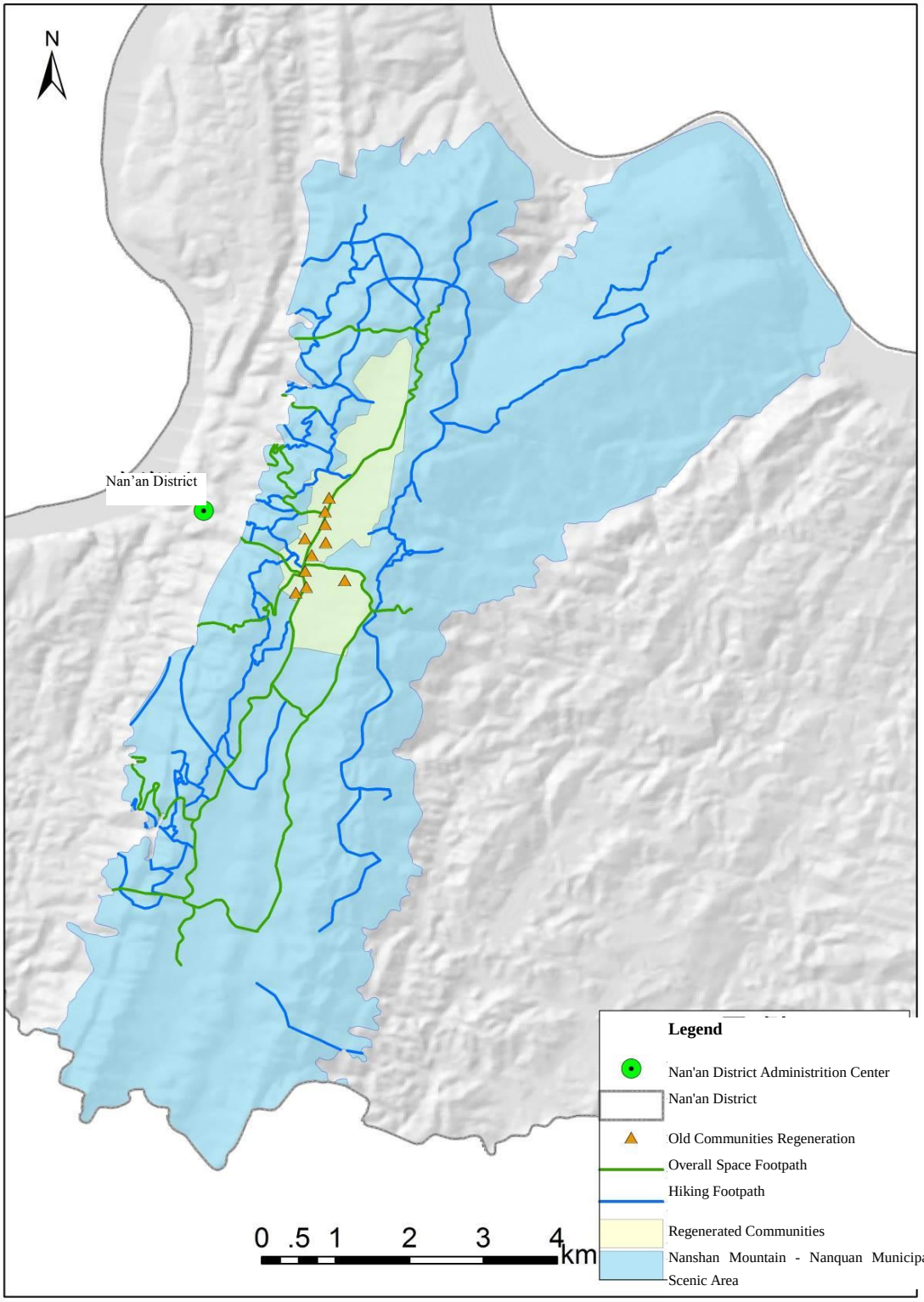


Figure 6.3-7 Projects located within Nanshan-Nanquan Scenic Area (in Nan'an District)

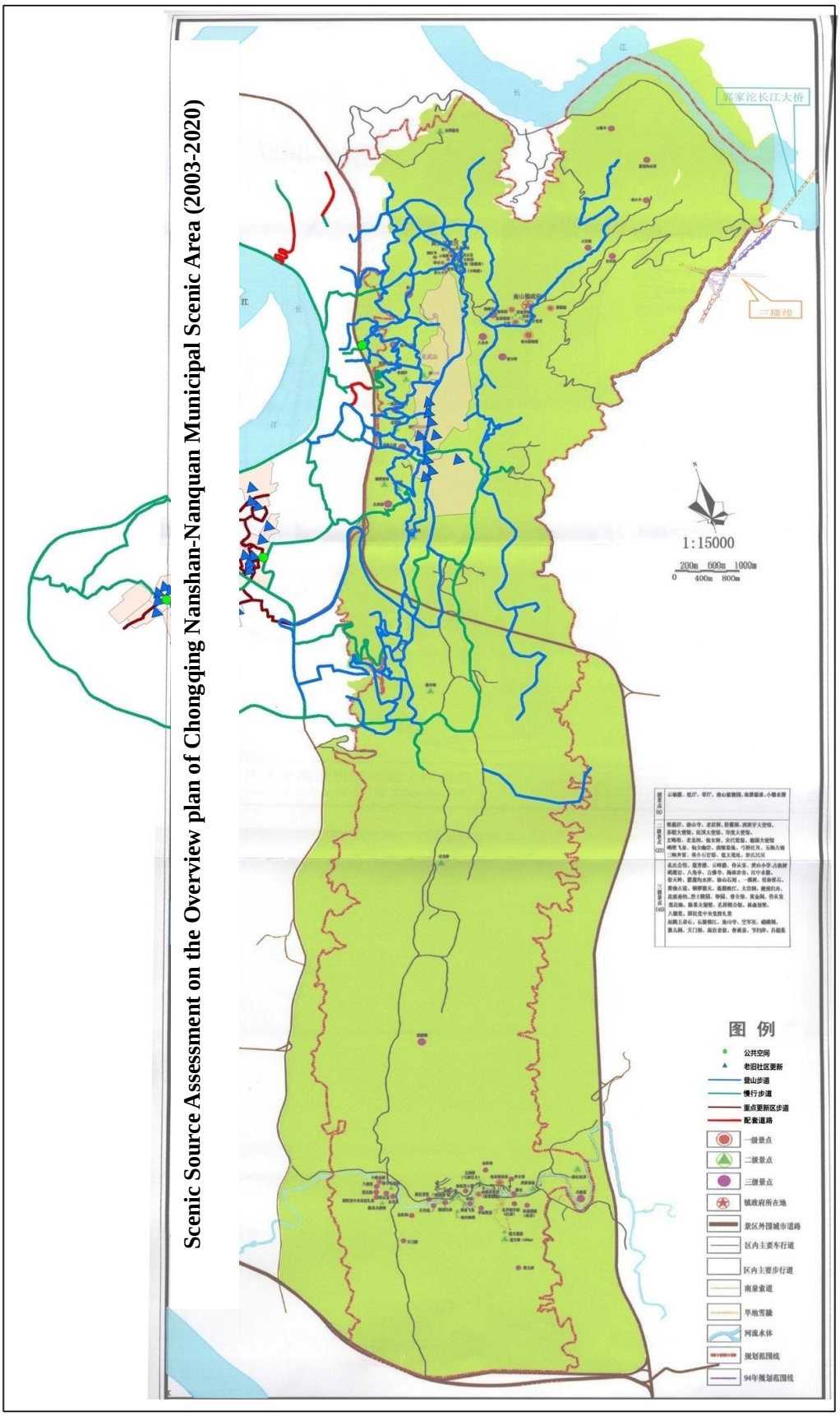


Figure 6.3-8 Positional relation diagram of the project and Nanshan-Nanquan Municipal Scenic Area

(2) Analysis of impacts of the project on the scenic area

① Impacts of the project implementation on the structure and function of the scenic area

Scenic areas are regions of ornamental, cultural or scientific values, gathering both natural and human cultural landscape, and with beautiful environment, for visitors' sightseeing or conducting scientific and cultural activities.

This project has three aspects of content in such scenic area, namely the overall space footpaths, hiking footpaths and Nanshan Sub-district Community regeneration. The Nanshan Sub-district Community regeneration include: ① adding lighting and monitoring facilities; ② transformation of sewer pipe networks and various pipelines; and ③ greening layout, treatment of fallen exterior wall tiles, roofing waterproof treatment, installation of fitness and leisure facilities, etc. All the road projects are road reconstruction, so the implementation of such projects will not involve newly acquired land and will have no impact on the core scenic area and scenic spots of the Scenic Area, but little impact on the structure and function of the Scenic Area.

② Impacts of the project implementation on the landscape and scenic spots of the scenic area

During the implementation of the project, due to the aboveground vegetation damaged by the construction, increased exposed slopes, etc., the landscape quality will be decreased and the landscape function will be weakened, so the project will have temporary adverse impact on the forests, landscape, and the like in the scenic area, but the construction scope will be strictly controlled, with the enclosure erected, special people arranged for management and publicity and education strengthened. After such measures are taken, the project will have little impact on the scenic spots in the scenic area. After the completion of the project, its impact on the scenic spots will disappear, and the construction area may be recovered by landscape planting to minimize the impacts of the construction.

(3) Conclusion of the impacts of the construction on the scenic area

According to the above description, the construction phase of this project involves the areas near the scenic spots, but will not have direct impact on the vegetation and existing scenic spots in the scenic area. It will have little impact on the structure, functions and landscape of the scenic area. With the completion of the project, such impacts will disappear. The project construction meets the requirement of protecting scenic areas, and conforms with relevant policies, laws and regulations of the state and Chongqing. Generally, the project construction will have little impact on the landscape and scenic spots in the scenic area.

6.3.4 Analysis of the impacts on Physical Cultural Resources

As analyzed in Section 4.4.2, in Nan'an district, Nanbin Road historical buildings, a Laojun Temple by Longhuang Road and Anti-Japanese War (WWII) historic site museum will be potentially impacted by pedestrian improvements activities in Nan'an district. Construction will be

very simple works like paving on the existing road, which will not encroach the boundary of those PCRs. Design of the pedestrian has incorporated into the coordination with the landscape of those historical sites.

In accordance with the *Law of the People's Republic of China on the Protection of Cultural Relics*, no facilities that pollute the sites protected for their historical and cultural value or their environment may be put up within the area of protection for these sites or the area for control of construction, and no activities that may adversely affect the safety and environment of these sites may be conducted. Where there are already facilities that pollute the sites and their environment, they shall be brought under control prior to a specified deadline. No construction of additional projects or such operations as blasting, drilling and digging may be conducted within the area of protection for a historical and cultural site. However, where under special circumstances it is necessary to conduct construction of additional projects or such operations as blasting, drilling and digging within the area of protection for such a site, its safety shall be guaranteed, and the matter shall be subject to approval by the people's government which originally verified and announced the site and which, before giving approval, shall ask consent of the administrative department for cultural relics under the people's government at the next higher level; and where construction of additional projects or such operations as blasting, drilling and digging are to be conducted within the area of protection for a major historical and cultural site protected at the national level, the matter shall be subject to approval by the people's government of the relevant province, autonomous region, or municipality directly under the Central Government, which, before giving approval, shall ask consent of the administrative department for cultural relics under the State Council.

The physical cultural resources involved in the project construction include Nanbin Road Ancient Architectural Complex, Laojundong Temple and Chongqing Anti-Japanese War Ruins Museum. The footpaths and hiking footpaths of the overall space in the project are planned to be rebuilt, and simple construction work like paving is planned to be conducted on the existing road, which will not pollute cultural relics protection units and their environment. nor construction of additional projects or such operations as blasting, drilling and digging conducted within the area of protection for a historical and cultural site. Meanwhile, the improvement of footpaths will not affect those historical sites. The landscape harmony has been considered in the design, so it will have little influence.

For the historical buildings along the Nanbin Road and Laojun Taoist Temple, the project supported pedestrian walkways won't physically encroach these historical sites. Nonetheless, precaution should be made given the proximity of the constructions activities to the relics sites.

For the Chongqing Anti-Japanese War Historical Site Museum, it is an area of about 500mu (33ha) that housed 15 buildings (See below topography map). A number of the project supported trails are located within the area. Rehabiltation of the trails are based on approved protection planning and will be conducted following strict regulatory guidelines. It is not

expected the construction activities will have significant impacts to the historical site.

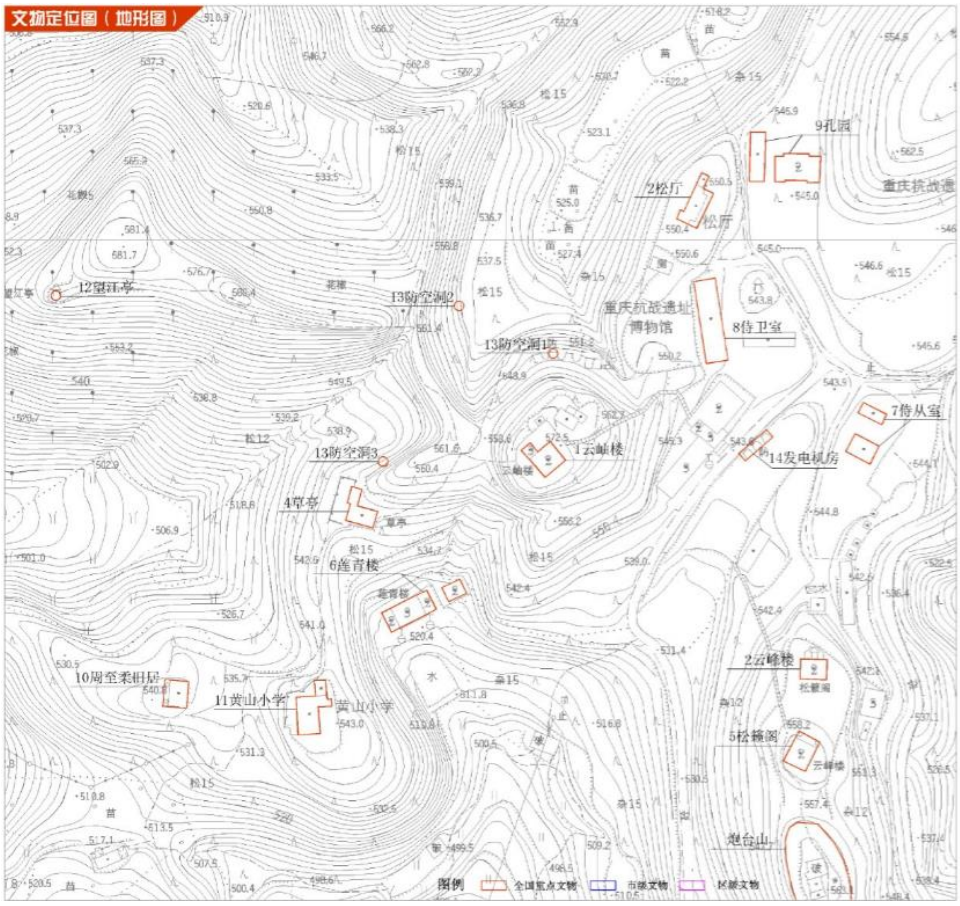


Figure 6.3-9 Topography map and historical buildings in the Chongqing Anti-Japanese War Historical Site Museum

Other thant these identified PCR sites, where any road plan involves the area of the sites protected for their historical and cultural value or the area for control of construction, the Environmental Impact Assessment requires the project should consider the avoidance measures first, to avoid the impact on the sites protected for their historical and cultural value. However, where the impact on the area of protection for such a site cannot be avoided, its safety shall be guaranteed, and the matter shall be subject to approval by the people's government which originally verified and announced the site and which, before giving approval, shall ask consent of the administrative department for cultural relics under the people's government at the next higher level; and where construction of additional projects or such operations as blasting, drilling and digging are to be conducted within the area of protection for a major historical and cultural site protected at the national level, the matter shall be subject to approval by the people's government of the relevant province, autonomous region, or municipality directly under the Central Government, which, before giving approval, shall ask consent of the administrative department for cultural relics under the State Council; during the construction, in case any underground cultural relics or remains are discovered, in accordance with laws and regulations pertaining to cultural

relics, the construction unit should protect the site well, and inform the cultural relic administrative department without delay for rescue and processing to ensure the safety of such cultural relics or remains and the smooth construction of the project. After foregoing measures are taken, the project will have little impact on all the culture relic protection sites.

7 Mitigation measures for environmental impacts

7.1 Environment protection measures during construction phase

7.1.1 Prevention and control measures for sewage and wastewater pollution

The pollution control measures to be taken during the construction phase are as follows:

(1) Sanitary sewage from constructors

The sanitary sewage produced by the constructors is strictly forbidden to be discharged directly into the natural water body. The river beach should be avoided at construction site selection (for example, the beach under Dafosi Bridge). If it is impossible to connect with the existing municipal sewage pipe network, the sewage should be regularly sucked by the fecal suction truck to the sewage treatment plant for treatment after being collected and pretreated by the biochemical pool; if the municipal sewage pipe network can be connected, the sewage shall be discharged to the municipal sewage pipe network after being collected and pretreated by the biochemical pool.

It is suggested that the construction unit should try to rent the local residences when constructing the construction camp. If it is indeed necessary to construct temporary construction residences, the construction camp should be arranged within the permanently acquired land.

(2) Construction wastewater

The wastewater produced by the project is mainly the concrete curing wastewater in the supporting road construction, the wastewater from washing the transportation vehicle tires, the oily wastewater produced by the maintenance of the construction machines, etc. The construction wastewater will be reused or used for reducing dust in the construction site and roads after the treatment of the oil separation and grit chamber erected in the construction site, without being discharged outside.

(3) Management measures

The environmental protection education as to the construction site and the construction camp should be carried out for the construction personnel to make them understand the importance of water resources protection. Reasonable construction procedures should be developed for efficient organization of construction operations, and the construction management and engineering supervision should be strengthened. Construction machines must be strictly inspected to prevent oil leakage polluting water body. Construction materials such as oil and chemicals should not be piled near the surface water body, and the canvas should be prepared as temporary shelter. During the construction, the plastic film or non-woven fabrics should be applied to cover the excavation and filling slopes without protective measures, topsoil stockpiling location, stockpiling yard and the like, and measures like woven soil bags as fence and intercepting ditches should be taken around the topsoil stockpiling location and the stockpiling yard. Scientific, reasonable, efficient

and strict construction management will help to reduce the impact of construction phase on the surrounding surface water environment.

(4) Others

①The principles of "water for multiple usages, recycling and water saving" shall be implemented in the process of construction, and efforts should be made to reduce the discharge of wastewater.

②The management of construction machines should be strengthened to prevent moving, false use, dripping and leaking of the machines.

The Environmental Impact Assessment thinks that after foregoing water pollution prevention and control measures are taken, the sewage and wastewater produced during the construction phase will have little impact on the environment.

7.1.2 Ambient air pollution prevention and control measures

The ambient air pollution mitigation measures during the construction phase shall be in strict accordance with the *Prevention and Control Measures for Dust Pollution of Chongqing Main Urban Districts* (Chongqing Municipal People's Government Order No. 272), the *Notice of* Chongqing *Municipal People's Government on Enclosed Transport of Materials Easy to Scatter and Leak in Main Urban Districts* (YF Order No. 164) and other relevant regulations, and relevant measures mainly include:

(1) The construction unit shall, in accordance with the technical specifications for the prevention and control of dust pollution, formulate the prevention and control plan for dust pollution in combination with the actual situation of a specific project, and report to the municipal administrative department and the administrative department responsible for supervision and management of the dust pollution of this project respectively for recording three working days before the commencement of the project;

(2) Promoting the wet operation during the construction, erecting the watering for dust prevention supporting devices on the construction site, and strengthening the watering for dust prevention. (3) The entrance and exit for transport vehicles should be properly arranged on the construction site, the tires of the vehicles out of the construction site must be washed for soil at the exit, and the wastewater from such washing should be treated by establishing sedimentation tanks.

(3) Building hard enclosed fences before the construction of the road section involving sensitive points, which shall be not lower than 1.8m.

(4) The enclosures of not lower than the height of the stacked materials shall be erected for such materials easy to rise or scatter as cement, mortar and plaster stacked in the open air or the construction wastes which cannot be cleared and transported within 48h, which shall also be covered; it is forbidden to throw construction wastes or materials easy to rise or scatter from a places higher than 3m; bulk materials (cement, river sand, etc.) shall be enclosed (covered or

sheltered) for transportation.

(5) The sites that may be idle for more than 3 months should be covered, simply paved or afforested; after the completion of the project, the construction waste shall be removed within 10 days from the date of application for acceptance of the project completion;

(6) The construction site should be equipped with the watering cart for watering in dry weather on the construction site, and focus on the communities and sub-districts affected by the project construction;

(7) Use commercial concrete, and the construction site shall not be equipped with large concrete mixing stations which are not necessary for the process. Modified asphalt concrete shall be used for road surface, and the construction progress shall be accelerated at paving. The construction machines and plant shall be regularly maintained to keep them in good condition, and reduce the exhaust gas and pollutant emission from construction equipment.

(8) Construction personnel use the liquefied gas (LPG) as their living fuel.

After aforesaid air pollutant prevention measures are taken, the adverse effects of the dust produced during the construction on the environment can be effectively suppressed, and its overall impact on the surrounding sensitive points can be limited.

7.1.3 Noise pollution prevention and control measures

High-noise construction sites shall be located in areas far away from the environmental sensitive points;

The organization of the construction can be well designed by appropriate layout of construction machines and proper arrangement of the construction intensity. Try to place construction machines far away from surrounding sensitive points, appropriately position high-noise machines on the construction site, and erect fences around the construction site; temporary machine rooms should be arranged for strong-noise machines on the site like air compressors and diesel engines.

Choose low-noise equipment that meets national standards, strengthen the maintenance of such equipment, and avoid the high noise pollution caused by the abnormal working of such equipment;

In accordance with the *Emission Standard of Environment Noise for Boundary of Construction Site* (GB12523－2011), the construction time shall be appropriately arranged and the construction machines with strong noise are forbidden to work near residential areas at night (22:00 to 6:00); where under special circumstances it is necessary to conduct continual construction, the prior approval of relevant departments must be obtained and the prior communication with residents shall be conducted;

Night construction operations which may emit noise pollution other than urgent repair and emergent rescue shall be prohibited at the area with dense noise sensitive buildings within 15 days

before and during the college entrance examination and the senior high school entrance examination, and the construction operations which may produce environmental noise pollution shall be prohibited within the area of 100m around the examination rooms during the college entrance examination and the senior high school entrance examination;

The passing time of the construction vehicles should be coordinated during the construction phase. With busy existing traffic, the construction unit, the construction party and the traffic administration shall strengthen their communication and coordination to avoid traffic jams. During the transportation at night, measures of slowing down and no honking will be taken. Strengthen the maintenance of construction machines;

Some existing roads within the project area will be used to transport construction materials, earth and stone during project construction, and attention should be paid to the appropriate arrangement of the construction material transportation time. When vehicles pass the road sections of residential areas and schools, measures of slowing down and no honking should be taken.

Minimize the environmental noise hazard caused by the construction by optimizing the construction plan and appropriately arranging the construction period; at the construction bidding, the measures to reduce the environmental noise pollution shall be listed in the construction organization design and defined in the contract.

Operators and construction personnel on site should control working hours and take self-protection measures as per the Occupational Health Standard, for example, wearing earplugs, helmet, etc.

The supervision unit shall supervise the noise during the construction phase, be equipped with a certain amount of simple noise measuring instruments and monitor the residential areas near the construction site to ensure that they will not be impacted by the noise exceeding the standard.

After foregoing noise prevention and control measures are taken, the impact of the construction noise on the regional environment can be minimized.

7.1.4 Solid waste pollution presentation and control measures

The solid wastes at the construction phase are manly disused earth and stone, construction wastes and the municipal solid wastes from constructors.

Solid wastes during the construction phase shall be treated under the principles of “gathering together, separate treatment and recycling”. Waste slags will be directly transported to surrounding legal slag disposal fields (for example, Nan’an District Yinglong Slag Disposal Field, Nan’an District Changsheng Refuse Landfill, isolating green belt land reclamation spoil ground, etc.). Transport vehicles for waste earth and stone are prohibited from over-speed and overload; at the same time, fences and covering measures will be taken to prevent the waste slags from falling on the road to intensify the impact of the rising dust.

The project plans to take measures of collection at fixed points and regular clearing and transportation for the municipal solid wastes during the construction phase. At the construction camp, the management of municipal solid waste sorting will be adopted. Special people will be employed to regularly clear up the waste which will be delivered to the nearby refuse treatment station for treatment, and shall be prevented from scattering on the way to the station. At the same time, special attention should be paid to the maintenance and management of the temporary dump sites, and prevention of the wastes from scattering everywhere caused by stacking wastes randomly, and at the same time, spray germicides and pesticides to the stacking point to reduce the breeding of mosquitoes and germs.

7.1.5 Ecological environment protection measures

(1) Yielding measures

This project mainly considers the possible impact of the construction of slow walking systems and the public space on the ecological environment. The construction should reduce the occupation of ground facilities, and the places with dense vegetation should be avoided at the selection of the construction road, the construction camp, etc.

(2) Mitigation measures

Before the construction, the mellow soil of the topsoil layer in the area of the acquired land should be stripped, piled up at fixed points and covered with waterproof membrane. After the completion of the construction, the mellow soil may be used as the surface covering soil to recover the construction slash.

The disturbance to the surrounding ecological environment can be minimized by appropriately arranging the construction site, trying to confine the construction activities to the area of the acquired and occupied land for construction, and transplanting large and tall trees within the area of the occupied land before construction.

The inevitable water and soil loss caused by the construction can be minimized by appropriate design of the construction during the construction phase and excavation and filling by phases and areas.

Combined with the construction plan in an organized way, to build facilities of grit chambers, drainage ditches, retaining walls, etc. in advance. In order to ensure the stability of the temporary stacking and prevent the water and soil loss during construction, the necessary fences and covers shall be made for the temporary stacking, and at the same time, drainage ditches will be built in the direction where the water comes. During the construction in the rainy season, woven bags and plastic cloth may be used to cover the slope side of the excavated exposed soil and so on to reduce the earth surface erosion caused by the rainwater.

It is strictly forbidden to dump waste soil and slags into or clean construction equipment by the natural water bodies.

Raise the awareness of protection of the construction personnel. The construction method and time should be planned well to reduce the disturbance of the construction noise to the wild animals. Management should be strengthened to avoid direct discharge of sanitary sewage and construction wastewater, so as to reduce water pollution and maximize the protection of animal habitats.

(3) Recovery measures

① After the completion of the construction, the temporarily occupied land should be recovered in time, and the appropriate collocation of trees, shrubs, flowers and grass should be strengthened.

②The tall trees transplanted during the construction phase can be used for afforestation upon the conclusion of the construction.

③ Upon the conclusion of the construction, the bare areas along both sides of the road should be afforested, grass sowing by spraying for soil slopes, and spraying organic matrix for stone slopes.

(4) Water and soil conservation measures

In accordance with the stipulations of the *Law of the People's Republic of China on Water and Soil Conservation*, the *Regulations for the Implementation of the Law of the People's Republic of China on Water and Soil Conservation*, etc., the possible water and soil loss caused by the construction of this project must be protected. The principles and objectives of the water and soil loss control shall meet the general requirements of the state on soil and water conservation and environmental protection. The design of soil and water conservation should be synchronized with engineering design, construction and acceptance. The project construction unit shall bear the cost of controlling the water and soil loss caused by the construction.

7.2 Environment protection measures during operational phase

7.2.1 Prevention and control measures for sewage and wastewater pollution

The wastewater during the operational phase is mainly the sanitary sewage produced by urban residents at the public space, which will be discharged into the municipal sewage pipe network. The management of the drainage facilities of the project road should be strengthened, with regular inspection and maintenance maintained, and waring signs of "slow down and safe driving" are erected along the road.

7.2.2 Ambient air pollution prevention and control measures

Afforestation: the construction of green belts of the project should be improved. The points, lines and planes should be integrated and trees, shrubs, flowers and grasses should be appropriately matched. The function of absorption of the vegetation should be used to mitigate the impact of the exhaust gas on the two sides of the project.

Reducing road damage: the specifications and load of vehicles on the road shall comply with

relevant regulations. The dust prevention measures should be taken for damaged road surface in time which should be repaired within a month.

The vehicle exhaust emission inspection system will be implemented and the vehicles with their emitted exhaust gas exceeding standard will be controlled for being on road.

The public toilet management should be strengthened. Public toilets should be timely cleaned and kept sanitary and ventilated. Afforestation should be made around public toilets to reduce the escape of the bad smell.

Biochemical pools should be equipped with exhaust funnels to lead the bad smell above the ground for emission, with the emission height of 1m, in the form of shutter type, and surrounded by enclosed green space.

7.2.3 Noise pollution prevention and control measures

(1) Traffic management measures

①The road should be maintained regularly to improve the pavement smoothness and reduce the road traffic noise.

② Strengthen the management and maintenance of vegetation in green belts. In case of unrecoverable dry and dead plants, additional planting should be made timely to guarantee the noise reduction effect of the isolation bet.

(2) Planning feedbacks

① Controlling distance

When new buildings are planned along both sides of the roadbed, the school teaching buildings, hospital inpatient departments and residential areas should be kept far away from the planned supporting roads of this project.

② When new buildings are planned along both sides of the roadbed, buildings near streets should be designed for those with low noise standards, such as commercial, industrial and trading, public places, etc. as barriers (the sound can be reduced by the first row of buildings by 10dB to 15dB). The first row of buildings near streets should be equipped with sound proof windows to enhance the sound insulation effect of the windows of the buildings near streets. The plane structure of the buildings near streets should be designed as the u-shaped structure against the road. Change the orientation of the houses. The house may have its back against the road or the house gable wall faces the road. It should be avoided that the bedroom faces the road. The non-residing rooms of kitchens, toilets, and the like should be arranged to face the road.

(3) Engineering measures

The alternative acoustic environment protection measures in highway engineering include: noise barriers, sound insulation windows, environmental relocation, noise reduction by planting trees, etc. See Table 7.2-1 for comparison of common measures and analysis of noise reduction effects.

Table 7.2-1 Common highway noise treatment measures list

Prevention and control measures	Strengths	Weakness	Prevention and control effects	Implementation costs
Noise barriers	Land efficient, simple, practical, feasible, effective, with low one-off input, and easy to be implemented in road construction.	Noise barriers have good noise control effect on the nearby sensitive points but are costly and will impact the traffic safety.	Ordinary vertical sound absorption barriers of more than 3m can reduce noise by about over 10dB; semi-closed noise barriers, by 10 to 18dB; and closed noise barriers, generally by 23dB, or even 30dB max.	Complex sound absorption barriers cost about RMB 1,500/m^2; and closed noise barriers, about RMB 50 million/km.
Sound insulation windows	Available for public buildings, or the buildings severely polluted by noise or with good architectural structures.	High requirement as to technology, with poor effect on adobe houses or houses with poor designability.	Obvious noise reduction effect, with sound reduction index up to over 25dB.	RMB 800~1,200/m^2
Environmental relocation	It has the virtue of being able to permanently “address” the noise pollution problem, with remarkable environmental and social benefits.	Land has to be acquired again for development, with huge package investment, and relocation will cause new environmental problems.	It may completely address the problem of noise disturbance.	RMB 300-500 thousand/household
Green belt to reduce noise	It has the effects of noise insulation, dust prevention, environment improvement, etc.	Covering more land	The green belt of 10m wide with compactly planted arbors and bushes may reduce noise by 2 to 3dB; that of 20m wide may reduce by 3 to 5dB.	RMB 80-200/m

It can be known from the foregoing table that the noise barriers will have a better noise reduction effect in the case of excessively high noise level at the sensitive points along the line, especially when the sensitive points are close to the proposed highway. The noise reduction effect of sound insulation windows is also very good, but it is difficult to operate when there are more resident users involved at the limit exceeding sensitive points. Environmental relocation can solve the noise pollution at one time, but the cost is high. During the construction process, the project may be combined with the regional planning and construction to relocate part of the limit exceeding sensitive points. Planting green belts can reduce noise, beautify the environment and stabilize slopes. The effect of noise reduction by afforestation is related to the width of the green belt. The noise reduction increases with the increase of the width of the green belt. When the width of the green belt is 20m, the noise can be reduced by 3 to 5dB.

To sum up, for this project, the easier noise reduction measures are to plant protective forest belts of trees along both sides of the road, reserve special noise monitoring and treatment funds, and strengthen the monitoring during the operational phase. If the noise of the operational phase disturbs people, the residents and schools affected by excessive noise should be additionally equipped with sound insulation windows which can reduce noise by 15 to 20dB(A) and thus the impact of the traffic noise of the operational phase on residents and schools can be reduced greatly.

The areas at two sides of part road sections of the road project of this project have been planned to be residential land and commercial & residential land. The Assessment requires that the installation conditions of noise barriers along both sides of such sections should be reserved so as to determine whether noise barriers should be erected according to the actual impacts when new buildings are planned along both sides of the road.

According to relevant researches, the porous asphalt pavement has better sound absorption and noise reduction effect. Compared with ordinary asphalt, it can reduce noise by 4dB and above. Whereas many constructed residential areas, schools, and planned residential areas are distributed along both sides of the road project, the Assessment requires all the road surfaces of the road sections in Nan’an District should be made of porous asphalt pavement, to further reduce the impacted scope of traffic noise.

7.3 Mitigation measures for social impacts

7.3.1 Measures to mitigate the impacts of land acquisition and resettlement

First, when the route alternatives are compared, the land acquisition and resettlement shall serve as an important factor, and the alternative of occupying less land and involving less resettlement should be given priority;

From its beginning, the land acquisition should be carefully planned and well organized. When the land acquisition compensation plan is formulated, a hearing should be held to solicit

opinions and suggestions from the people involved, so as to make the compensation plan as reasonable as possible;

Conduct social investigation, actively communicate with the people involved in the land acquisition, and answer all the questions of them as to the land acquisition. Publicize the significance and impact of the project on improving the environment, promoting local economic development, promoting the increase of surrounding land value and providing more jobs for residents through various new media. Try to be supported by the local residents;

Improve the policies pertaining to the land acquisition and resettlement, pay attention to the protection of the residents' immediate interests, strictly implement the compensation standards for demolition and relocation, and adhere to "fairness, justice and openness", and make compensation according to law. The amount of the resettlement payment should be timely paid in full, to smoothly and effectively implement the land acquisition and reduce the resistance from the masses. As for the residents resettling in a place other than their own hometown, the publicity and construction of supporting facilities and planning effects of surrounding transportation and other facilities should be intensified, to gradually guide the residents to accept the resettlement plan;

Develop a risk early warning system. The unstable factors during the land acquisition and resettlement are to be checked every day. The security on the site will be strengthened to promptly and effectively solve the possible emergencies.

7.3.2 Measure to mitigate the impact of construction on residents' travel and safety

Optimize the construction plan. As for the road sections the residents must pass, actively optimize the construction plan, try to accelerate the construction progress, and timely inform the residents of the construction progress through various channels;

Regularize the construction activities. The construction vehicles and equipment shall be strictly required to operate within the specified construction area and shall not affect the normal operation of the vehicles outside such area. For some construction intersections that cannot be divided, personnel should be assigned for watching over, and guide and direct the traffic on site;

Enhance safety protection. Each construction unit shall erected fixed warning signs in prominent positions to remind vehicles of slowing down. The signs of "One Vehicle Allowed" should be erected at both ends of the construction section;

Strengthen emergency management. Equipment and vehicles for emergency rescue should be completely equipped. In case of any emergency and dangerous case, it should be ensured that they can be responded fast and efficiently.

7.3.3 Mitigating adverse impacts near school

(1) During construction, an access road dedicated to the students and school workers should be demarcated, fenced and signed to protect them from potential harm of construction vehicles;

contractor should assign dedicated personnel onsite to direct the traffic;

(2) Arrange the construction time properly, undertake construction in summer and winter vacations and holidays as practical as possible, and forbid the construction work near the school within 15 days prior to and during the college entrance examination and senior high school entrance examination;

(3) A closed hard fence shall be installed on the road section near the teaching building before construction, no lower than 1.8m;

(4) During school hours, the road construction must be paused until all students leave the road.

7.3.4 Mitigating adverse impacts on special groups of people

In the course of the project, special groups of people, especially the elderly, the poor, the disabled and the migrant population, are widely heard to protect their interests.

After the construction of the project is completed, the expenditure of the property management fee will be strictly checked to ensure that the increase of such fee is within a certain range. Relevant policies will be introduced to ensure that needy groups of people will not spend more for the rising property management fee after urban regeneration and transformation, and the government will subsidize part property management fee of the impoverished people.

During and after the project, the created employment opportunities will be maintained and managed, and the priority will be given to the impoverished people, migrant population and other needy groups.

7.3.5 mitigation measures impacts on Physical Cultural Resources

To minimize potential residual impacts on Physical Cultural Resources, the environment management plan includes a series of mitigation measures, including:

(1) Within the protection scope of cultural relics protection units, no other construction works or blast, drilling, excavation, etc. shall be conducted;

(2) Training and awareness raising to contractors must be carried out before and during the construction;

(3) Enhance construction supervision near those historical sites to avoid careless construction practices;

Further, chance-find procedure has been included in the EMPs. Namely, during construction, if any underground cultural relics are newly discovered, the construction unit shall suspend construction and, according to related laws of cultural relics, notify the cultural management department for rescue and treatment in a timely manner to guarantee the safety of cultural relics.

8 Analysis of land acquisition and resettlement impacts

The content of this section is quoted from the *World Bank Funded Chongqing New Urbanization Pilot and Demonstration Project Nan'an District Urban Regeneration Project Resettlement of Affected Residents Action Plan.*

8.1 Impacts of land acquisition, demolition and resident resettlement

Based on the preliminary investigation and identification, the real situation of all the sub-projects of Nan'an District Urban Regeneration Project has been known as to the land acquisition, house requisition, etc., and the sub-projects requiring due diligence investigation according to the investigation include: Hugui Road Project and part road sections of Longhuang Highway Widening and Transformation Project. The sub-projects requiring resettlement of affected residents plan include: Tushan Branch Road Project (involving land acquisition, demolition and resident resettlement) and part road sections of Longhuang Highway Widening and Transformation Project (involving land acquisition, demolition and resident resettlement). The other sub-projects require no land acquisition, demolition and resident resettlement.

This Resettlement of Affected Residents Action Plan is for such two sub-projects as Tushan Branch Road Project (involving land acquisition, demolition and resident resettlement) and part road sections of Longhuang Highway Widening and Transformation Project (involving land acquisition, demolition and resident resettlement). The project will have impact on such three communities as Liujiagang Community, Liuhulan Village, Tushan Town, Nan'an District, Guihuayuan Community, Lianhua Village, and Shanghao Community, Longmenhao Sub-district; permanently acquired rural collective land of 14.2mu, including 6.5mu of cultivated land, 2.5mu of farming land for other purposes (planting a small number of trees, etc.), 3.9mu of homestead, and 1.3mu of unused land. The number of people affected by such land acquisition is 14 households of 36 people.

The demolished rural houses cover 1,450m^2, demolished urban residences 539m^2, demolished non-residence houses on state-owned land 4,464.32m^2, and demolished houses with limited property rights 4,636.8m^2. The number of people affected by such house demolition is 31 households of 90 people.

8.2 Resettlement principles and compensation entitlement

To avoid and reduce resettlement of affected people for land acquisition, our company closely consulted with local government and the neighborhood committees during the preliminary feasibility study of the project. We also adjust the route at road design to decrease the resettlement of Chongqing No. 11 Middle School and part industrial businesses.

8.2.1 Rural collective land acquisition:

The compensation standard for land acquisition shall be in accordance with the *Notice of Chongqing Municipal People's Government on Issues Pertaining to Further Adjusting Compensation and Resettlement Standards for Land Acquisition* (YFF [2013] No. 58) and the official document (NAFF [2013] No. 68). The standards are land compensation fee RMB 18,000/mu, and the comprehensive quota compensation for attachments to young crops RMB 22,000/mu. The resettlement subsidy for each person changing from "agricultural to non-agricultural" status is RMB 38,000/person.

8.2.2 Demolishing residences on rural collective land

The compensation standard for demolishing residences on rural collective land is RMB 660/m^2 for reinforced-concrete structure houses, RMB 600/m^2 for brick-concrete structure houses, RMB 390-480/m^2 for masonry-timber structure houses, RMB 330-360/m^2 for cob wall structure houses, and RMB 100-120/m^2 for simple structure houses. There are such two methods of resettlement available as resettlement with money or resettlement with residence. The compensation for the resettlement with money totals RMB 7,200/m^2, according to 30m^2 for each person needing resettlement; those of the resettlement with residence will be given 30m^2 of residing area per person.

8.2.3 Demolishing houses on state-owned land

Demolishing houses on state-owned land shall be in accordance with the *Acquisition and Compensation Methods (Provisional) for Houses on the State-owned Land of Chongqing* (YBF [2011] No. 123). The compensation for both residences and non-residence houses demolished will be based on the property valuation. Each house will be independently evaluated firmly under the principle of "one valuation for one household". The resettlement methods of resettlement with money and resettlement with property right transfer can be chosen freely. In the case of resettlement with money, resettled residents may receive the compensation calculated according to the valuation; in the case of resettlement with property right transfer, after the resettled residents choose their appropriate houses for resettlement under the principle of "first signing contract, first choosing house", the difference between the evaluated price of their original houses and the evaluated price of the house for resettlement will be settled. As for the demolition of businesses and public institutions, they will receive 6% of the evaluated house price as the compensation for their stopped production or business in addition to the compensation for their houses.

8.2.4 Demolishing houses with limited property rights

Houses with limited property rights are rural residences left over by history, constructed on the rural collective land, and not completely in conformity with the construction and sale regulations. The compensation standard for such houses shall be formulated with reference to the *Official Reply of Chongqing Nan'an District People's Government on Approval of the Instructions*

to Dealing with Compensation and Resettlement in Relocation of Houses with Limited Property Rights in Nan'an District (NAFF [2012] No. 105). There are two options as the resettlement with money and the resettlement with house. In the case of resettlement with money, the part within 100m^2 will be compensated according to the standard of RMB 5,000/m^2, and the part exceeding 100m^2 will be compensated according to the construction replacement price; in the case of resettlement with house, the part less than 100m^2 will be compensated a resettlement house with an equal area. The part exceeding 100m^2 will be compensated according to the construction replacement price. Non-residences with limited property rights can only be compensated in the mode of resettlement with money with the same standard as that of the residence. Stores on the first floor can additionally receive RMB 200,000 per room of operating loss subsidies and RMB 30,000 per 15m^2 of store removal loss expenses, based on the monetary compensation for residences.

8.3 Livelihood recovery measures for migrants

8.3.1 Livelihood recovery

All the peasant households whose land has been acquired are nonagricultural population and shall enjoy the resident endowment insurance. At the same time, the project has prepared various occupational skill trainings, job trainings, etc. for those affected people. In addition, free assisting policies will be provided for people with difficulties in finding jobs to help them find appropriate jobs.

8.3.2 Resettlement for rural houses

The relocation households have such two options as the resettlement with money and the resettlement with house. In addition to the house compensation, relocation households may receive relocation awards, residual value subsidies, etc., as well as move subsidies, etc. The resettlement with money will be conducted according to the standard of 30m^2 per relocating person and at the price of RMB 7,200/m^2. The resettlement with house will be conducted according to the standard of 30m^2 per relocating person to provide the resettlement houses.

8.3.3 Resettlement for urban houses

The relocation households have such two options as the resettlement with money and the resettlement with property right transfer. In the case of resettlement with money, resettled residents may receive the compensation calculated according to the valuation; in the case of resettlement with property right transfer, after the resettled residents choose their appropriate houses for resettlement under the principle of "first signing contract, first choosing house", the difference between the evaluated price of their original houses and the evaluated price of the house for resettlement will be settled. As for the resettlement of businesses and public institutions, the affected businesses will receive 6% of the evaluated house price as the compensation for their stopped production or business in addition to the compensation for their houses.

8.3.4 Resettlement for houses with limited property rights

The relocation households have such two options as the resettlement with money and the resettlement with house. In the case of choosing resettlement with money, the part within 100m^2 will be compensated according to the standard of RMB 5,000/m^2, and the part exceeding 100m^2 will be compensated according to the construction replacement price; in the case of resettlement with house, the part less than 100m^2 will be compensated a resettlement house with an equal area. The part exceeding 100m^2 will be compensated according to the construction replacement price. Non-residences with limited property rights can only be compensated in the mode of resettlement with money with the same standard as that of the residence. Stores on the first floor can additionally receive RMB 200,000 per room of operating loss subsidies and RMB 30,000 per 15m^2 of store removal loss expenses, based on the monetary compensation for residences.

The special needs and expectations of the disadvantaged will be concerned and supported. The project office of Nan’an District will supervise the implementation to ensure the disadvantaged get enough compensation, housing arrangements, special funds and basic cost of living allowances, and will provide the support for the recovery of their living conditions and income.

8.4 Organization arrangement

The implementing agencies of this project are Nan’an District Land Acquisition Office and Nan’an District Housing Administration. Such two departments will be respectively responsible for the acquisition of rural collective land, demolition of the houses on rural collective land and demolition of the houses on the state-owned land. Their responsibilities include preparation and coordination in the preliminary report preparation stage, comprehensive migrant resettlement work during the land acquisition, and monitoring and evaluation in the late stage of the project implementation.

9 Public consultation and information disclosure

9.1 Purpose of public consultation and information disclosure

Public consultation and information disclosure are important parts of the project environmental impact assessment. Information disclosure is to inform the stakeholders in the project of the project information without delay, put forward concern on the project impact, or make comments and suggestions on the project. Public consultation is to get public opinions from the area directly impacted by the project, so that the decision making department may timely discover potential problems and promptly modify and improve the design plan to fundamentally address the problems put forward by the public, further perfect and rationalize the process design, environment protection measures and environment monitoring and management of the project, and strive to achieve the optimized unification of the project construction in terms of environmental benefits, social benefits and economic benefits.

The public consultation and information disclosure are designed for organizations and individuals within the scope of the project environment impact, and attach special importance to the needs and appeals of the groups of schools, hospitals, non-governmental organizations, etc.

9.2 Public consultation methods

This Assessment conducts the public consultation activities by the way of symposiums, visits, questionnaire surveys, etc., in accordance with the *Provisional Methods on Public Participation in Environmental Impact Assessment* (HF 2006 No. [28]), the World Bank OP/BP4.01 *Environmental Assessment* and BP17.50 *Information Disclosure*.

9.3 Summary, opinions and feedback of public consultation

The public subscribe to and support the implementation of the project according to the interviews in the project area.

9.4 Information disclosure

This project has been disclosed twice.

9.4.1 First disclosure

From 8 November 2017 to 14 November 2017, our company was disclosing the basic information of the project on the website of CCTEG Chongqing Engineering Co., Ltd. (http://www.cqmsy.com/) for the first time.

The screen shot of such disclosure is as follows:

Figure 9.4-1 Screen shot of the first disclosure of environmental impact assessment information

9.4.2 Second disclosure

From 21 December 2017 to 3 January 2018, our company was disclosing the basic information of the project on the website of CCTEG Chongqing Engineering Co., Ltd. (http://www.cqmsy.com/) for the second time.

The screen shot of such disclosure is as follows:

Figure 9.4-2 Screen shot of the second disclosure of environmental impact assessment

information

9.5 Information disclosure methods

The full text of the Environmental Impact Assessment Report of this project disclosed its complete first draft at the offices of all Nan’an District communities involved in the project for the first time on 25 December 2017; and disclosed at the offices of all communities for the second time after the project symposium and the pubic engagement inquiry.

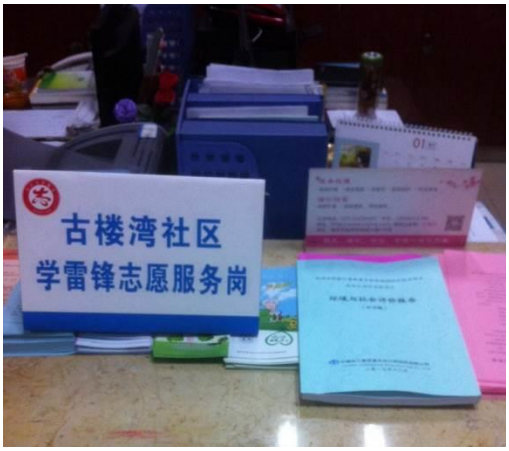


Figure 9.5-1 Photos of full text disclosure site

9.6 Public engagement methods, content and inquiry scope

9.6.1 Public engagement methods and scope

During the public engagement, the project inquired the public opinion by the way of symposiums and questionnaire surveys and directly got written opinions and suggestions on this project from the public.

The pubic inquiry this time mainly covered relevant departments of Nan'an District and the residents of the place where the project is located.

Figure 9.6-1 Project symposium

9.6.2 Public engagement inquiry content

The inquire content mainly includes individuals' attitudes towards the project construction, how the project construction will impact the environment, public suggestions and demands, etc.

9.7 Findings statistics and suggestion feedback

9.7.1 People compositions of public engagement

Our company issued 146 questionnaire forms and actually took 146 forms back, with a retrieve rate of 100%. See Table 9.7-1 for the people composition of public engagement, and see attachments to the Report for their personal information list.

Tbale 9.7-1 Analysis of people compositions of public engagement

Item	Category	Number of people	Percentage (%)
Gender	Male	67	45.9
	Female	79	54.1
Age	50 years old and above	58	39.7
	30 to 49 years old	64	43.8
	Under 30 years of age	23	15.8
Educational level	Junior middle school and primary school	43	29.5
	Senior high school and technical secondary school	39	26.7

Item	Category	Number of people	Percentage (%)
Gender	Male	67	45.9
	Female	79	54.1
	Colleges, junior colleges and above	60	41.1
Profession	Cadre	18	12.3
	Office clerk	35	24.0
	Teacher	0	0
	Worker	17	11.6
	Farmer	2	1.4
	Deputy to the People's Congress	1	0.7
	Others	61	41.8

It can be seen from the foregoing table that among the people of public engagement, the number of males is 67, accounting for 45.9%, and females 79, 54.1%; people under 30 years old accounts for 15.8%, 30 to 49, 43.8% and 50 and the above, 39.7%; most people have the educational level of college, junior college and the above, accounting for 41.1%, then the educational level of junior middle school and primary school, 29.5%, and the least, senior high school and technical secondary school, 26.7%; most people are engaged in professions other than those listed in the table, accounting for 41.8%, then office clerk 24.0%, cadre 12.3%, and worker 11.6%; the people of public engagement have certain representativeness according to the local actual social and environmental conditions.

9.7.2 Statistics of public opinions

See Table 9.7-2 for the findings and statistics of public opinions.

Table 9.7-2 Public engagement findings and statistics

1. Do you know Nan'an District Urban Regeneration Project?
[59, 40.4%] Yes [56, 38.4%] Basically [31, 21.2%] No
2. Are you satisfied with the environmental conditions of the place where you currently live or work?
[68, 46.6%] Yes [59, 40.4%] Relatively satisfied [19, 13.0%] No
3. Do you think the construction of the project will facilitate the economic and social development of the project area?
[121, 82.9%] Yes [0, 0] No [25, 17.1%] Not clear
4. What do you think is the environment concern that will impact you most or you care about most at the construction phase?
[32, 21.9%] Wastewater [34, 23.3%] Exhaust gas [42, 28.8%] Waste residues
[79, 54.1%] Noise [44, 30.1%] Ecological damage
5. What do you think is the environment concern that will impact you most or you care about most at the operational phase?
[37, 25.3%] Wastewater [29, 19.9%] Exhaust gas [41, 28.1%] Waste residues
[68, 46.6%] Noise [53, 36.3%] Ecological damage

6. What is your attitude towards the impact of this project during the construction and operational phases?
[74, 50.7%] Understand [66, 45.2%] Understand, but there must be mitigation measures
[6, 4.1%] I don't care
7. What do you think is the function of the construction of this project for the project area?
[106, 72.6%] To improve regional environment [48, 32.9%] To promote economic development
[42, 28.8%] To improve the standard of living [4, 2.7%] A minor role
8. Provided that environment protection and ecological protection are guaranteed, do you agree the construction of the project?
[120, 82.2%] Agree [0, 0%] Disagree [26, 17.8%] I don't care

Note: Question 4, 5 and 7 may have multiple answers.

The statistics in the table shows that:

① 78.8% of the public questioned have basic knowledge or more of this project.

② 46.6% of those questioned are satisfied with the environmental conditions of the place where they currently live or work, and 40.4% relatively satisfied.

③ 82.9% of those questioned believe the construction of the project will facilitate the economic and social development of the project area, and 17.1% say they are not clear.

④ As for the environmental concerns brought about by the construction of the project during the construction phase, 54.1% of the public questioned show their concern about noise impact, followed by the ecological environment, waste residues, exhaust gas and wastewater, respectively accounting for 30.1%, 28.8%, 23.3% and 21.9% of the investigation samples.

⑤ As for the environmental concerns brought about by the project during the operational phase, 46.6% of the public questioned show their concern about noise impact, followed by the ecological environment, waste residues, wastewater and exhaust gas, respectively accounting for 36.3%, 28.1%, 25.3% and 19.9% of the investigation samples.

⑥ As for the impacts caused by the construction and operational phases of the project, 50.7% of the public questioned think they can understand, 45.2% say they can understand but there must be mitigation measures, and 4.1% don't care.

⑦ As for the function of the construction of the project for the project area, 72.6% of those questioned think it may improve the regional environment, 32.9% believe it may promote the economic development, 28.8% say it may improve the standard of living, and 2.7% believe it will play a minor role.

⑧ 82.2% of those questioned agree the construction of the project, 17.8% don't care, and nobody objects.

9.7.3 Public concerns and solutions

According to the analysis of the statistics of the questionnaire forms of public engagement issued this time, the major public concern is environment polluting problems.

The noise pollution problem concerns the public most, followed by the ecological

environment, waste residues, exhaust gas and wastewater, which the proposed project has taken corresponding actions to address. The construction unit shall strictly take the prevention and control measures proposed in this Environmental Impact Assessment for treatment and mitigate the environment pollution brought about by the construction of the project as far as practicable. The public concerns have been considered in the project design and environment protection measures.

During the disclosure of this project to the public, neither the construction unit nor the assessment unit received any information feedback given in other forms.

9.8 Public engagement research conclusion

It can be seen from the public engagement inquiry process that most of the local people have certain knowledge of the project, and such public engagement will also facilitate the public to know details of the project, raise their awareness of environment protection and right to speak, and protect their own interest. The public questioned agree the construction of the project, and the Environmental Impact Assessment requires the construction unit to strictly take the prevention and control measures proposed in this Environmental Impact Assessment for pollution treatment and mitigate the environment pollution brought about by the production of the project as far as practicable. This Environmental Impact Assessment think as long as appropriate pollution prevention and control measures are taken practically, the local public concerns may be properly addressed and the adverse environmental impacts of the project construction are acceptable to the public.

10 Environmental Management Plan (EMP)

10.1 Purpose

The *Environmental Management Plan* is to implement relevant mitigation measures to the identified environment impacts, and supervise the effectiveness of such measures during the project life cycle. The *Environmental Impact Assessment* based *Environmental Management Plan* is developed in accordance with Chinese laws, regulations and guidelines pertaining to environment, the World Bank safeguards policies and the best practices of similar projects. The *Environmental Management Plan* is designed to guarantee its consistency with the *Environmental Impact Assessment* to reach the standards with regard to environment protection. The *Environmental Management Plan* effectively meets the supervising requirement, and guides the Project Owner to manage the Contractor and subcontractors.

10.1.1 Environment management organizations

The implementation of this *Environmental Management Plan* requires the engagement of multiple organizations and departments; each organization plays a different but important role to guarantee the effective environment management for the project.

Such two groups of organizations will be involved in the environment management process: as one group of organizations to be responsible for organizing or implementing the *Environmental Management Plan*, and the other group to enforce standards, laws and regulations pertaining to the project, and supervise the implementation of the *Environmental Management Plan* and the overall environmental performance. See Figure 10.1-1 for the project environment management and supervisory organization frame diagram.

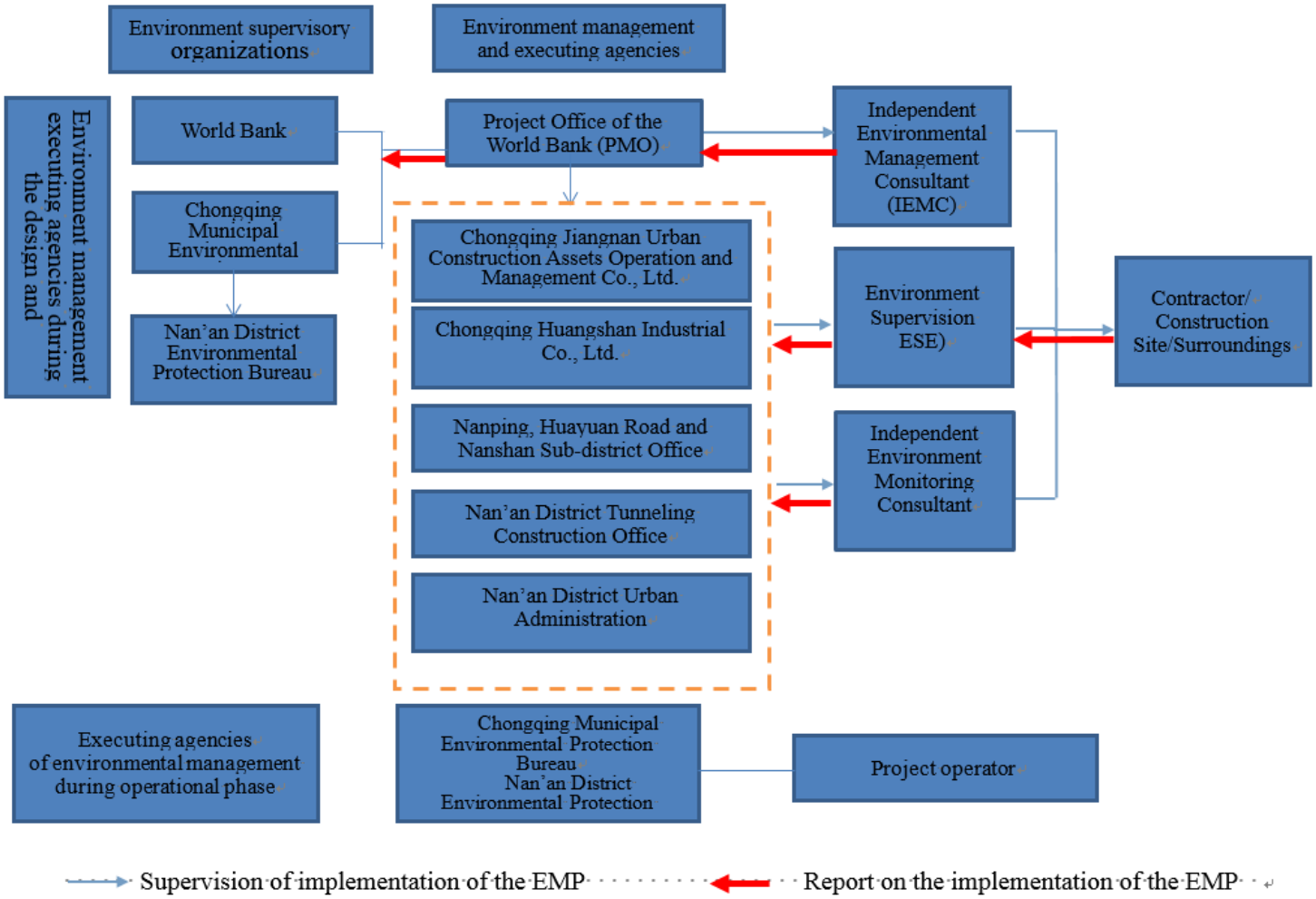


Figure 10.1-1 Environmental management and supervisory organization

10.1.2 Environment management responsibilities

See Table 10.1-1 for key environment management responsibilities of each environment management organization.

Table 10.1-1 Environmental supervision and management responsibility list

SN	Organization/unit	Responsibilities
	Project Office of the World Bank	Responsible for all the environment management work of the project, including effective implementation of mitigation measures, supervision and monitoring, budget security and report to the World Bank and the local environment bureau; Ensure that measures in the Environmental Management Plan have been included in the bidding documents and the construction contract; Supervise the construction unit to implement the pollution control measures, and timely report any violations to the construction unit; Guarantee that the supervised content of the environmental protection agency is included in the bidding documents and the contract concluded with the Supervision Engineer, supervise and participate in the supervision of the project; Entrust the environment monitoring organization with environment monitoring during the construction phase, and cooperate in the environment monitoring during the construction phase. Organize environmental trainings for the Contractor and the Environment Supervision Engineer.
	Nan’an District Environmental Protection Bureau	Nan’an District Environmental Protection Bureau is responsible for the environmental management and supervision within the development area. Implementation of the monitoring and supervision over environment protection on behalf of Chongqing Municipal Environmental Protection Bureau during the construction and operational phases. Investigate and address the resident disturbance complaints during the construction and operational phases. Guarantee the “three simultaneous”. Guarantee the normal operation of environment protection facilities.
	Chongqing Jiangnan Urban Construction Assets Operation and Management Co., Ltd. Chongqing Huangshan Industrial Co., Ltd. Nanping, Huayuan Road	The Project Owner is going to implement the World Bank funded infrastructure construction, including procurement, construction management, implementation of safeguards policies and compliance, monitoring and reporting, etc.

SN	Organization/unit	Responsibilities
	and Nanshan Sub-district Office	
	Nan'an District Tunneling Construction Office	
	Nan'an District Urban Administration	
	Project operator	Operation of environment protection facilities, environment management and other activities during the operational phase of the project.
	Environment Supervision Engineer (ESE)	Review and assess whether the construction design meets the requirement of the environmental impact assessment and the Environmental Management Plan, and in particular review and assess the site environmental management and the required measures used to mitigate impacts; Supervise the site environmental management of the Contractor and provide accurate guidance; Review the Contractor's implementation of the Environmental Management Plan, and verify and confirm the environment supervisory process, parameters, monitoring locations, equipment and results; Report the implementation of the Environmental Management Plan; Examine and approve invoices or expenditures according to the implementation of the Environmental Management Plan.
	Contractor	Develop detailed Contractor Environment Protection Plan which shall be a component of the construction contract. Report new environmental issues or any cultural relics discovered during the construction phase to the Supervision Engineer. Conduct ongoing public consultation during the construction.
	Independent Environmental Management Consultant (IEMC)	Project Office of the World Bank (PMO) will employ the IEMC independent from the Environment Supervision Engineer and the Contractor. The IEMC's task is to assess the implementation of the *Environmental Management Plan* during the project construction phase, advise the Project Owner on management and finally guarantee that the project conforms with the requirements of the *Environmental Management Plan*.
	Environment Quality Monitoring Consultant (EQMC)	The Environment Quality Monitoring Consultant refers to the professional monitoring organization to implement environment quality monitoring in accordance with the Environment Monitoring Plan contained in the Environmental Impact Assessment Report. The Project Owner will employ the

SN	Organization/unit	Responsibilities
		Environment Quality Monitoring Consultant to implement the monitoring plan.

10.2 Environmental mitigation measures

Based on the analysis in *Environmental Impact Assessment*, following chapters summarize some outstanding environmental impact and mitigation measures. Table 10.2-1, 10.2-2 and 10.2-3 list main activities and phases, confirmed potential environmental impact and typical mitigation measures, as well as implementation and monitoring responsibilities.

These mitigation measures are in conformity with waste collection and transportation requirements in relevant national laws, regulations, guidelines, rules, World Bank's policies, the *General Guideline for* Environment, *Health and Safety*, the *Guideline for Water and Sanitary Environment, Health and Safety*, the *Guideline for Environment, Health and Safety of Waste Management Facilities*; so as to solve various impacts during the design, construction and operational phase.

10.2.1 Environmental protection measures and suggestions during the design phase

Table 10.2-1 List of environmental impacts and mitigation measures during the design phase

Links and factors	Potential impacts/issues	Mitigation measures	Implementor	Supervisor	Monitoring indicators	Monitoringfrequency
Land acquisition and resettlement of affected residents	Potential impacts on original residents in Nan'an District	Prepare resettlement plan according to national policies and World Bank policies	Chongqing Jiangnan Urban Construction Assets Operation and Management Co., Ltd., Nan'an District Tunneling Construction Office,	The World Bank Project Management Office (PMO), Nan'an District Development and Reform Commission	Action plan for resettlement of affected residents approved by World Bank	Before assessment
Acoustic environment	Impacts on construction workers	Due to a pretty large noise produced during the construction of building works and road works, reasonable noise isolation and reduction measures shall be taken during the project design to mitigate the impact of construction noise on the field construction workers.	Environmental assessment consultant	World Bank PMO, Nan'an District Environmental Protection Bureau	Environmental impact assessment approved by World Bank and Nan'an District Environmental Protection Bureau	Before assessment
	Impact of traffic noise on the life of residents in sensitive sites along the road	It's suggested that the planning department should make reasonable layout of functional areas and not to add sensitive sites in the standard distance.				

Atmospheric environment	Impacts of dust from transportation on surrounding residents	Raw materials shall be purchased locally.	Environmental assessment consultant	World Bank PMO, Nan'an District Environmental Protection Bureau	Environmental impact assessment approved by World Bank and Nan'an District Environmental Protection Bureau	Before assessment
Ecological environment	Impacts of water and soil loss	The new road and community regeneration design should further optimize and adjust the route, try to balance the excavation and filling of earth and stone, and reduce the quantities of the excavation and filling of earth and stone, the surface vegetation damage, and new soil erosion.	Environmental assessment consultant	World Bank PMO, Nan'an District Environmental Protection Bureau	Environmental impact assessment approved by World Bank and Nan'an District Environmental Protection Bureau	Before assessment
	Impacts of land occupation	The project design shall comprehensively consider the surrounding environment and shall further refine the permanent land occupation design to use land reasonably.				
	Impacts of landscape	Road greening works and main works shall be designed synchronously. On the premise of meeting the regional planning requirement, the route of roads shall maintain the natural landscape and harmonize with the surrounding environment as much as possible. To reduce the damage to existing ecological environment, implement greening ecological construction project synchronously during the project design.				

10.2.2 Environmental protection measures and suggestions during the construction phase

Table 10.2-2 List of environmental impacts and mitigation measures during the construction phase

Links and	Potential	Mitigation measures	Implementation	Monitoring	Monitoring	Monitoring

factors	impacts/issues		responsibilities	responsibilities	indicators	frequency
Society environment	Cultural relics protection	① In the protection scope of cultural relics protection unit, no construction or blasting, drilling, excavation, etc. shall be carried out. ②Training and awareness raising to contractors must be carried out before and during the construction; ③Enhance construction supervision near those historical sites to avoid careless construction practices;④In the construction process, as per relevant cultural relics regulations, if underground cultural relics sites are discovered, the construction organization shall properly protect the site, notify cultural relics management department for rescue and treatment and ensure safe and smooth construction of cultural relics sites.	Contractor	Environmental supervision engineer, independent environmental consultant	Publicity and training provided; Record of randomly discovered cultural relics	Daily
Ecological environment	All projects	(1) Yielding measures This project mainly considers the possible impact of the construction of slow walking systems and the public space on the ecological environment. The construction should reduce the occupation of ground facilities, and the places with dense vegetation should be avoided at the selection of the construction road, the construction camp, etc. (2) Mitigation measures ① Before the construction, the mellow soil of the topsoil layer in the area of the acquired land should be stripped, piled up at fixed points and covered with waterproof membrane. After the completion of the construction, the mellow soil may be used as the surface covering soil to recover the construction slash. ② The disturbance to the surrounding ecological environment can be minimized by appropriately arranging the construction site, trying to confine the construction activities to the area of the acquired and occupied land for construction, and transplanting large and tall trees within the area of the occupied land before construction. ③ The inevitable water and soil loss caused by the construction can be minimized by appropriate design of the construction during the	Contractor	Environmental supervision engineer, independent environmental consultant	Filed supervision by the environmental supervision engineer; Specifications are followed;	Daily

		construction phase and excavation and filling by phases and areas. ④ Combined with the construction plan in an organized way, to build facilities of grit chambers, drainage ditches, retaining walls, etc. in advance. In order to ensure the stability of the temporary stacking and prevent the water and soil loss during construction, the necessary fences and covers shall be made for the temporary stacking, and at the same time, drainage ditches will be built in the direction where the water comes. During the construction in the rainy season, woven bags and plastic cloth may be used to cover the slope side of the excavated exposed soil and so on to reduce the earth surface erosion caused by the rainwater. ⑤ It is strictly forbidden to dump waste soil and slags into or clean construction equipment by the natural water bodies. ⑥ Raise the awareness of protection of the construction personnel. The construction method and time should be planned well to reduce the disturbance of the construction noise to the wild animals. Management should be strengthened to avoid direct discharge of sanitary sewage and construction wastewater, so as to reduce water pollution and maximize the protection of animal habitats. (3) Recovery measures ① After the completion of the construction, the temporarily occupied land should be recovered in time, and the appropriate collocation of trees, shrubs, flowers and grass should be strengthened. ② The tall trees transplanted during the construction phase can be used for afforestation upon the conclusion of the construction. ③ Upon the conclusion of the construction, the bare areas along both sides of the road should be afforested, grass sowing by spraying for soil slopes, and spraying organic matrix for stone slopes. (4) Water and soil conservation measures In accordance with the stipulations of the Law of the People's Republic				

		of China on Water and Soil Conservation, the Regulations for the Implementation of the Law of the People's Republic of China on Water and Soil Conservation, etc., the possible water and soil loss caused by the construction of this project must be protected. The principles and objectives of the water and soil loss control shall meet the general requirements of the state on soil and water conservation and environmental protection. The design of soil and water conservation should be synchronized with engineering design, construction and acceptance. The project construction unit shall bear the cost of controlling the water and soil loss caused by the construction.				
Acoustic environment	Impacts of noise during the construction phase	(1) High-noise construction sites shall be located in areas far away from the environmental sensitive sites; (2) The organization of the construction can be well designed by appropriate layout of construction machines and proper arrangement of the construction intensity. Try to place construction machines far away from surrounding sensitive sites, appropriately position high-noise machines on the construction site, and erect fences around the construction site; temporary machine rooms should be arranged for strong-noise machines on the site like air compressors and diesel engines. (3) Choose low-noise equipment that meets national standards, strengthen the maintenance of such equipment, and avoid the high noise pollution caused by the abnormal working of such equipment; (4) In accordance with the Emission standard of environment noise for boundary of construction site (GB12523－2011), the construction time shall be appropriately arranged and the construction machines with strong noise are forbidden to work near residential areas at night (22:00 to 6:00); where under special circumstances it is necessary to conduct continual construction, the prior approval of relevant departments must be obtained and the prior communication with residents shall be	Contractor	Environmental supervision engineer, independent environmental consultant	Filed supervision by the environmental supervision engineer; Specifications are followed;	Monthly

		conducted; (5) Night construction operations which may emit noise pollution other than urgent repair and emergent rescue shall be prohibited at the area with dense noise sensitive buildings within 15 days before and during the college entrance examination and the senior high school entrance examination, and the construction operations which may produce environmental noise pollution shall be prohibited within the area of 100m around the examination rooms during the college entrance examination and the senior high school entrance examination; (6) The passing time of the construction vehicles should be coordinated during the construction phase. With busy existing traffic, the construction unit, the construction party and the traffic administration shall strengthen their communication and coordination to avoid traffic jams. During the transportation at night, measures of slowing down and no honking will be taken. Strengthen the maintenance of construction machines; (7) Some existing roads within the project area will be used to transport construction materials, earth and stone during project construction, and attention should be paid to the appropriate arrangement of the construction material transportation time. When vehicles pass the road sections of residential areas and schools, measures of slowing down and no honking should be taken. (9) Minimize the environmental noise hazard caused by the construction by optimizing the construction plan and appropriately arranging the construction period; at the construction bidding, the measures to reduce the environmental noise pollution shall be listed in the construction organization design and defined in the contract. (10) Operators and construction personnel on site should control working hours and take self-protection measures as per the Occupational Health Standard, for example, wearing earplugs, helmet,				

		etc. (11) The supervision unit shall supervise the noise during the construction phase, be equipped with a certain amount of simple noise measuring instruments and monitor the residential areas near the construction site to ensure that they will not be impacted by the noise exceeding the standard.				
Atmospheric environment	All projects	(1) The construction unit shall, in accordance with the technical specifications for the prevention and control of dust pollution, formulate the prevention and control plan for dust pollution in combination with the actual situation of a specific project, and report to the municipal administrative department and the administrative department responsible for supervision and management of the dust pollution of this project respectively for recording three working days before the commencement of the project; (2) Promoting the wet operation during the construction, erecting the watering for dust prevention supporting devices on the construction site, and strengthening the watering for dust prevention. The entrance and exit for transport vehicles should be properly arranged on the construction site, the tires of the vehicles out of the construction site must be washed for soil at the exit, and the wastewater from such washing should be treated by establishing sedimentation tanks. (3) Building hard enclosed fences before the construction of the road section involving sensitive sites, which shall be not lower than 1.8m. (4) The enclosures of not lower than the height of the stacked materials shall be erected for such materials easy to rise or scatter as cement, mortar and plaster stacked in the open air or the construction wastes which cannot be cleared and transported within 48h, which shall also be covered; it is forbidden to throw construction wastes or materials easy to rise or scatter from a places higher than 3m; bulk materials (cement, river sand, etc.) shall be enclosed (covered or sheltered) for	Contractor	Environmental supervision engineer, independent environmental consultant	Filed supervision by the environmental supervision engineer; Specifications are followed;	Random sampling during peak construction period

		transportation. (5) The sites that may be idle for more than 3 months should be covered, simply paved or afforested; after the completion of the project, the construction waste shall be removed within 10 days from the date of application for acceptance of the project completion; (6) The construction site should be equipped with the watering cart for watering in dry weather on the construction site, and focus on the communities and sub-districts affected by the project construction; (7) Use commercial concrete, and the construction site shall not be equipped with large concrete mixing stations which are not necessary for the process. Modified asphalt concrete shall be used for road surface, and the construction progress shall be accelerated at paving. The construction machines and plant shall be regularly maintained to keep them in good condition, and reduce the exhaust gas and pollutant emission from construction equipment. (8) Construction personnel use the liquefied gas (LPG) as their living fuel.				
Surface water environment	All projects	(1) Sanitary sewage from constructors The sanitary sewage produced by the constructors is strictly forbidden to be discharged directly into the natural water body. The river beach should be avoided at construction site selection (for example, the beach under Dafosi Bridge). If it is impossible to connect with the existing municipal sewage pipe network, the sewage should be regularly sucked by the fecal suction truck to the sewage treatment plant for treatment after being collected and pretreated by the biochemical pool; if the municipal sewage pipe network can be connected, the sewage shall be discharged to the municipal sewage pipe network after being collected and pretreated by the biochemical pool. It is suggested that the construction unit should try to rent the local residences when constructing the construction camp. If it is indeed	Contractor	Environmental supervision engineer, independent environmental consultant	Filed supervision by the environmental supervision engineer; Specifications are followed;	/

		necessary to construct temporary construction residences, the construction camp should be arranged within the permanently acquired land. (2) Construction wastewater The wastewater produced by the project is mainly the concrete curing wastewater in the supporting road construction, the wastewater from washing the transportation vehicle tires, the oily wastewater produced by the maintenance of the construction machines, etc. The construction wastewater will be reused or used for reducing dust in the construction site and roads after the treatment of the oil separation and grit chamber erected in the construction site, without being discharged outside. (3) Management measures The environmental protection education as to the construction site and the construction camp should be carried out for the construction personnel to make them understand the importance of water resources protection. Reasonable construction procedures should be developed for efficient organization of construction operations, and the construction management and engineering supervision should be strengthened. Construction machines must be strictly inspected to prevent oil leakage polluting water body. Construction materials such as oil and chemicals should not be piled near the surface water body, and the canvas should be prepared as temporary shelter. During the construction, the plastic film or non-woven fabrics should be applied to cover the excavation and filling slopes without protective measures, topsoil stockpiling location, stockpiling yard and the like, and measures like woven soil bags as fence and intercepting ditches should be taken around the topsoil stockpiling location and the stockpiling yard. Scientific, reasonable, efficient and strict construction management will help to reduce the impact of construction phase on the surrounding surface water environment.				

		(4) Others ① The principles of "water for multiple usages, recycling and water saving" shall be implemented in the process of construction, and efforts should be made to reduce the discharge of wastewater. ② The management of construction machines should be strengthened to prevent moving, false use, dripping and leaking of the machines.				
Solid waste	All projects	Solid wastes during the construction phase shall be treated under the principles of "gathering together, separate treatment and recycling". Waste slags will be directly transported to surrounding legal slag disposal fields (for example, Nan'an District Yinglong Slag Disposal Field, Nan'an District Changsheng Refuse Landfill, isolating green belt land reclamation spoil ground, etc.). Transport vehicles for waste earth and stone are prohibited from over-speed and overload; at the same time, fences and covering measures will be taken to prevent the waste slags from falling on the road to intensify the impact of the rising dust. The project plans to take measures of collection at fixed points and regular clearing and transportation for the municipal solid wastes during the construction phase. At the construction camp, the management of municipal solid waste sorting will be adopted. Special people will be employed to regularly clear up the waste which will be delivered to the nearby refuse treatment station for treatment, and shall be prevented from scattering on the way to the station. At the same time, special attention should be paid to the maintenance and management of the temporary dump sites, and prevention of the wastes from scattering everywhere caused by stacking wastes randomly, and at the same time, spray germicides and pesticides to the stacking point to reduce the breeding of mosquitoes and germs.	Contractor	Environmental supervision engineer, independent environmental consultant	Filed supervision by the environmental supervision engineer; Specifications are followed;	Daily

10.2.3 Environmental protection measures and suggestions during the operational phase

Table 10.2-3 List of environmental impacts and mitigation measures during the operational phase

Links and factors	Potential impacts/issues	Mitigation measures	Implementation responsibilities	Monitoring responsibilities	Monitoring indicators	Monitoring frequency
Surface water environment	All projects	The wastewater during the operational phase is mainly the sanitary sewage produced by urban residents at the public space, which will be discharged into the municipal sewage pipe network. The management of the drainage facilities of the project road should be strengthened, with regular inspection and maintenance maintained, and waring signs of "slow down and safe driving" are erected along the road.	World Bank PMO, the Owner	Nan'an District Environmental Protection Bureau	Specifications are followed;	/
Atmospheric environment	All projects	(1) Afforestation: the construction of green belts of the project should be improved. The points, lines and planes should be integrated and trees, shrubs, flowers and grasses should be appropriately matched. The function of absorption of the vegetation should be used to mitigate the impact of the exhaust gas on the two sides of the project. (2) Reducing road damage: the specifications and load of vehicles on the road shall comply with relevant regulations. The dust prevention measures should be taken for damaged road surface in time which should be repaired within a month. (3) The vehicle exhaust emission inspection system will be implemented and the vehicles with their emitted exhaust gas exceeding standard will be controlled for being on road. (4) The public toilet management should be strengthened. Public toilets should be timely cleaned and kept sanitary and ventilated. Afforestation should be made around public toilets to reduce the escape of the bad smell. (5) Biochemical pools should be equipped with exhaust funnels to lead the bad smell above the ground for emission, with the emission height of 1m, in the form of shutter type, and surrounded by enclosed green space.	World Bank PMO, the Owner	Nan'an District Environmental Protection Bureau	Specifications are followed; Environmental monitoring plan prepared	Quarterly
Acoustic environment	Link road	(1) Traffic management measures ① The road should be maintained regularly to improve the	World Bank PMO, the Owner	Nan'an District Environmental	Specifications are followed;	Quarterly

Links and factors	Potential impacts/issues	Mitigation measures	Implementation responsibilities	Monitoring responsibilities	Monitoring indicators	Monitoring frequency
		pavement smoothness and reduce the road traffic noise. ② Strengthen the management and maintenance of vegetation in green belts. In case of unrecoverable dry and dead plants, additional planting should be made timely to guarantee the noise reduction effect of the isolation bet. (2) Engineering measures ① Plant protective forest belts of trees along both sides of the road, reserve special noise monitoring and treatment funds, and strengthen monitoring during the operational phase. If the noise of the operational phase disturbs people, the residences and schools affected by excessive noise should be additionally equipped with sound insulation windows which can reduce noise by 15 to 20dB (A) and thus the impact of the traffic noise of the operational phase on residents and schools can be reduced greatly. ② The areas at two sides of part road sections of the road project of this project have been planned to be residential land and commercial & residential land. The Assessment requires that the installation conditions of noise barriers along both sides of such sections should be reserved so as to determine whether noise barriers should be erected according to the actual impacts when new buildings are planned along both sides of the road. ③ All the road surfaces of the road sections in Nan'an District are made of porous asphalt pavement, to further reduce the impacted scope of traffic noise.		Protection Bureau	Environmental monitoring plan prepared	

10.3 Environmental monitoring plan

10.3.1 Purpose and principle of formulation

The purpose of formulating environmental monitoring plan is to supervise implementation of various measures; properly adjust environmental protection action plan as per the monitoring results and provide a basis for implementation time and scheme of environmental protection measures. The principle of formulating the plan is the estimated main environmental impacts possibly generated in each phases (construction phase or operational phase).

10.3.2 Monitoring organization

The environment monitoring during the construction phase and operational phase shall be conducted by national environment quality supervision and certification organization that has complete equipment, strong technical strength and properly completes environment monitoring task undertaken.

10.3.3 Environment monitoring plan

As per characteristics of the Project and all construction and operational phases, Table 10.3-1 lists monitoring plan during the project construction and operational phases.

Table 10.3-1 Implementation of environment monitoring plan during the construction and operational phases

Category	Item	Monitoring plans by phases	
		Construction phase	**Operational phase**
Acoustic environment	**Monitoring location**	The operation site with a large amount of operating equipment, especially in the area near the main sensitive areas.	International New City (Guoji Xincheng) of Sunshine 100 (Yangguang 100), Yangguang Lvzhou, Danzishi New Street, Dormitory Building of No. 11 Middle School, Teaching Building of Longmenhao Primary School, R&F Modern Plaza, Xingxin Jiayuan, Shangxin Shanshui, Shenghuiyuan, etc.
	Monitoring factors	Equivalent continuous sound level (L_{Aeq})	Equivalent continuous sound level (L_{Aeq})
	Monitoring frequency	Once/Month	Once/Quarter
Air quality	**Monitoring location**	The operation site with a large amount of operating equipment, sensitive areas or non-paved road or open space near sensitive environment.	Nanping Regular Monitoring Point Chongwen Road
	Monitoring factors	PM_{10}	NO_2, CO, PM_{10}

Category	Item	Monitoring plans by phases	
		Construction phase	**Operational phase**
	Monitoring frequency	To perform random sampling during the peak construction period	1 day per quarter
Surface water environmental	Monitoring location	500m downstream of the Dafo Temple Bridge of Yangtze River	/
	Monitoring factors	SS , petroleum, pH, BOD_5, COD	/
	Monitoring frequency	Once/Month	/

10.3.4 Environment monitoring report

(1) Environment monitoring report during the construction phase

The construction phase of project is about 5 years and different phases shall be built as per project content. As per Chinese environment management regulations and business policy requirements of World Bank, the Owner shall prepare Environment Monitoring Report and submit it to World Bank and Nan'an District Environmental Protection Bureau. The purpose of the report is to make environmental protection department confirm that all environmental protection measures are implemented as per relevant requirements of approved environment monitoring plan so as to control adverse environmental impact in the project plan.

Environmental monitoring report shall include:

① Brief description of project schedule;

② Setting and responsibilities of environment management organizations;

③ Main construction content and methods, environmental impacts and mitigation measures and implementation condition of measures;

④ Environment monitoring report;

⑤ Public complaints and solutions.

According to construction management provisions, the Contractor and ESE shall submit the periodic environmental report to the Owner during the construction phase.

(2) Environment monitoring report during the operational phase

After the proposed project is put into operation, as per the monitoring plan, World Bank Loan Project Office shall entrust environment monitoring station with qualification to perform environment monitoring. Meanwhile, the annual environmental monitoring report is prepared, and its contents include: The establishment of the environmental management organization, operation status of the project, the implementation of environmental prevention measures as required by the Environmental Protection Bureau, environmental monitoring (date, frequency, locations, methods,

applicable standards, etc.), statistical analysis results of monitoring data and necessary follow-ups. The prepared environment monitoring report shall be submitted to Nan'an District Environmental Protection Bureau and World Bank.

10.4 Training and ability construction

10.4.1 Environmental protection technology and skill training

(1) In-service training for environmental management personnel

The purpose of in-service training for environmental management personnel is to enhance environment management during the construction phase and operational phase, ensure quality of environmental monitoring and practical and effective environmental management, so as to improve the whole project quality. After participating in position training, environmental management personnel can tell apart main environmental issues during the construction phase, and have a better understanding of existing problems and deficiencies on environmental management, and report to the engineering environmental protection office (department) in time in order to take necessary prevention and control measures as soon as possible. During the construction phase, the project management organization shall invite environmental protection experts or environmental management personnel with similar management experience to explain possible environmental issues and solutions.

(2) Training for construction responsible personnel and construction workers

Before the construction, for the bid winner, the systematic environmental professional knowledge training shall be organized for the responsible personnel and construction workers responsible for construction in order to avoid environmental damages due to misoperation during construction. For contract responsible personnel, the purpose of training is to define the environmental protection responsibilities of the Contractor; for construction workers, the purpose is to ensure the proper construction operation during the construction phase in order to avoid some construction behaviors having unnecessary adverse impacts on the environment. The training is helpful for the project responsible personnel to understand their obligations in environmental protection needed to be assumed and possible consequences of the environmental damage. The construction workers will have a better understanding of the protection level and methods for environmental sensitive areas. Based on the actual situation of the Project, the training for construction workers shall last one week.

(3) During the operational phase of Project, the project management organization shall regularly hold environmental protection knowledge training to facilitate the staff to identify possible environment issues of respective posts and take necessary measures. Each person shall hold the idea of environmental protection.

10.4.2 Training modes and training expenses

Table 10.4-1 Environmental protection training program

SN	Training objects	Training content	Organizer	Number of trainees	Training and study time	Venue	Budget (RMB 10 thousand)
1	Staff of project office and project environmental protection office (department)	Knowledge of environmental protection management	Construction unit	2 persons	15 days	Chongqing	0.6
2	Staff of project office and project environmental protection office (department)	Visit similar domestic project sites so as to learn the mature environmental management experience.	Construction unit	2 persons	5 days	/	0.2
3	Staff of project office and project environmental protection office (department)	Acquire comprehensive knowledge in environmental protection and management and understand the contents of environmental impact report of the Project.	Construction unit	2 persons	15 days	Chongqing	0.3
4	Site responsible personnel from the supervision organization and environmental supervisor of the project	Knowledge of environmental supervision, content of environmental impact report of the Project and corresponding environmental protection design documents of the Project.	Construction unit and supervision organization	1 person	15 days	Chongqing	0.3
6	Main technical leaders and construction responsible personnel of the Contractor	Knowledge in environmental protection and environment management	Construction unit and Contractor	3 persons	15 days	Chongqing	0.9
7	Construction workers	Knowledge in environmental protection of the Project	Construction unit and Contractor	150 persons	5 days	Chongqing	7.5
Total				/	/	/	9.8

10.5 Environmental protection investment

Budget has been made for implementing Environmental Management Plan during the

construction and operational phases, as shown in Table 10.5-1. Total budget of environmental investment covers environmental mitigation measures, environmental protection monitoring and management and main works, as well as mitigation and elimination of negative impacts on environment. Notes that many mitigation measures are management practices, and the budget is included in the whole contract and may not be indicated specifically.

The environmental protection investment estimate of the Project is totally RMB 8.5 million and the total investment of the Project is RMB 1,942,460,000, so the environmental protection investment occupies 0.44% of total investment. See the table below for the environmental protection project and investment estimate of the Project:

Table 10.5-1 List of environmental protection investment

SN	Phase	Environmental factors	Pollution sources	Environmental protection measures	Environmental protection investment (RMB 10 thousand)
1	Construction phase	Sewage and wastewater	Flushing wastewater	Set the oil separation and sand settlement pond, and recycle wastewater after treatment rather than discharging out.	50
2			Domestic sewage	Try to rent local houses. If it is necessary to establish construction camp, then set a biochemical pool for collection pretreatment. For the construction camp with conditions, sewage can be directly connected with municipal sewage pipe network; and for the construction camp without conditions, sewage shall be regularly extracted to the sewage treatment plant for treatment by a fecal truck.	30
3		Atmospheric pollutants	Dust	Enhance management, promote wet method operation, set baffle, materials storage yard fence and cover it along the construction site; prohibit throwing materials from high places	60
4		Noise	Noise	Select low-noise equipment; reasonably arrange construction	30

				schedule, avoid night construction; reasonably arrange construction machinery and equipment on the site; and set a fence	
5		Solid waste	Spoil, domestic garbage	Transport spoil to specified slag disposal pit; collect domestic garbages at fixed points and regularly clean and transport it	40
6		Ecological environment	Ecological environment	Arrange construction activities within the construction land scope; before construction, strip surface in the land scope and use it as greening soil after construction.	40
7			Water and soil conservation	Excavated materials shall be transported for backfilling; set retaining wall, drainage ditch, ecological protection slope, intercepting drain and sand settlement pond and plant trees and grass	Included in investment for main project
8	Operational phase	Air pollutant	Dust, off-gas	Enhance detection and repairing of motor vehicle, prohibit passage of vehicle with off-gas exceeding standard, maintain road conditions and use plants to purify air	20
9		Noise	Noise	Build asphalt pavement, plant trees and grass, limit speed in residential area and school road sections, set honking prohibition signs, set acoustic screen, reserve noise monitoring and allocate special fund for governance	500
10		Risk prevention measure	/	Speed limit and formulation of emergency plan	/
11	Environmental management	/	Environmental monitoring during the construction phase, environmental management maintenance during the operational phase, etc.		80
12	Total				850

Note: the investment is only the environmental assessment estimate, and the actual investment depends on project estimation.

11 Environmental assessment conclusions

11.1 Project overview

The **project development objective** is to improve use of public space and increase pedestrian mobility in select districts of Chongqing's *Central City.*

Urban Regeneration Interventions in Nan'an District (US$ 147.20 million, IBRD Loan US$ 72.25 million). Support of investments in (a) regeneration of 10 neighborhoods (i.e. Dongxinglu, Jinzijie, Yangguang, Xiangshuilu, JInshanlu, Jinyan, Gulouwan, Nanhu, Huangjiaya, and Zhenwushan) of 29 Streets in connection with 16,133 households in 268 buildings of build-up area 1,208,500 m2 on 529 hectares of land in Nanping, Huayuanlu, and Nanshan Street Communities Neighborhoods; (b) improvement of District-Wide Pedestrian Walkway Networks of 29 pedestrian routines of total length and width of 88.32 km and 3m respectively, rehabilitation of Mountain Walkway Networks of 16 pedestrian routines of total length of 42.31 km; and upgrading of 3 road connections (i.e. Huanglonglu of 769 m, Huguilu of 1,403m and Tushanlu of 647 m); and (c) greening improvement of Nanhu Neighborhood, Guohuishan, Houbao, Nanping, Huigonglu and under theDafoqiaoBridge public spaces and parks totaled 32.17 hectares of land area.

11.2 Compliance analysis of relevant policies and planning relating to the project

As per *Catalogue for Guiding Industry Restructuring (2011 Version)* (as amended), "XXII, City Infrastructure": 4. City road and smart traffic system construction, 9. City water supply and drainage pipe network project, water supply source and water purification plant" belongs to encouragement type; "XXXVII, Other Service Industries: urban-rural community infrastructure service facilities and comprehensive service network construction" belongs to encouragement type.

The Project meets requirements of *Outline for the 13th Five-year Plan of National Economic and Social* Development *in Chongqing, Notice of Chongqing Municipal People's Government Office on Printing and Distributing Ecological Protection Red Line Delineation Scheme of Chongqing* (YFBF [2016] No. 230), *Administrative Measures for Forest Park, Administrative Measures for National Forest Park, Administrative Measures for Forest Park in Chongqing, Ordinance for Scenic Spots and Ordinance for Scenic Spots in Chongqing.*

11.3 Current status of environmental functional areas and environment quality of the project

11.3.1 Division of environmental functions

Surface water: Yangtze River section water function in Nan'an District is Category-III water area and implements Category-III water quality standard.

Ambient air: Mingyue Mountain Tree Farm, Nanshan National Forest Park, Liangfengya Municipal Forest Park and Nanshan-Nanquan Municipal Scenic Area (for the areas under the administration of Nan'an District) in Nan'an District shall be the Category-I areas and shall be in accordance with the Class-I standard in the *Ambient Air Quality Standards* (GB 3095-2012); the

towns and rural areas under Nan'an District shall be Category-II areas and shall be in accordance with the Class -II standard in the *Ambient Air Quality Standards* (GB 3095-2012).

Acoustic environment: the acoustic environment of project area is Category 1, 2 and 4a (noise level of Category1 in daytime is 55dB; 45dB at night; noise level of Category 2 in daytime is 60dB; 50dB at night; noise level of Category 4a in daytime is 70dB and 55dB at night).

11.3.2 Present condition of environment quality

(1) Surface water

The environmental assessment adopts routine monitoring data of surface water environment of Yangtze River Cuntan Section and Yuzui Section for analysis; and the water quality of monitoring section meets standard, and water quality is generally good.

(2) Ambient air

2 site monitoring points (respectively at Nanhu Park and No. 135 of Chongwen Road) are set for this assessment. Meanwhile, use atmospheric data of Area A, Panlong Huayuan Phase I and Nan'an District Nanping regular monitoring points (Chongqing Technology and Business University) for analysis. All monitoring factors of 3 monitoring points like Nanhu Park, Area A of Panlong Huayuan (Phase I) and Nanping regular monitoring points meet Class-II standard of *Ambient Air Quality Standard* (GB3095-2012) and ambient air quality in the region is good; although No. 135 Chongwen Road is located in Nanshan-Nanquan Scenic Area and implements Class-I standard; it's located in the urban built-up area, adjacent to highway and obviously influenced by social activities and traffic transportation. PM10 exceeds Class-I standard and the maximum exceeding standard rate is 62%.

(3) Acoustic environment

Totally 19 noise monitoring points are set for this assessment. The noise level at daytime and night of Z1-Z19 monitoring points meet relevant standards of *Acoustical Environment Quality Standard* (GB3096-2008) and acoustic environment quality is good.

11.4 Summary of natural environment and investigation of environment sensitive target

Nan'an District is located in the paralleled ridge-valley of East Sichuan where anticlines and synclines are distributed in parallel. From east to west, there is the Mingyuexia anticline, the Guangfusi syncline, and the Tongluoxia anticline. The anticline develops into mountains and the syncline into valleys. Therefore the combined geomorphic features of low mountains, hills, flat lands and rivers are formed here. Low mountains with an average elevation of 500m are mainly distributed in Nanshan Sub-district and Guangyang Town. Hills with an average elevation between 200m to 500m are mainly distributed in 7 towns, Nanping, Tushan, Jiguanshi, Xiakou, Changshengqiao, Yinglong and Guangyang, and 7 sub-districts along the river. From top to bottom, the exposed strata in the area are the Q4ml and the J2s sandstone and sandy mudstone in

underlying bedrock. The rock layers exposed in the survey area are composed of sandstones - mudstones with different thicknesses of positive sedimentary rhythm layers. They are mainly yellow-gray and gray fine-grained arkoses of medium-thick and thick layer, and purple-red and dark-purple sandy mudstones. The exposed strata are the Q4ml and the J2s sedimentary layer from top to bottom. The seismic basic intensity is less than 6; the ground motion peak acceleration is 0.05g and the characteristic period is 0.25s. Nan'an District is located in the Yangtze River Valley in the southern Sichuan Basin with the subtropical monsoon climate. It is rich in heat and rainfall and has a long frost-free period with less ice and snow, wind and sunshine, but of high humidity due to its cloudy and foggy weather. Spring always arrives early here, summer lasts for a long period, autumn passes quickly and winter is comparatively warm, which are quite distinctive. The annual average temperature is 18.3℃ and the annual average rainfall is about 1,082.6mm. Surface water resources are mainly the transit water brought by rivers and streams. The accumulative annual average amount of transit water is 344.75 billion m^3, of which the transit water of the Yangtze River accounts for most of it, and three small rivers with annual water amount of 40.48 million m^3 contribute less than the Yangtze River but more than other surface runoff waters in the area.

The assessment scope involves important ecological sensitive areas lie Nanshan National Forest Park, Liangfengya Municipal Forest Park and Nanshan-Nanquan Municipal Scenic Area (the part under jurisdiction of Nan'an District. As per field investigation, residential buildings, offices, schools and other buildings are distributed near the Project. Atmospheric and acoustic environmental protection target in 200m of project shall be confirmed.

11.5 Environmental impact and pollution prevention measures

11.5.1 Water environment impact and pollution prevention measures

(1) Construction phase

The sanitary sewage produced by the constructors is strictly forbidden to be discharged directly into the natural water body. The river beach should be avoided at construction site selection (for example, the beach under Dafosi Bridge). If it is impossible to connect with the existing municipal sewage pipe network, the sewage should be regularly sucked by the fecal suction truck to the sewage treatment plant for treatment after being collected and pretreated by the biochemical pool; if the municipal sewage pipe network can be connected, the sewage shall be discharged to the municipal sewage pipe network after being collected and pretreated by the biochemical pool.

An oil separation and settlement pond shall be set at construction site for collecting construction sewage. Construction sewage can be recycled after oil separation settlement or used for waster splashing and dust suppression in the construction site and road.

The environmental protection education as to the construction site and the construction camp should be carried out for the construction personnel to make them understand the importance of

water resources protection. Reasonable construction procedures should be developed for efficient organization of construction operations, and the construction management and engineering supervision should be strengthened. Construction machines must be strictly inspected to prevent oil leakage polluting water body. Construction materials such as oil and chemicals should not be piled near the surface water body, and the canvas should be prepared as temporary shelter. During the construction, the plastic film or non-woven fabrics should be applied to cover the excavation and filling slopes without protective measures, topsoil stockpiling location, stockpiling yard and the like, and measures like woven soil bags as fence and intercepting ditches should be taken around the topsoil stockpiling location and the stockpiling yard.

(2) Operational phase

During the operational phase, sewage is mainly from domestic sewage generated in public spaces by city residents and will be discharged to municipal pipe network. The management of the drainage facilities of the project road should be strengthened, with regular inspection and maintenance maintained, and warning signs of "slow down and safe driving" are erected along the road.

11.5.2 Ambient air impact and pollution prevention measures

(1) Construction phase

During the construction phase of the project, the impact on ambient air is mainly reflected in the earthwork excavation, backfilling, materials transportation and mixing, asphalt pavement, etc. Regularly spray water at construction site, cover tarpaulin on vehicle with road materials; keep the stockyard away from residential areas, set a fence; use commodity concrete and use liquidized gas as fuel to alleviate impact degree.

(2) Operational phase

During the operational phase, exhaust off-gas emissions and dust of vehicle passing by may cause certain impact. The ambient air quality of the project area is good. The project adopts bituminous concrete pavement which can hinder dust of road to some extent. After enhancing road cleaning, the impact of dust on environment is reduced.

11.5.3 Noise impact and pollution prevention measures

(1) Construction phase

Noise during the construction phase is mainly from construction machinery and transportation vehicle. The environmental assessment requirements in the construction process: ① High-noise construction places shall be arranged away from environment sensitive points; construction machinery shall be reasonably arranged; construction strength shall be reasonably arranged; construction organization design shall be properly made; high-noise construction machinery shall be away from surrounding sensitive areas; temporary machine rooms shall be set up and fences shall be set up around the construction site. ② Select low-noise equipment meeting

national standards and enhance maintenance of equipment; ③ Reasonably arrange construction time; prohibit night construction of high-noise construction machinery; for continuous construction in special conditions, be sure to obtain approval from relevant departments in advance and communicate with residents in advance; ④ Except repairing and emergency rescue operation; prohibit night construction emitting noise pollution in noise sensitive building areas 15 days before and during college entrance examination and entrance examination for secondary school; and prohibit construction generating environmental noise pollution in 100m of examination room during college entrance examination and entrance examination for secondary school; ⑤ During the construction phase, properly coordinate passage time of construction vehicle; the development organization, construction organization and traffic control department shall enhance communication and coordination to avoid traffic jam. Take slow-down measures and prohibit honking for transportation at night. Enhance maintenance of construction machinery; ⑥ Reasonably arrange transportation time of construction materials. Slow down and prohibit honking when passing by nearby residential areas and schools; ⑦ Construction workers and field construction workers shall perform self-protection in the working time as per labour hygiene standard; such as wearing earplug and helmet; ⑧ The supervision organization shall properly perform noise supervision during the construction phase, configure certain number of simple noise measuring instruments to monitor nearby residential areas of construction site so as to protect it from influence of noise exceeding standard.

(2) Operational phase

As per noise prediction results, after reconstruction of Longhuang Highway, the predicted noise value at 30m at daytime in near, middle and long term can meet Category 2 standard of *Acoustical Environment Quality Standard* (GB3096-2008); the predicted noise value at 30m at night in near term can meet Category 2 standard and that of middle and long term respectively exceeds 1.0dB(A) and 2.4dB(A). After the construction of Hugui Road is completed, the predicted noise value at the place of 30m away in both daytime and night hours in the near term, middle term and long term can meet the standard of Category 2 in the *Environmental Quality Standard for Noise*. As per noise prediction results, after reconstruction of Tushan Branch Road, the predicted noise value at 30m at daytime in near, middle and long term can meet Category 2 standard of *Acoustical Environment Quality Standard* (GB3096-2008); the predicted noise value at 30m at night in near term can meet Category 2 standard and that of middle and long term respectively exceeds 1.4dB(A) and 3.1dB(A).

Without taking any measure, in different prediction years, with the increase of traffic flow, the night noise impact of road operation on sensitive objects is gradually increasing. Within the range of 30m along two sides of Longhuang Highway, the noise values of the acoustic environment sensitive objects in daytime hours in the short term, middle term and long term can meet the standard of Category 4a in the *Environmental Quality Standard for Noise*, and the maximum standard exceeding volume at night in the middle term is 0.2dB(A), in the long term,

2.7dB(A). Outside the range of 30m, the noise values in daytime hours in the short term, middle term and long term can meet the standard of Category 2 in the *Environmental Quality Standard for Noise*, and the maximum standard exceeding volumes of the noise values in night hours are respectively 0.6dB(A), 1.1dB(A) and 1.8dB(A). The noise values of the acoustic environment sensitive objects along the two sides of Hugui Road in both daytime and night hours in the short term, middle term and long term are able to reach relevant standards in the *Environmental Quality Standard for Noise*. Within the range of 30m along two sides of Tushan Branch Road, the noise values of the acoustic environment sensitive objects in daytime hours in the short term, middle term and long term can meet the standard of Category 4a in the *Environmental Quality Standard for Noise*, and the maximum standard exceeding volume at night in the middle term is 1.6dB(A), in the long term, 3.1dB(A). Outside the range of 30m, the maximum standard exceeding volumes of the noise values in daytime hours in the short term, middle term and long term are respectively 8.2dB(A), 9.8dB(A) and 11.5dB(A), in night hours are respectively 11.6dB(A), 13.2dB(A) and 14.9dB(A).

This Environmental Impact Assessment suggests that the project should plant protective green belts along both sides of the road, which may reduce the traffic noise by 3 to 5dB(A). When the land along the two sides of the road is developed, the first row of the buildings near the road should be designed for those with low noise standards, such as commercial, industrial and trading, public places, etc. as barriers. The plane structure of the buildings near streets should be designed as the u-shaped structure against the road. It should be avoided that the bedroom faces the road. The non-residing rooms of kitchens, toilets, and the like should be arranged to face the road. Special noise monitoring and treatment funds should be reserved, and the monitoring should be strengthened during the operational phase. If the noise of the operational phase disturbs people, the residences and schools affected by excessive noise should be additionally equipped with sound insulation windows which can reduce noise by 15 to 20dB(A) and thus the impact of the traffic noise of the operational phase on residents and schools can be reduced greatly. After measures are taken, the acoustic environment along both sides of the road can meet the corresponding acoustic environmental quality standards, and the impact of the road traffic noise on residential areas can be reduced to the acceptable range.

11.5.4 Solid waste impact and pollution prevention measures

The total excavation of the Project is about 249,200m^3, the filling is about 38,000m^3, the surface cleaning is about 20,400m^3, old road destruction is 9,900m^3 and spoil is 224,600m^3, without borrowed soil. Waste slags will be directly transported to surrounding legal slag disposal fields (for example, Nan’an District Yinglong Slag Disposal Field, Nan’an District Changsheng Refuse Landfill, isolating green belt land reclamation spoil ground, etc.). Domestic waste shall be collected at fixed points and transported to nearby garbage disposal sites for disposal.

11.6 Ecological environment impact and protection measures

(1) Yielding measures

The Project mainly considers city greenland construction like road and park and reduces occupation of ground facilities by project construction. Construction access road and construction camp along the construction route shall avoid dense vegetation.

(2) Mitigation measures

Before the construction, the mellow soil of the topsoil layer in the area of the acquired land should be stripped, piled up at fixed points and covered with waterproof membrane. After the completion of the construction, the mellow soil may be used as the surface covering soil to recover the construction slash.

The disturbance to the surrounding ecological environment can be minimized by appropriately arranging the construction site, trying to confine the construction activities to the area of the acquired and occupied land for construction, and transplanting large and tall trees within the area of the occupied land before construction.

The inevitable water and soil loss caused by the construction can be minimized by appropriate design of the construction during the construction phase and excavation and filling by phases and areas.

Combined with the construction plan in an organized way, to build facilities of grit chambers, drainage ditches, retaining walls, etc. in advance. In order to ensure the stability of the temporary stacking and prevent the water and soil loss during construction, the necessary fences and covers shall be made for the temporary stacking, and at the same time, drainage ditches will be built in the direction where the water comes. During the construction in the rainy season, woven bags and plastic cloth may be used to cover the slope side of the excavated exposed soil and so on to reduce the earth surface erosion caused by the rainwater.

It is strictly forbidden to dump waste soil and slags into or clean construction equipment by the natural water bodies.

Raise the awareness of protection of the construction personnel. The construction method and time should be planned well to reduce the disturbance of the construction noise to the wild animals. Management should be strengthened to avoid direct discharge of sanitary sewage and construction wastewater, so as to reduce water pollution and maximize the protection of animal habitats.

(3) Recovery measures

① After the completion of the construction, the temporarily occupied land should be recovered in time, and the appropriate collocation of trees, shrubs, flowers and grass should be strengthened.

② The tall trees transplanted during the construction phase can be used for afforestation upon the conclusion of the construction.

③ Upon the conclusion of the construction, the bare areas along both sides of the road should be afforested, grass sowing by spraying for soil slopes, and spraying organic matrix for stone slopes.

(4) Water and soil conservation

In accordance with the stipulations of the *Law of the People's Republic of China on Water and Soil Conservation*, the *Regulations for the Implementation of the Law of the People's Republic of China on Water and* Soil *Conservation*, etc., the possible water and soil loss caused by the construction of this project must be protected. The principles and objectives of the water and soil loss control shall meet the general requirements of the state on soil and water conservation and environmental protection. The design of soil and water conservation should be synchronized with engineering design, construction and acceptance. The project construction unit shall bear the cost of controlling the water and soil loss caused by the construction.

11.7 Public participation

The public participation and publicity of the Project adopts online publicity and field publicity. Carry out seminar on the publicity basis, visit and investigate individuals who are directly affected by the Project and care the project construction and the respondents support the project construction.

11.8 Comprehensive conclusion

China: Chongqing New Urbanization Pilot and Demonstration Project Nan'an District Urban Regeneration Project meets the national industrial policy, environmental protection policies and relevant planning. The construction phase and operational phase of the Project may cause certain impact on environment. After taking strict ecological environment protection measures and pollution prevention measures, the adverse impact on environment is effectively controlled and alleviated; pollutant emitted can meet standard, the environmental impact is limited; therefore, from environmental protection aspect, the assessment regards that the construction is feasible.

11.9 Suggestions

(1) Enhance implementation of environmental protection measures and strictly implement "three synchronizations" system.

(2) Improve environment awareness and enhance environmental management.

(3) Enhance management of greenbelt in the project area and ensure survival rate of trees.

(4) Ensure allocation of environmental protection fund and ensure construction of environmental protection facilities.

Attachment

Statistical table for the public participating in the investigation

Name	Gender	Age	Educational level	Working organization	Tel.
Liu Zhongzhong	Female		Junior high school	Residents of Zhenwushan Community	13350338543
Xiao Dexin	Male		Junior high school	No. 13, Chongwen Road	18725804090
Li Taizhi	Female		Junior high school	No. 22, Chongwen Road	15123184716
Wang Xiaolan	Female		Primary school	No. 13, Chongwen Road	86365619
Bai Peide	Male	68	Junior high school		18725796560
Xia Xunbing	Female	64	Primary school		13368250572
Hu Dingying	Female	67	Junior high school		13594024966
Shan Manhong	Female	66	Junior high school		18996159024
Liu Shouyun	Male	67	Junior high school		15123944422
Huang Hefu	Male	67	Junior high school		13228607905
Wu Junjun	Male	30		Nanshan Sub-district Office	62466550
Yang Yu	Male	28	Junior college	Nanshan Sub-district Office	18223014946
Tan Xi	Female	34		Nanshan Sub-district	62462003
Ruan Wuping	Male	38	University	Sub-district Office of Nanshan, Nan’an District	62467193
Huang Zhongmei	Male	49	Junior college	Nanshan Sub-district	62467804
Ren Yujia	Female	23	University		
He Xiaoyun	Female	24	University		
Huang Xiaokou	Male	47	Undergraduate	Nanshan Sub-district Ecological Office	62466550
Pang Xiaoxuan	Female	42	Senior high school	Nanshan Sub-district	62467804
Wu Jiasheng	Male	54			62467804
Hu Xing	Female	33	Technical secondary school		
Huang Niya	Female	41	Senior high school	None	13996420551
Wang Li	Female	25	Junior high school	None	
Wu Hong	Female	40	Senior high school	Huangmei Town Community	15025306936
Zhao Yaxin	Female	27	Undergraduate		19923700577
Tan Yongfu	Male	54	Senior high school	None	13883964509
Huang Changsheng	Male	61	Junior high school	None	13527474710
Xie Gangya	Female	49	Senior high school		13618346685
Xie Huan	Female	36	Senior high school	Freelancer	13368259102

Name	Gender	Age	Educational level	Working organization	Tel.
Hu Xingwen	Male	60	Junior high school	Retiree	18983843767
Lei Yu	Male	41	Junior college	Nan'an District Traffic Commission	13996320975
Ma Rongfeng	Male	46	Undergraduate	Nan'an District Bureau of Statistics	62948455
Tang Haoqiang	Male	47	Correspondence undergraduate	Nan'an District Bureau of Tourism Development	13618259198
Xu Yao	Female	36	Undergraduate (on-the-job)	Nan'an District Housing Requisition Center	62986073
Luo Qingqing	Female	30	Junior college	Nan'an District Branch of Land and Resources Bureau	
Tan Yanni	Female	26	Undergraduate	Nan'an District Commission of Urban-Rural Development	62988228
Chuan Jie	Male	26	Undergraduate	Entity in Nanping Street	15310800411
Li Guangjun	Female	27	Undergraduate	Entity	151235187911
Li Shewu	Female	35	Undergraduate	Yangguang Community	18908377411
Pang Shu	Male	33	Junior college	Entity	13667687865
Ren Lijuan	Female	28	Junior College	Entity	13985922214
Deng Ping	Male	61	Senior high school	Unemployed	15213468624
Yang Tao	Male	30	Undergraduate	Entity	13985978016
Guang Tianzhi	Female	53	Primary school	Unemployed	15023711843
Wu Yuchu	Female	18	Senior high school		
Li Xiaoying	Female	42	Junior college	Yangguang Community	13983365036
Liu Xiaojuan	Female	30	Undergraduate	Nan’an District Environmental Protection Bureau	13996029743
Gu Gaorong	Male	65	Junior high school	Nan'an District Economic Commission	13983685492
Liu Ting	Female	41	Senior high school	Unemployed	18523586454
Li Cui	Female	31	Junior college	None	15310936227
Zhu Qintai	Female	65	Technical secondary school	Retiree	13308373197
Liu Hongqiong	Female	40	Junior college	Unemployed	62830260
Zhao Dashou	Male	76	Junior college	Retiree	15310238573
Liu Xianping	Male	63	Junior high school	Retiree	
Dong Jianhe	Male	65	Senior high school	Chongqing Fixed Assets Management Co., Ltd.	13452489721
Hu Zujin	Male	59	Primary school	Flexible employee	13648322819
Zhou	Male	45	Technical		15023608488

Name	Gender	Age	Educational level	Working organization	Tel.
Yuanchun			secondary school		
Cao Jiyou	Male	55	Senior high school		15823344950
Zhang Qiufen	Female	60	Primary school	Entity	
He Quan	Male	47	Junior high school	East Road Lane 3	
Yang Bo	Male	37	Senior high school	Entity	
Yuan Qingmao	Female	41	Senior high school	Entity	
Li Shiju	Female	57	Junior high school	1-7-3, No. 35, Xiangshui Road	13452329372
Luo Mao	Female	60	Senior high school	1-6-2, No. 34, Xiangshui Road	13452878002
Liu Jinhua	Male	41	Senior high school	2-2-1, No. 34, Xiangshui Road	13608346256
Xiong Zhoujia	Male	73	Junior high school	3-7-4, No. 37, Xiangshui Road	18983972191
Yang Songshu	Male	77	Primary school	1-6-3	13983123630
Liu Yu	Male	30	Senior high school		13983817685
Wu Jinpo	Male	30	Senior high school		
Li Wei	Male	48	Junior college		13274021005
Wang Xu	Male	26	Junior college		15826159731
Huang Fang	Female	33	Junior college		18523585164
Dai Lili	Female	32	Junior college		17783374839
Li Wenbing	Male	51	Senior high school		
Liao Yuanyu	Female	24	Undergraduate		18502348337
Qin Xiaoping	Female	26	Undergraduate	North	13658291001
Huang Li	Female	46	Senior high school	None	18580755020
Chen Yulan	Female	60	Senior high school	Retiree	13752877288
Lei Zhiying	Female	73	Senior high school	Retiree	13500321863
Wang Shaoying	Female	64	Junior high school	Retiree	13608346712
Gao Xiaomu	Female	60	Junior high school	Retiree	
Chen Daifang	Female	62	Junior high school	Yuzhong Clutch Factory	13360681823
Jiang Zhibi	Female	65	Junior high school	Hongyan Textile Factory	13996201498
Sun Shilin	Male	43	Junior college	Nanping Sub-district	18996065669
Gu Qiying	Female	40	Junior college	Huanyu Communication Co., Ltd.	13629740261
Wang Min	Female	30		Freelancer	
Xiang Jing	Female	38	Junior college		13896058029
Luo Ya	Female	24	Undergraduate	Nan'an District Agriculture Commission	15823060313

Name	Gender	Age	Educational level	Working organization	Tel.
Peng Liyong	Male	43	University	Nan'an District Urban Council	62988713
Zeng Zun	Female	28	Undergraduate	Nan'an District Bureau of Urban Planning	62605133
Chen Mei	Female	30	Undergraduate	Nan'an District Culture Commission	15723037693
Zhao Zezheng	Male	24	Undergraduate	Nan'an District Culture Commission	13883955896
Xiong Yi	Female	28	Undergraduate	Nan'an District Culture Commission	13996292386
Shen Yuan	Female	28	Undergraduate	Nan'an District Cultural Center	13883531624
Wu Liujuan	Female	30	Postgraduate	Nan'an Library	18580606386
Zhang Ya	Female	26	University	Nan'an District Cultural Relics Management Office	15823913014
Lou Shuang	Female	34	Undergraduate	Nan'an District Arts Center	13594003201
Chen Jiang	Male	28	University	Jiangzhinan Film Co., Ltd.	17723974821
Zhang Kaifeng	Male	64	University	Shangxin Street Theater	18696699585
Xia Yong	Male	39	University	Nan'an District cultural market administrative law enforcement team	18184007675
Jiang Sanfeng	Male	28	Senior high school	Power Construction Corporation	15696418233
Li Guanxiang	Male	58	Senior high school	Power Construction Corporation	13628319447
Xie Xiang	Female	52	Undergraduate	Power Construction Corporation	13708363102
Ynang Yunzhong	Male	49	Junior high school	Power Construction Corporation	18896027629
Liu Bo	Male	36	Junior high school	Chongqing Power Construction Company	18375653424
Pang Kaiying	Female	49	Junior college	Chongqing Power Construction Company	13896255217
Liu Qin	Female	44	Junior college	Chongqing Power Construction Company	13983813328
Luo Guochao	Male	45	Junior college	Chongqing Power Construction Company	15111898001
Liu Simin	Female	55	Junior high school	Power Construction Corporation	13883314513
Tang Shunqian	Male	47	Junior high school	Power Construction Corporation	13637855026
Tu Xiangling	Female	30	Junior college	Huayuan Road Sub-district	18623078594

Name	Gender	Age	Educational level	Working organization	Tel.
Zhou Longmei	Female	43	Senior high school	Huayuan Road Sub-district	88307913
Mou Zuojuan	Female	33	Undergraduate	Huayuan Road Sub-district, Nan'an District	13658388033
Hu Hu	Male	31	Undergraduate	Huayuan Road Sub-district	18996155322
Zheng Hongzhi	Male	43	Undergraduate	Huayuan Road Sub-district Office	86115383
Yang Ling	Female	27	Undergraduate	Huayuan Road Sub-district Office	13883649583
He Shihui	Female	70	Technical secondary school	Retiree	18223336120
Xu Guoshe	Male	76	Junior high school	CETC 3	15902351401
He Bijuan	Female	76	Senior high school	Retiree	13368001379
Zhang Xiaoti	Male	67	Technical secondary school	Chongqing Shipping (Group) Co., Ltd.	13399885303
Chen Lai	Female	33	Senior high school	Freelancer	18680718920
Liu Yan	Male	44	Undergraduate	None	15723151580
Chen Gang	Male	47	Senior high school	None	15213051481
Yang Jianmei	Female	43	Junior high school	Sanitation worker	18725873160
Ren Tingcai	Male	28	Junior college		18166582097
Tan Mingling	Female	66	Technical secondary school	Air Compressor Factory	15123157593
Huang Chenhuai	Female	83		Retiree	1511877836
Liu Jianguo	Male	57	Junior high school	Retiree	18423469039
Chen Liangrong	Female	55	Senior high school	Retiree	62834701
Xing Wenlong	Male	73	Junior high school		15998984818
Tang Xianwei	Male	74	Primary school		62927637
Fan Liangshe	Male	60	Senior high school	Retiree	
Yao Yuanli	Female	55	Senior high school	Retiree	15683075939
Jiang Yuexiu	Female	65	Primary school	Retiree	
Tang Hongling	Female	30	Junior high school		18223052313
Hou Bi	Female	48	Primary school	None	13752882679
Chen Tao	Male	36	Junior college	Freelancer	13650555120
Yang Yong	Male	42	Junior college	Freelancer	18983972627
Huang Guangfu	Male	76	Junior high school	24th street retired staff	13883202117
Wang Li	Male	59	Lower primary school	Chongqing Piano Plant	13452048691

Name	Gender	Age	Educational level	Working organization	Tel.
Zhang Kaigui	Male	63	Technical secondary school	Chongqing Scientific Education and Cultural Products Co., Ltd.	18908351373
Yang Biping	Female	60	Senior high school	Retiree	18184780132
Li Hongyi	Female	73	Junior high school	Chongqing Clock & Watch Industrial Co., Ltd.	62828208
Zhong Yi	Female	35	Junior college	Nan'an District Xinhua Bookstore	13308369295
Feng Shifeng	Female	55	Senior high school	Retiree	15902366076
Zhu Heling	Female	50	Junior high school	Entity	13637777135
Wang Xuefu	Male	65	Primary school	Retiree	15823351948
Chen Botao	Male	68	Junior high school		13370707725